Merck KGaA
Darmstadt, Germany

Annual Report 2017

DISCLAIMER

1668

Excerpt from the "Pharmacy Privilege" issued by the ruling court to the company founder FRIEDRICH JACOB MERCK:

"[He shall run the pharmacy] ensuring that it is properly stocked with good, freshly prepared medicinal products at all times so as to cure ailments and prevent ill health."

2018

STEFAN OSCHMANN
Chairman of the Executive Board and CEO of Merck KGaA, Darmstadt, Germany

"Scientific curiosity has been a major driver of our success for 350 years. It has enabled us to pioneer new technologies. And now we are helping to shape the digital revolution."

SIMON CLARK
is a PhD student in climate physics at the University of Exeter. His YouTube videos also mainly address topics in physics.

"Things only improve if there are people who have crazy ideas and try out something new."

Do we drive fresh ideas?

Find the answer on page 10.

SAMUEL CUNHA
is a Brazilian parasitologist who shares his passion for biology with numerous followers on YouTube.

"To stay passionate, we always have to think of the future, of the potential result of our work."

What do we think of this principle?

Find the answer on page 11.

EVA AMSEN
is a biochemist, writer and science communicator based in London.

"For scientists it is important to exchange ideas not only with their colleagues, but also with people from totally different fields – for example, with artists."

Do we practice interdisciplinary exchange?

Find the answer on page 13.

INÉS DAWSON
is a biologist, a PhD student at Oxford and a popular YouTube blogger.

"Research and creativity should go hand in hand, as not all problems have a clear solution."

Do we promote creativity?

Find the answer on page 14.

JAKOB FUTORJANSKI
is co-founder and CEO of NeuroNation, a Berlin-based start-up specialized in developing solutions for scientific mind mapping.

"Only if we know why we are doing something, can we master the great challenges of our time."

Does Jakob's motto also apply at our company?

Find the answer on page 12.

SIMONE STREY
is a graduate geographer and CEO of Peat, a start-up that is developing software solutions to make sustainable pest control in agriculture easier. The young company is working with our Innovation Center in Darmstadt.

"Handling our natural resources responsibly is becoming increasingly important."

Do we act responsibly?

Find the answer on page 15.

ALWAYS CURIOUS

IMAGINE

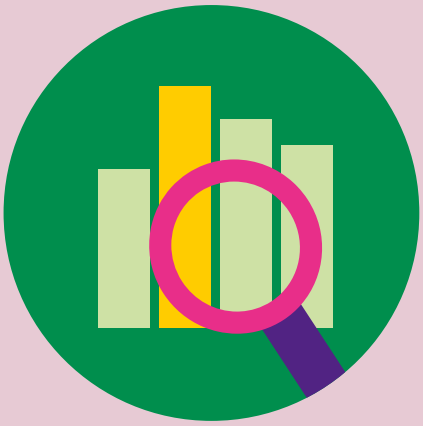
THE NEXT 350 YEARS

What does the future that we're helping to shape look like? Our magazine delivers the answers and celebrates the innovative strength that we have been demonstrating for 350 years.

Highlights of 2017

January 11

We build portfolio in DNA damage response (DDR)
We enter into a licensing agreement with Vertex Pharmaceuticals for four promising R&D DDR programs. The addition of the DDR portfolio in-licensed from Vertex to our own in-house DDR platform has positioned us as one of the key players in the DDR field.



January 12

Big Data partnership with Palantir
We want to use the advanced data analytics capabilities of the U.S. company Palantir to more rapidly develop and deliver medicines and commercialize new products. This could also play a part in the development of entirely new therapeutic options for patients in the future. Initially, we will use Palantir's technology in cancer treatment and patient services. Later on it can be used in other areas of the company.

March 23

FDA grants accelerated approval of Bavencio® in rare and aggressive form of skin cancer
The U.S. Food and Drug Administration (FDA) grants the first approval of an oncology treatment for metastatic Merkel cell carcinoma.

May 9

Bavencio® receives accelerated approval in the United States for bladder cancer
Less than two months later, the FDA grants the next approval for Bavencio® – for the treatment of patients with advanced or metastatic urothelial cancer.

Highlights of 2017

July 21

New Performance Materials application laboratory in Shanghai
We open an applications laboratory in China through which we provide comprehensive, customized services for our quality products. This also effectively allows us to seek and foster creative collaboration with customers for new applications and formulations.

August 3

Patent for CRISPR technology
The European Patent Office grants us the patent for our CRISPR technology used in a genomic integration method for eukaryotic cells. We were awarded similar patents by the Australian, Canadian and Singapore patent offices over the course of 2017.

August 25

European Commission gives the green light for Mavenclad®
Mavenclad® (cladribine tablets) is approved for MS patients in the EU, and is the first oral short-course treatment for highly active relapsing multiple sclerosis.

August 31

We light up Seoul
At the first Seoul Biennale of Architecture and Urbanism, together with our collaboration partners OLEDWorks, OPVIUS and Kolon, we present a new textile façade concept combining OPV (organic photovoltaics) and OLED (organic light-emitting diode) technologies.

September 1

We divest Biosimilars business
The closing of the Biosimilars sale to Fresenius announced on September 1 is in line with our strategy to focus our Healthcare business sector on the pipeline of innovative medicines in oncology, immuno-oncology and immunology. We receive an upfront payment of € 156 million and are entitled to milestone payments of up to € 500 million, plus royalties on future product sales.

September 5

We examine strategic options for Consumer Health

We are currently preparing strategic options for Consumer Health. These include both a full or partial sale of the business as well as strategic partnerships. We are thus focusing on our innovation-driven Biopharma pipeline and are initiating the next stage of the successful further development of the Consumer Health business.

September 12

Debut at the International Motor Show (IAA) in Frankfurt

We exhibit at Europe's most important motor show with our own stand for the first time. Our presentation centers on high-tech materials for lighting, antennas, displays and surfaces.

September 21

EU approval of Bavencio® in Merkel cell carcinoma

The European Commission approves our oncology medicine Bavencio® in this rare and aggressive form of skin cancer.

October 23

New Life Science Center in Burlington, Massachusetts

We open a new Life Science Center in Burlington, north of Boston, to strengthen our presence in this key global science region. The new facility serves as a regional hub for scientific advances and customer collaboration. The Greater Boston area is a hotbed of life science innovation.

November 30

Liquid crystal window modules facility in the Netherlands

We open our new production facility for liquid crystal window modules in Veldhoven, a town near Eindhoven. With an investment of around € 15 million, we are continuing to build on our expertise as the market and technology leader in liquid crystals for displays by moving into other applications beyond televisions, laptops, smartphones, and tablet PCs.

Key figures for 2017

GROUP

Key figures

€ million	2017	2016	Change € million	Change in %
Net sales	15,327	15,024	303	2.0%
Operating result (EBIT)[1]	2,525	2,481	44	1.8%
Margin (% of net sales)[1]	16.5%	16.5%		
EBITDA[1]	4,282	4,415	–133	–3.0%
Margin (% of net sales)[1]	27.9%	29.4%		
EBITDA pre[1]	4,414	4,490	–76	–1.7%
Margin (% of net sales)[1]	28.8%	29.9%		
Profit after tax	2,610	1,633	977	59.9%
Earnings per share (€)	5.98	3.75	2.23	59.5%
Earnings per share pre (€)[1]	6.16	6.21	–0.05	–0.8%
Business free cash flow[1]	3,318	3,318	–	–

[1] Not defined by International Financial Reporting Standards (IFRS).

GROUP

Net sales

€ million

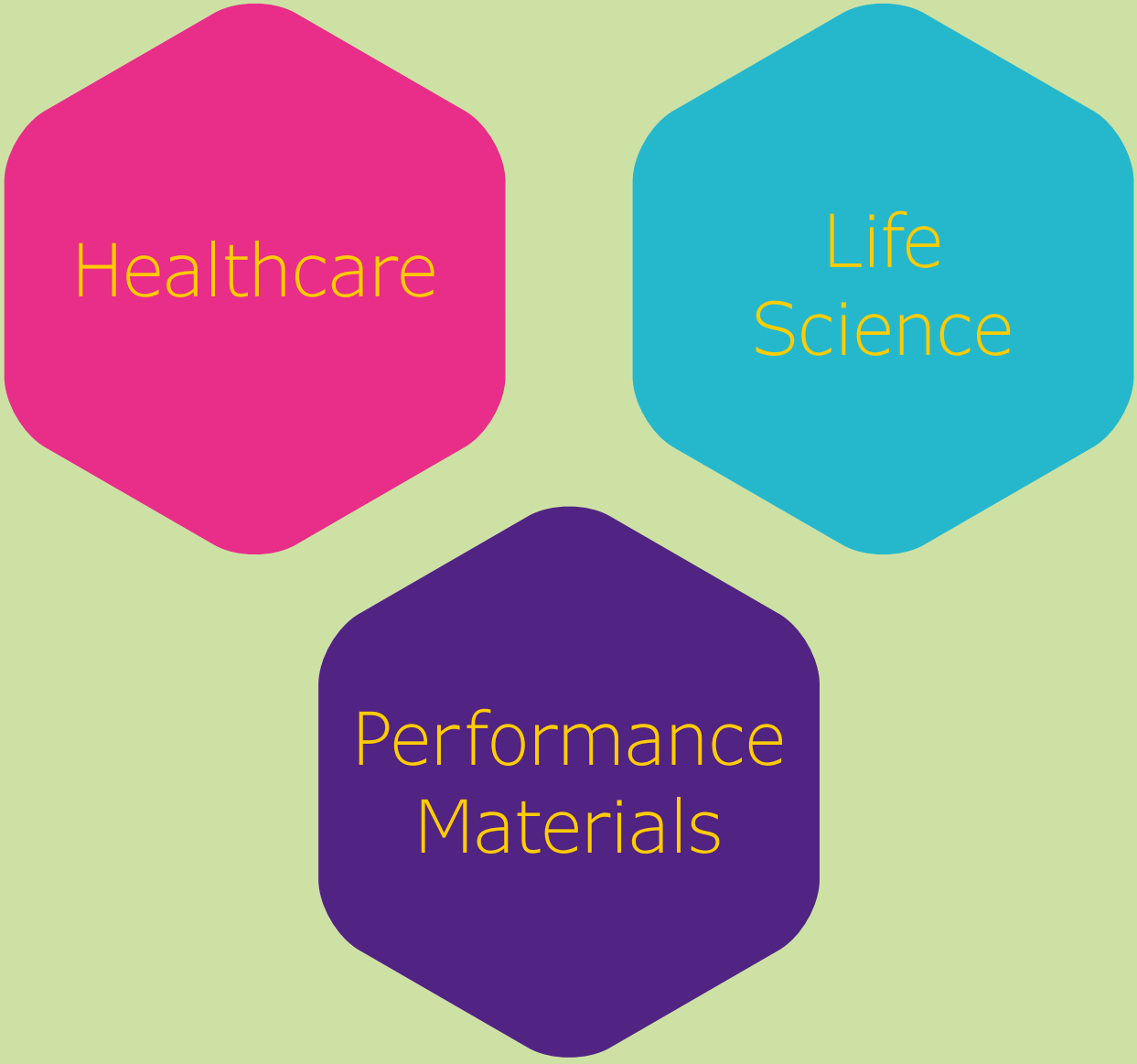
GROUP

EBITDA pre[1]

€ million

[1] Not defined by International Financial Reporting Standards (IFRS).

Merck KGaA
Darmstadt, Germany



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MAGAZINE

REPORT

Corporate Governance

Consolidated Financial Statements

*** The management report of Merck KGaA, Darmstadt, Germany, has been combined with the Group management report and published in both our 2017 Annual Report and the annual financial statements of Merck KGaA, Darmstadt, Germany. The authoritative German versions of the annual financial statements and the combined management report of the Group and Merck KGaA, Darmstadt, Germany, for 2017 have been filed with the electronic German Federal Gazette and are available on the website of the German company register.**

CURIOUS MINDS

Young people as the source of impetus and ideas: They are experts in their respective fields, international aspiring young scientists, founders, unconventional thinkers. They succinctly and self-confidently outline their expectations of a better future and the Executive Board explains what our company is doing in this respect.

Online

Videos of the full interviews can be found at

ar.emdgroup.com/2017/magazine/curious-minds

SIMON CLARK

"Things only improve if there are people who have crazy ideas and try out something new."

STEFAN OSCHMANN

Chairman of the Executive Board, CEO

"We are infinitely curious – and have been for 350 years. Many fresh, un-conventional ideas and new approaches come from our in-house research. Additionally, we collaborate closely with start-ups and universities around the world."

SAMUEL CUNHA

"To stay passionate, we always have to think of the future, of the potential result of our work."

BELÉN GARIJO
Member of the Executive Board, CEO Healthcare

"Fueled by passion, we discover and develop new medicines to help patients and their families. What better purpose is there than improving the quality of life around the world?"

UDIT BATRA
Member of the Executive Board, CEO Life Science

"Our 350th anniversary is testament of what can be achieved if you have a clear goal, a learning mind-set to constantly challenge your assumptions, and the courage to take the risk to redefine yourself."

JAKOB FUTORJANSKI

"Only if we know why we are doing something, can we master the great challenges of our time."

EVA AMSEN

"For scientists it is important to exchange ideas not only with their colleagues, but also with people from totally different fields – for example, with artists."

KAI BECKMANN
Member of the Executive Board, CEO Performance Materials

"Diversity and intensive exchanges across business and country borders are inspiring. In the age of digitalization, this is easier than ever before. With our technologies, we will continue to make a key contribution to this."

MARCUS KUHNERT
Member of the Executive Board, Chief Financial Officer

"Creativity and curiosity are the key factors for innovation. To achieve good results, it's important to provide researchers with the resources they need – and we do this. We invest based on robust clinical data and viable business cases."

INÉS DAWSON

"Research and creativity should go hand in hand, as not all problems have a clear solution."

SIMONE STREY

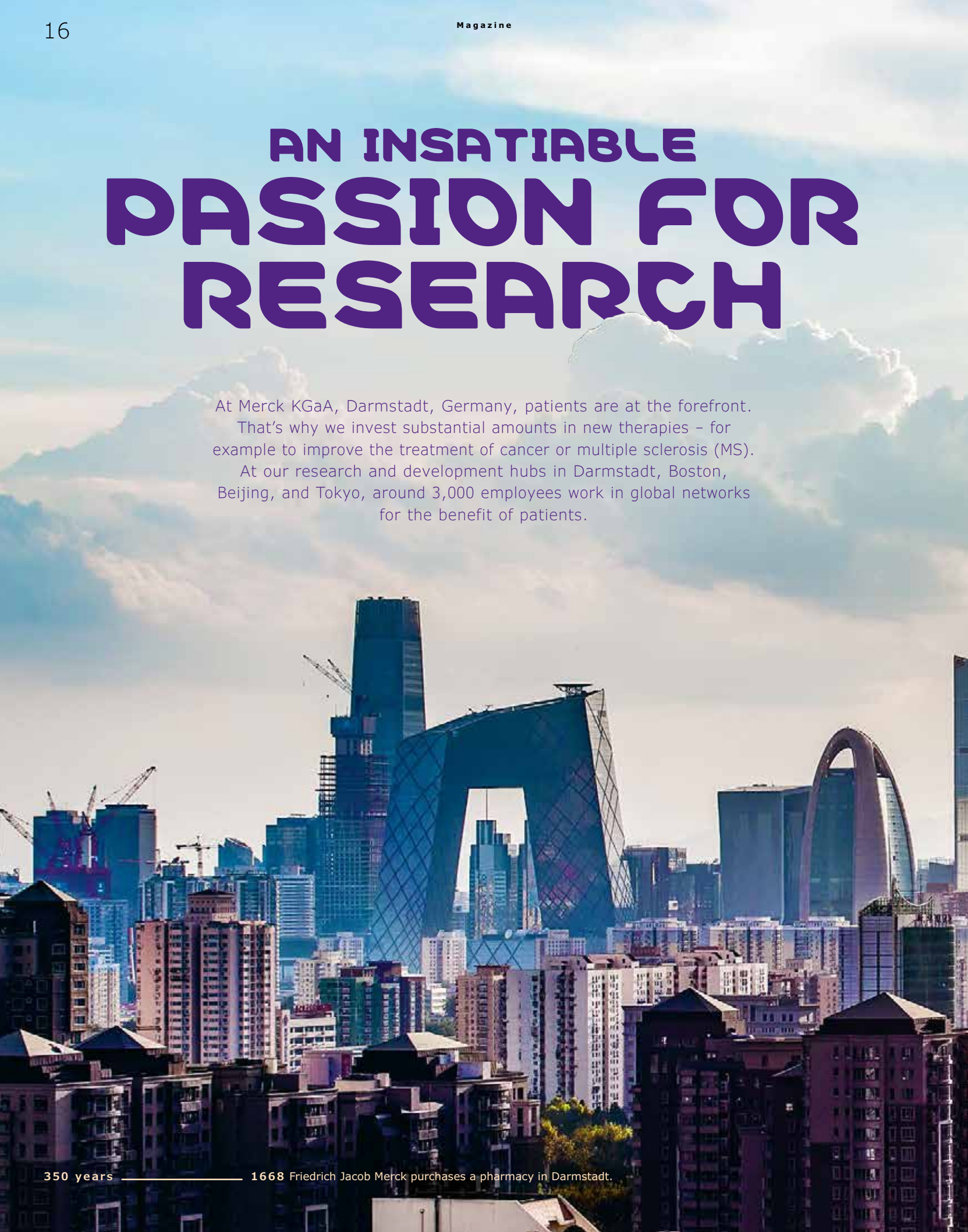
"Handling our natural resources responsibly is becoming increasingly important."

WALTER GALINAT
Member of the Executive Board

"We want to help shape a future worth living. Responsible actions in all areas are the foundation for our sustainable success. We place high priority on the efficient use of resources – in both our production operations and our products."

AN INSATIABLE PASSION FOR RESEARCH

At Merck KGaA, Darmstadt, Germany, patients are at the forefront. That's why we invest substantial amounts in new therapies – for example to improve the treatment of cancer or multiple sclerosis (MS). At our research and development hubs in Darmstadt, Boston, Beijing, and Tokyo, around 3,000 employees work in global networks for the benefit of patients.



350 years — **1668** Friedrich Jacob Merck purchases a pharmacy in Darmstadt.

Beijing: The Chinese capital is home to one of our R&D hubs.

Our new Innovation Center, to be opened in 2018 in Darmstadt – our global headquarters and R&D hub.

350 years **1754** Johann Justus Merck works during his training in Stuttgart with the “Pharmacopoea Wirtenbergica”, the most modern pharmaceutical formulary of its time.

The research spirit of the Merck family of pharmacists was obvious early on. For instance, in the 19th century Emanuel Merck worked intensively with plant-based natural substances. He succeeded in isolating alkaloids such as morphine in pure form. And in 1827, when he offered these active ingredients for the first time in the "Cabinet of Pharmaceutical and Chemical Innovations", he achieved a quantum leap – from a pharmacy to a research-based pharmaceutical and chemical company. Soon the portfolio encompassed hundreds of products, for example as of 1894 the innovative thyroid medicine Thyreoidinum siccatum. And today, the discovery and development of innovative medicines to benefit patients is of utmost importance to us, and we conduct conducts research and development around the world. This applies in particular to the four closely linked R&D hubs located on three continents and operated by our Healthcare business sector.

>1,500
SCIENTISTS AND CLINICAL RESEARCHERS WORK AT OUR R&D CENTER AT OUR HEADQUARTERS IN DARMSTADT

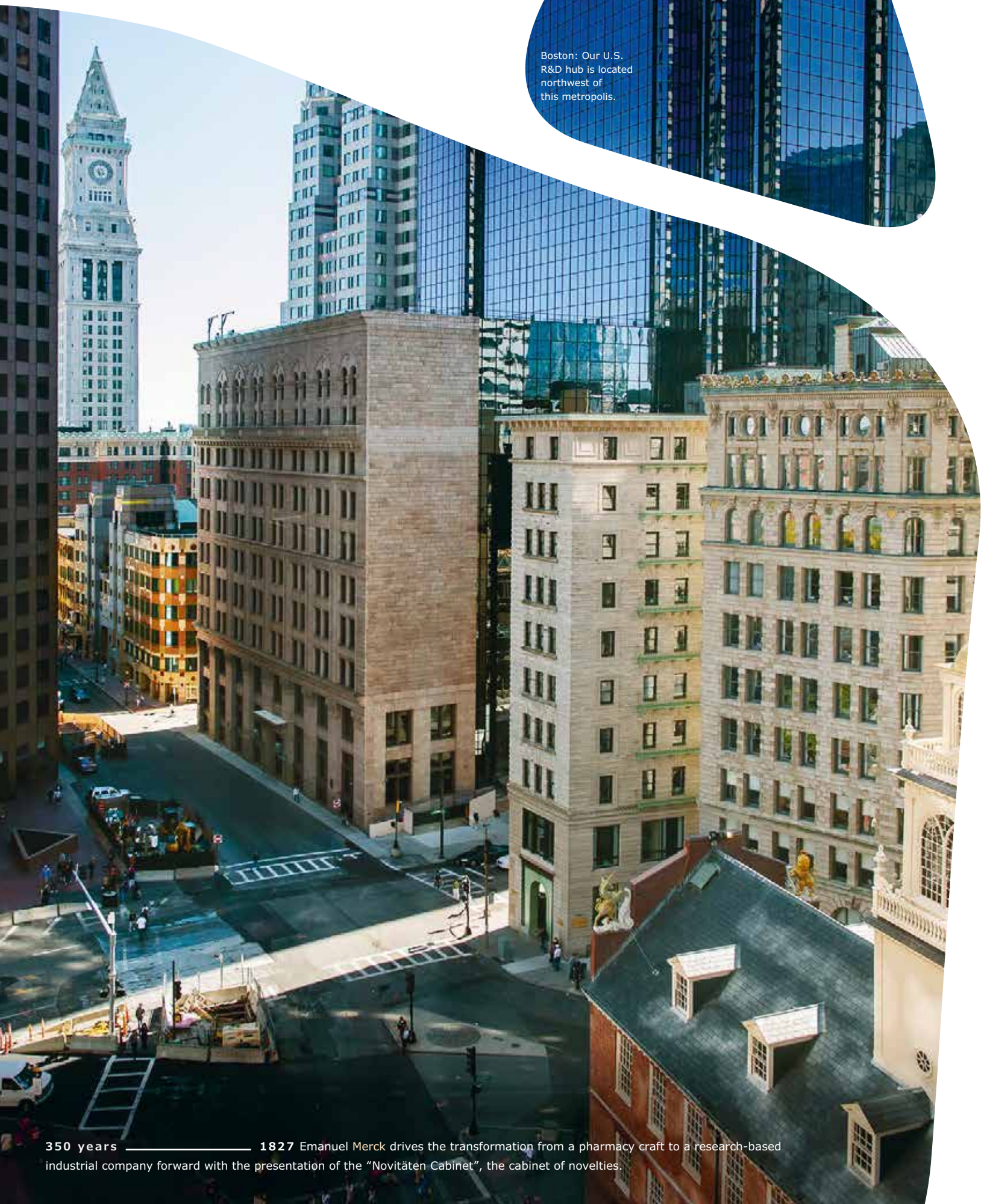
MS MEDICINE MAVENCLAD® APPROVED

More than 1,500 scientists and clinical researchers work at our R&D center at our headquarters in Darmstadt. Bodo Hammes is one of them. Hammes is a pharmacist but doesn't work in a laboratory. Instead, he handles the regulatory strategy for the approval of medicines. He is responsible for Immunology and Neurology and is currently focusing on the MS product Mavenclad® (cladribine tablets). In 2017, we received approval in the European Union, Canada and Australia for this new medicine to treat relapsing forms of multiple sclerosis – a major success. Multiple sclerosis is one of the most common chronic neurological diseases, affecting around 2.3 million people worldwide. "Obtaining approval of a new medicine in the individual markets is a long journey. Intensive cooperation with the regulatory authorities is therefore extremely important on the home stretch since we want patients to benefit from effective new treatments as soon as possible," says Hammes. Pharmaceutical researchers must first identify an active ingredient candidate that then undergoes extensive laboratory tests in preclinical development. Only when preclinical testing succeeds can the three phases of clinical development and testing in humans proceed. The development of a drug from the first idea until its final approval usually takes about 13 years. For the marketing authorization of Mavenclad®, more than 10,000 patient years of data from approximately 2,400 patients enrolled in the clinical trial program were taken into consideration, including patients with a follow-up time of up to eight years. The regulatory authorities review the study data closely and evaluate the benefit-risk ratio of the drug. Our dossier for Mavenclad® encompasses more than 200,000 pages, from the precise manufacturing information and countless study results, tables and references up to

"Obtaining approval of a new medicine in the individual markets is a long journey."

BODO HAMMES
Director Global Regulatory Lead Mavenclad®

Around 2.3
MILLION PEOPLE WORLDWIDE HAVE MS



Boston: Our U.S. R&D hub is located northwest of this metropolis.

350 years **1827** Emanuel Merck drives the transformation from a pharmacy craft to a research-based industrial company forward with the presentation of the “Novitäten Cabinet”, the cabinet of novelties.

"We are playing a game of chess against cancer. It's a tough opponent, but with the right moves, we can translate them into patient benefits."

KIN-MING LO
Head of Redirected Immunotherapy

1777

First immunological experiments conducted.

Research in the form of self-experimentation

James Nooth, an English surgeon, implants patient tumor tissue into his arm, hoping to achieve cancer prophylaxis. The outcome? Inflammation and minor pain.

the package leaflet. "To run a project as big as this one, you need an extremely knowledgeable and passionate, interdisciplinary team – we have that and I am proud to be part of it," says Hammes with a smile.

>500
R&D PROFESSIONALS IN BOSTON

BAVENCIO®: A STEP IN THE FIGHT AGAINST CANCER

The dedication and expertise required for the research and development of new medicines is something Kin-Ming Lo is well-versed in. Originally from Hong Kong, Lo has been working in research and development for over 30 years and is a scientist at our R&D hub in Billerica, Massachusetts, just outside of Boston. At this highly modern facility, more than 500 scientists work in the areas of neurology, immunology, immuno-oncology, and oncology. A major focus of immuno-oncology is on developing breakthrough immunotherapies for cancer. "We are playing a game of chess against cancer. It's a tough opponent, but with the right moves, we can translate them into patient benefits," says Lo. In cooperation with Pfizer, we achieved an important step forward in 2017. The new oncology medicine Bavencio® (avelumab) was approved in the United States, the European Union, Japan, Switzerland and Canada for use in metastatic Merkel cell carcinoma (MCC), a rare and aggressive form of skin cancer. In addition, the U.S. Food and Drug Administration granted approval of Bavencio® for the treatment of patients with locally advanced or metastatic urothelial carcinoma (UC). Bavencio® is a human antibody that is directed against the PD-L1 (programmed cell death ligand 1) protein, a key component of an immunosuppressive network that dampens the ability of T cells to attack tumors. The clinical development program encompasses around 30 clinical trials with more than 7,000 patients who

are being studied across more than 15 tumor types. Apart from metastatic MCC and UC, these include breast, lung, gastric, ovarian, and head and neck cancer as well as renal cell carcinoma. Vanita Sood and her team also contributed to the successful development of Bavencio®. Sood, a computational biologist who works both in Billerica and at global headquarters in Darmstadt focuses on turning therapeutic ideas into molecules. “We take the raw material of the starting molecule and turn it, atom by atom, into an actual drug. For Bavencio®, we also determined how the drug acts, attacking the tumor cell to disable the tumor’s defense system,” Sood explains. She is currently working to harness machine learning and artificial intelligence with the aim of accelerating the ability to predict which molecules out of trillions have the right properties to become safe and effective drugs.

“We take the raw material of the starting molecule and turn it, atom by atom, into an actual drug. For Bavencio®, we also determined how the drug acts, attacking the tumor cell to disable the tumor’s defense system.”

VANITA SOOD
Head of Drug Structure, Prediction and Design

Inside our state-of-the art R&D hub in Billerica near Boston.

Our scientists and researchers in Tokyo give us a strong presence in northeast Asia.

350 years **1879** Our company develops internationally, establishing business contacts to Asia (1832), North America (1845), South America (1851), Africa (1867), and Australia (1879).

Back to Kin-Ming Lo. While working on Bavencio® in its early R&D days, he already began thinking of strategies to improve its activity. “Cancer cells employ multiple immunosuppressive pathways to escape detection by the immune system. If we suppress more than one of the mechanisms that tumors use to avoid the immune system, we have a better chance of killing the cancer,” says Lo. This has led to the development of a bifunctional antibody fusion protein and other candidates in the R&D pipeline.

>7,000
PATIENTS IN 30 CLINICAL TRIALS

COLLABORATION IN A GLOBAL NETWORK

But for now, everyone involved is pleased that Bavencio® is being approved for the treatment of Merkel cell carcinoma in a growing number of markets. This is also the case in Japan. Ryoko Miyauchi, a pharmacist, has been working for eleven years at the research and development hub in Tokyo, which is located in a quiet and picturesque part of the Japanese capital. Together with her colleagues, she worked on the regulatory submission of Bavencio®, which was the first human anti-PD-L1 antibody to be approved in Japan – and also the first in Asia. The fact that this happened in a short period of time is not a matter of course. Just like every other market, Japan has very specific requirements for the approval of medicines. “We worked very closely with our global network to prepare the Japanese dossier for Bavencio®. In the process, it was very stimulating to get to know the different cultures and people. We’ve not only benefited from working together, but also made new friends,” says Miyauchi.

“It is very stimulating to get to know different cultures and people and to benefit from working together.”

RYOKO MIYAUCHI
CMC Senior Scientist

"We are working to enable Chinese patients to benefit sooner and more extensively from our drug pipeline."

YUE HUANG
Head of Clinical Pharmacology China

1887

First commercial subsidiary in the United States.

The successful export business in the United States led in 1887 to the establishment of a subsidiary in New York.

PHARMA STRATEGY FOR CHINA

This cross-border team spirit is also confirmed by Yue Huang: "After having lived for nearly 20 years in the United States and Switzerland, I returned to my homeland of China, and I am very happy to still be working with people from many different cultures who are extremely dedicated and committed to the work we're doing." From the 21st floor of the modern office building that houses the Chinese research and development hub of our company, the Head of Clinical Pharmacology in China has a good view of the bustling metropolis of Beijing. Yue Huang is also working intensively on Bavencio® and its potential approval in China. Another advance relates to the oncology drug Erbitux®, following the positive Phase III trial as a first-line treatment for colorectal cancer in China. The research and development strategy at the Beijing hub is mainly focused on bringing innovative and established global assets to China by leveraging the fast-evolving scientific and regulatory environment. "We are working to enable Chinese patients to benefit sooner and more extensively from our drug pipeline," says Yue Huang.

Our vision of giving as many people as possible around the world access to innovative medicines is thus increasingly becoming a reality.

In Beijing, our R&D experts collaborate with scientists and clinical experts from all over China.

NEW WAYS OF IDENTIFYING DISEASE

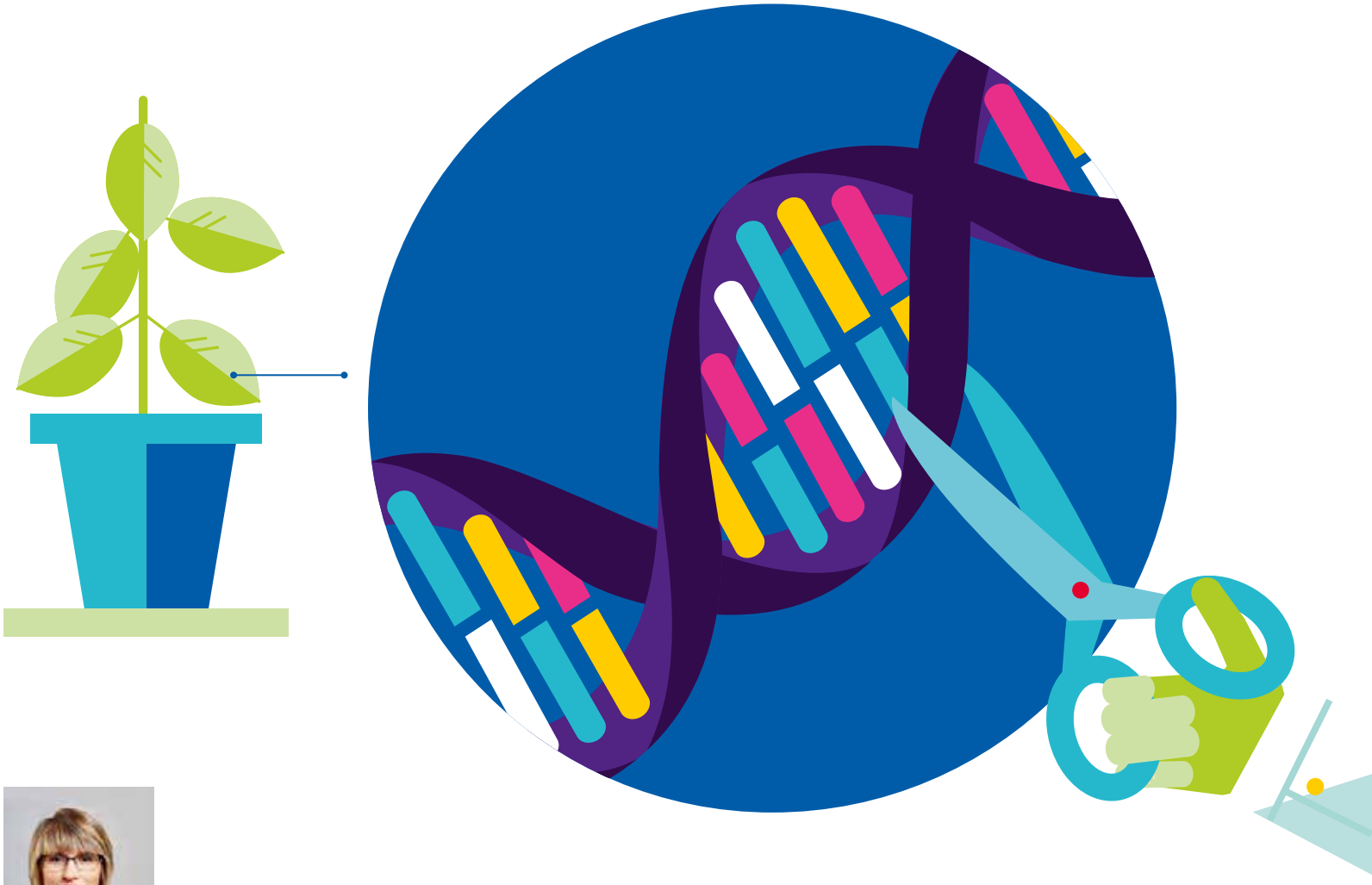
Working closely with the global scientific community, our Life Science business sector is developing numerous innovative products and solutions for biotech and pharmaceutical research. The new tools and processes that we offer are helping our customers to capture the potential of genome medicine.

350 years ——— **1917** The U.S. subsidiary Merck & Co., Inc., headquartered in New Jersey, USA, is expropriated and is entirely legally and economically independent today. Outside the United States and Canada, the company operates as MSD.

The concept of purity has always been firmly embedded in the biosciences. Emanuel Merck produced basic materials for medicinal products and very successfully supplied colleagues in other pharmacies as well as physicians and chemists. In 1851, he emphasized in a letter to a customer: “I always guarantee you the purity of my preparations.” To this very day, this strong commitment to quality characterizes our work. By providing products for protein research, cell biology, and chemical-based pharmaceuticals, the Life Science business covers the bioprocessing value chain. With more than 300,000 life science products and solutions, we provide scientists with state-of-the-art tools and services to enable them to successfully meet their toughest challenges.

TOOLS TO IMPROVE HUMAN HEALTH

For 27 years now, Anja Dedeo has been helping to make this possible. Based at our Danvers site near Boston, the experienced scientist works in technology development, where she focuses on the further development of efficient molecular workflow tools. For instance, she evaluates new technologies in protein and nucleic acid sample preparation, as well as ways to enhance the efficiency of Western blotting, a standard technique for transferring proteins to a blotting membrane. “Our goal is to make laboratory work easier and more efficient through new technologies. We perform hands-on evaluations of these technologies, which can range from early prototype devices, to various reagents, kits or a combination of all,” says Dedeo. She knows that just because a technology appears promising based on the scientific evaluation, commercial viability is not automatically guaranteed. That is why Anja Dedeo highly values collaboration with many different disciplines, for instance with internal departments such as Business Development and Marketing, as well as with academic institutions and other external partners. “In this age of personalized medicine, scientists are looking for new ways to identify disease and treat it with medicines that have the fewest side effects. To support and provide scientists with quality products for this challenging task, we have to precisely understand their needs and pain points,” says Dedeo.

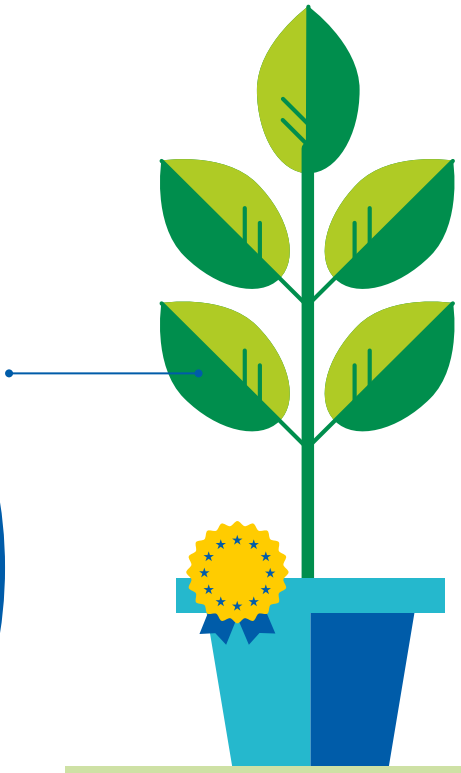


ANJA DEDEO
R&D Manager, Technology Development, Molecular Workflow Tools

MARTHA ROOK
Head of Gene Editing & Novel Modalities in Bedford, MA (USA)

CRISPR: LEADING-EDGE TECHNOLOGY FOR GENOME EDITING

This applies especially to the new possibilities offered by gene therapy. Since the human genome was fully decoded around 15 years ago, a lot has happened in medical research and biotechnology. For instance, CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) technology was developed. With CRISPR, the DNA of all organisms can be edited similarly to a text. Certain gene sequences of a cell can be separated or cut out and replaced as with a pair of scissors. This allows scientists to alter the DNA of plants, animals and humans in a targeted manner, for instance to repair genetic defects and to potentially cure hereditary diseases. “CRISPR can be used to understand the link between a gene and the function of that gene in a cell. Making these tools available to scientists helps them to design and carry out experiments to elucidate the cause of diseases. I have the privilege of working on some of the most exciting technologies in life science,” says Martha Rook, Head of Gene Editing & Novel Modalities in Bedford near Boston. Together with her colleagues and team, Rook focuses on new applications and services for drug development – from basic research to manufacturing processes. For scientists, the genome-editing scissors are relatively easy and economical to use. That’s why numerous researchers around the globe are already applying CRISPR, for instance to cultivate plants that are more resistant or to fight diseases such as AIDS and cancer.



A GROWING PATENT PORTFOLIO

We offer a wide selection of products for genome editing. “Our CRISPR tools can be used for disease modeling, among other things. Cell models deliver important insights for the development of new medicines and side effect testing,” Rook explains. Our growing patent portfolio includes genomic integration. This involves cutting the chromosomal sequence of eukaryotic cells (such as mammalian and plant cells) and inserting an external or donor DNA sequence into those cells using CRISPR. Researchers can thus replace disease-associated mutations with beneficial or functional gene sequences. In addition, we have developed an alternative CRISPR genome-editing method called proxy-CRISPR that permits access to previously unreachable cell locations, making CRISPR more efficient, flexible and specific.

The tremendous opportunities offered by gene editing involve a tremendous responsibility. We conduct gene editing research in compliance with statutory regulations and careful consideration of ethical standards. For this purpose, we have established our Bioethics Advisory Panel (MBAP) to provide advice and guidance on research work that we are involved in (see interview on page 33). The guidelines we have adopted on human stem cell research as well as fertility research are available on our website.

1668

Our company is born.

Friedrich Jacob Merck purchases the second town pharmacy.

The Merck family acquires the pharmacy on the Schlossgraben, which later becomes the Engel-Apotheke (Angel Pharmacy), the historic core of the company. On August 26, 1668, he is issued a license to run a pharmacy, which is still owned by the Merck family today.

1894

The pharmacy becomes a company.

A new thyroid medicine.

At the turn of the century, we expand our position as a research-based industrial company. One of the new products in the portfolio was the thyroid medicine Thyreoidinum siccatum. To this very day, we are the leader in this therapeutic area outside the United States.

350 years **1995** Establishment of Merck KGaA, Darmstadt, Germany. With a volume of DM 2.4 billion, this represents the largest public offering in German history at that time.

"Ethical responsibility lies with the scientific community."

Interview with Professor Dr. Jochen Taupitz, a renowned ethics expert, legal scholar at the University of Mannheim, Chairman of the Central German Ethics Council of the German Federal Medical Council, and Member of our Bioethics Advisory Panel

For many years now, genetic research has been making great progress. What opportunities do you see in gene therapy?
New gene therapy techniques such as CRISPR make it possible to intervene in the genome of plants, animals and humans much more easily, precisely and cost-efficiently. This is a big advantage for crop cultivation and animal breeding – and also for people. That's because somatic gene therapy can be used to cure people suffering from certain hereditary diseases. And in the distant future, the possibility exists of influencing the genome of a person so that subsequent generations also benefit. Through intervention in the germ line, meaning the genes of early embryos or human egg or sperm cells, it could be possible to spare future human beings of serious hereditary disorders.

What are the risks?
Germline gene therapy in humans is presently not justifiable because the techniques are not precise enough yet. It is currently not possible to rule out unexpected off-target effects. However, research work is underway in laboratories in several countries on embryos. National legislation differs considerably. Many countries permit research on embryos for the first 14 days of their development. In Germany, however, this is forbidden. If gene editing becomes more precise and safer, using gene therapy to prevent serious hereditary disease is in my view legitimate – and makes more sense than eliminating embryos as a result of preimplantation diagnosis.

You are a member of our Bioethics Advisory Panel (MBAP), which works for all three business sectors under the leadership of the Chief Medical Officer. Could you please summarize the tasks of this panel?
Experts from different disciplines, for example ethicists, lawyers and physicians, and from different countries and cultures discuss ethical aspects of your research activities and give the company advice, for instance on human stem cell research. For your company, as a company with operations around the world, it is certainly important to be informed of the global ethical debates, different moral perceptions and legal systems, and to align the company strategy accordingly. Merck KGaA, Darmstadt, Germany, implements the recommendation of the MBAP in concrete work processes. Additionally, the company follows clear principles and guidelines that distinctly oppose the potential misuse of gene therapy. After all, ethical responsibility lies with the scientific community.

PROF. DR. JOCHEN TAUPITZ
Legal scholar at the University of Mannheim and renowned ethics expert

350 years **2007** The acquisition of Serono succeeds, making us a leading biotech company.


WELCOME
TO
SPACE

Chemical processes are driving fast technological change in the fascinating world of atoms and molecules. We offer a broad portfolio of specialty chemicals that can be encountered almost everywhere: whether in consumer electronics, architecture, automobiles, or even the universe.

Our chemical materials are already finding their way to space today, inside the chips of diverse electronic instruments and the solar panels of satellites. It is quite imaginable that Merck KGaA, Darmstadt, Germany, will have an even stronger presence in space in the future, however. Our successful collaboration with the European Space Agency (ESA) provides a solid foundation for this.

The two partners are united by curiosity, their passion to explore the unknown. In joint projects and workshops, the scientists and engineers share ideas on, for example, the utilization of virtual reality and Big Data. "ESA can contribute its expertise in space travel in fields such as digitalization, materials science and health. In return, ESA can also learn a lot from the innovative business of a leading science and technology company," says ESA Director General Prof. Jan Wörner. In autumn 2017, our company and ESA co-hosted a hackathon, an event for creatively developing new solutions. "The young scientists and start-ups address, among other things, the question of how to analyze the spread of neglected tropical diseases using data and instruments from space travel," says Matthias Simnacher, coordinator of the partnership between ESA and our company at our Innovation Center. Within the scope of further joint projects and competitions, we are advancing the development of materials for use in space – such as special coatings and additives.

SKIN-LIKE SOLAR CELLS

Our materials are already being used to manufacture high-performance solar cells for satellites and missions to the planets. Yet we are also working to utilize solar energy on Earth. Above all, building façades and roofs offer extensive surfaces for climate-friendly power generation based on organic photovoltaics (OPV). Only one kilogram of OPV can cover the size of a football field. We develop and produce inks based on semiconducting polymers for OPV modules. These are one hundred times thinner than a hair and are printed by means of simple methods similarly to a newspaper. Therefore, the cost-efficient solar cells can be used on both rigid and flexible substrates. The extremely lightweight and flexible organic solar foils open up future-oriented applications. OPV elements can be integrated on all kinds of surfaces – such as electrical devices, cars or clothing. They also can be applied on curved surfaces like a second skin. Or even on "trees". The components from Merck KGaA, Darmstadt, Germany, were part of the solar trees at the EXPO Milano 2015. These plant-like objects are twelve meters tall and generate electricity by means of numerous OPV modules. They were recently installed at our headquarters in Darmstadt. "We are working intensively to increase the application possibilities and efficiency levels of printable organic solar cells," says Thomas Kietzke, Head of OPV in the Advanced Technologies business unit.

1888

The discovery of liquid crystals.

It started with carrots

In 1888, the Austrian chemist and botanist Friedrich Reinitzer sees that cholesteryl benzoate derived from carrots has two different melting points. He asks Otto Lehmann, a German physicist, to support him with his research. Lehmann realizes that cholesteryl benzoate and other substances have a further phase in between the liquid and solid state. He called these substances "liquid crystals," the basis of today's LC displays.

The solar trees at the Darmstadt site (2018).

Organic photovoltaic technology (OPV) was already used in power-generating solar trees at the 2015 World Expo.

THE RISE OF LIQUID CRYSTALS

There is amazing potential not only in the sun, but also in carrots. In 1888, Friedrich Reinitzer, a chemist, investigated cholesterol, which he extracted from the root vegetable. In doing so, he noticed that the substance had two melting points – and happened to discover liquid crystals. The scientific community was impressed. And in 1904, our company produced liquid crystals at the request of Otto Lehmann, a physicist. The only problem was that no practical application could be found at the time for the curious scientific phenomenon. So research slumbered again until 1968 – exactly 300 years after the company was founded – when a few young researchers at our company devoted themselves to liquid crystals (LCs). They discovered that the molecules were ideally suited for manufacturing displays. The first liquid crystal displays were soon being built into wristwatches and pocket calculators. Display panels, televisions, computers, tablets and smartphones followed later. Technological development gathered momentum, demand grew significantly – and we are the global market leader to this day.

NEW LC APPLICATIONS FOR AUTOMOBILES

Yet the exciting career of liquid crystals is continuing, as new fields of application are increasingly being discovered, for example automobiles. One focus is on materials for lighting systems. For example, smart LCD matrix headlights can adapt light distribution with high resolution as needed in real time. “The core component is the display with liquid crystals developed by us specifically for this application and featuring high temperature stability,” says Dieter Schroth, responsible for new applications of LC technology. Liquid crystal mixtures from Merck KGaA, Darmstadt, Germany, are additionally used in innovative satellite antennas. In the age of digitalization, car drivers want to be “always on”, also while on the road. Smart antennas steer their beam electronically through a liquid crystal layer, thus constantly maintaining contact with the satellite. This makes it possible to receive huge data volumes at almost any location in the world. Compared with other antenna solutions, LC antennas are extremely flat and cost-effectively adaptable. They can thus be easily integrated into the roof of a car. Another potential application in the automotive sector is liquid crystal window technology developed by our company. Individually switchable car windows and sunroofs can be darkened at the push of a button in the future.

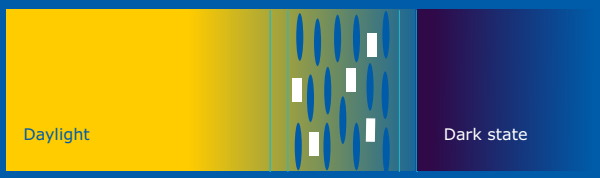
CRYSTAL-CLEAR VIEW

Smart windows based on our technology are already being used in architecture. “In smart glass applications, our liquid crystals regulate the light transmission of window panes and façades by means of transparent conductive coatings. A switching process determines the alignment of the liquid crystal molecules on the glass surface and thus the desired change in light transmission,” explains Johannes Canisius, Head of the Liquid Crystal Windows business field. LC windows can be used in buildings in many variants, for example as

Production of liquid crystal window modules in Veldhoven, the Netherlands.

350 years **2015** With the acquisition of the U.S. company Sigma-Aldrich, our company further expands its leading position in the life science business. The portfolio now encompasses more than 300,000 products.

off



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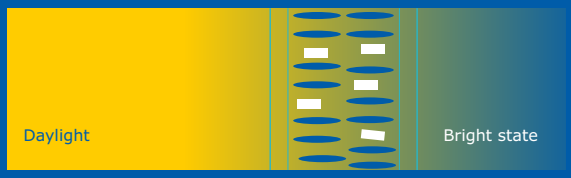


■ Dye molecules
○ Liquid crystal molecules

sun protection and privacy control. As sun protection, they could make it possible to do without exterior blinds, as they can be darkened to a few percent light transmission with continuously variable switching within seconds. By means of optimizing the amount of light and heat entering, the technology can significantly increase the energy efficiency of buildings with glazed façades. Savings of up to 40% of the building's energy consumption are possible. Also when darkened, the windows remain transparent and provide a color-neutral view to the outside. The privacy variant switches immediately from transparent to opaque. Rooms with glazed walls can also be easily protected from looks from outside – from conference rooms and bathrooms to treatment rooms in hospitals. In November 2017, we commissioned the company's first facility worldwide for the production of liquid crystal window modules in Veldhoven, the Netherlands.

INNOVATIVE PROCESSES FOR CHIP MANUFACTURE

The production of semiconductor materials for chip manufacture is also in full swing at our company. These materials are used in a wide variety of electronic applications. Ever smaller, faster, more powerful, energy-efficient and economical is the motto in this dynamic market. With the growing demand for electronic devices, the demand for semiconductors is increasing, too. And further miniaturizations call for further improvements in process chemicals. Semiconductors are created in patterned layers that ultimately form a complete integrated circuit. We offer products such as antireflective coatings to improve precision of production, special aids to stabilize the structures, as well as materials that make it possible to reduce structural dimensions by means of a chemical shrinking process. Owing to the demand for ever smaller structures, we are researching new patterning techniques, such as directed self-assembly (DSA) and selective deposition. "Instead of the former complex and expensive lithographic processes, we want to establish smart and cost-efficient processes in which part of the structural information is already contained in the process chemicals," says Ralph Dammel, from EMD Performance Materials. Through our € 300 million corporate venture capital arm we invest in innovative start-ups in three core strategic areas, we are also active in the semiconductor materials area. For instance by investing in Aveni, a French start-up working on solutions to enable the semiconductor industry to further miniaturize chips.

Whether carrots or chips – with curiosity and a passion for research, we are shaping progress in innovative high-tech materials, which are used all around the globe – and sometimes even beyond.

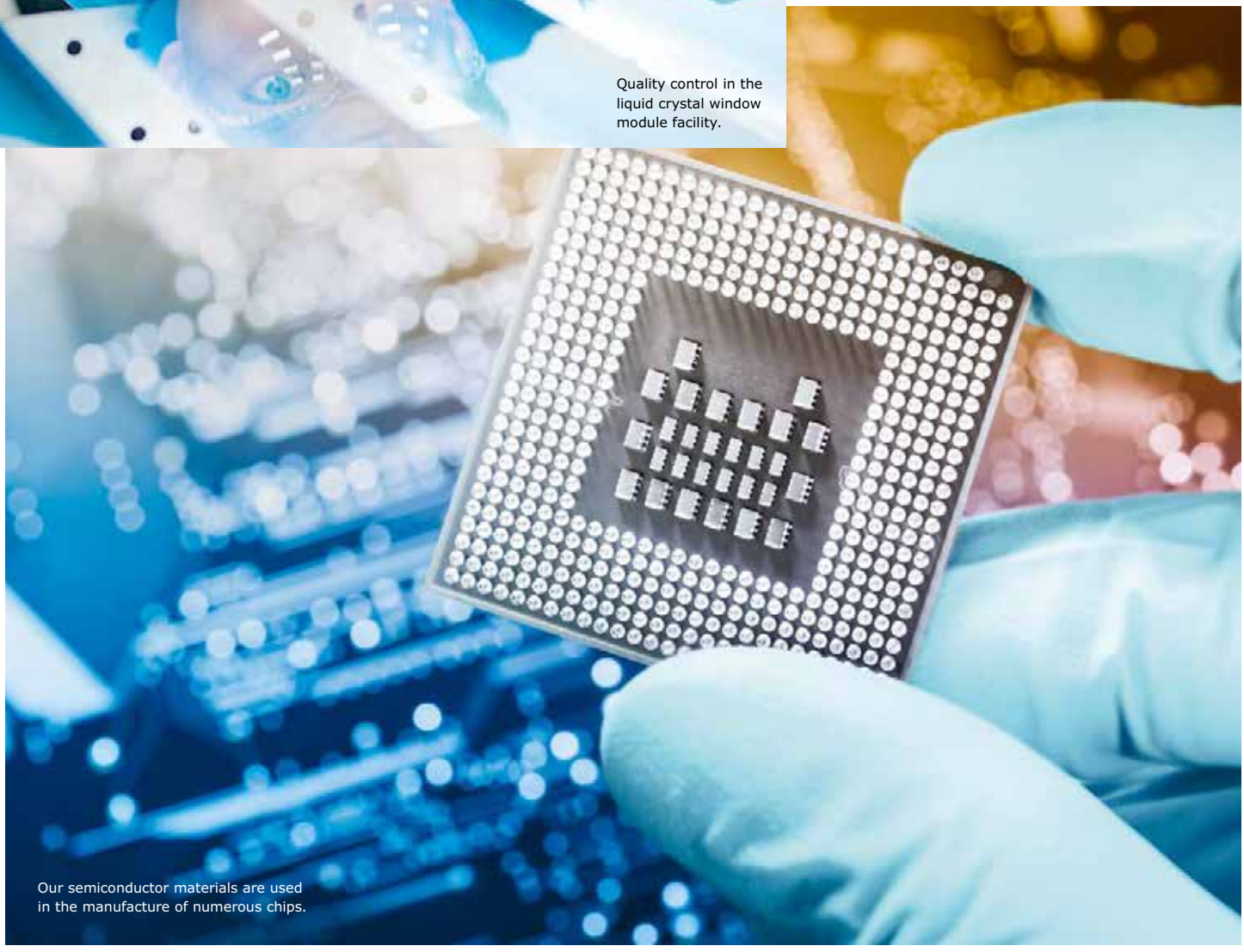
1968

The official start of liquid crystal development

Around 300 years after the establishment of our company

In 1904, our price lists already contain materials with liquid crystalline properties. In 1905, we start cooperating with Otto Lehmann, the father of liquid crystal research. We have been conducting our own research into liquid crystals since 1968.

Quality control in the liquid crystal window module facility.



Our semiconductor materials are used in the manufacture of numerous chips.

TO OUR SHAREHOLDERS

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TO OUR SHAREHOLDERS

42 – 54

Dear shareholders, dear friends,

The publication of our Annual Report is a good opportunity to reflect for a moment and to take stock, not only from a financial perspective. In my letter to you last year, I explained how we at Merck KGaA, Darmstadt, Germany, want to help shape technological advances. Today we can see that we successfully did so in 2017. More about that later.

Since 2018 is a very special year for our company, let us first take a look at the present. This year, we are celebrating the 350th anniversary of our company. Few companies have roots that date back so far. And in our industry, we are the only ones who have been successful for so long.

For three and a half centuries, we have repeatedly contributed to advances in science. In 1668, Friedrich Jacob Merck laid the foundations with his pharmacy in Darmstadt. In the 19th century, Emanuel Merck was one of the industrial pioneers of modern pharmacy. Today, more than 6,000 scientists are working for our company on cutting-edge health solutions and technologies.

Our company has constantly reinvented itself. But many important things have remained constant. Scientific curiosity has been, is and always will be the force that drives our scientists in Europe, Asia and North America to find new solutions for the most pressing questions facing humanity. In everything we do, we orient towards a clearly defined and binding set of values. For instance, this means we run our business as responsible entrepreneurs.

Stefan Oschmann

Chairman of the Executive Board and CEO

In 2017, we helped shape technological advances and achieved milestones in our markets.

- We received the first approvals for not one, but two important new medicines – the immuno-oncology drug Bavencio® and Mavenclad® for relapsing multiple sclerosis in patients with high disease activity. Mavenclad® offers patients an innovative dosing regimen. Taken orally for a maximum of 20 days in the first two years, it can deliver and sustain four years of disease control.

- The acquisition of BioControl Systems has enabled us to expand our offerings for customers in the food industry. We now offer them a comprehensive range of technologies to test for foodborne pathogens. In our new Food Safety Studio, our customers can collaborate with our scientists, for instance to develop rapid tests to check their products.

- We made our debut at the International Motor Show in Frankfurt, where we presented our technologies for future mobility. These include materials for smart headlights that can adapt light distribution as needed, thus providing for greater traffic safety. And liquid crystals for satellite antennas that permit reception of large data volumes nearly anywhere in the world, an important technology for autonomous driving.

These are just a few examples of what we accomplished in 2017 thanks to the curiosity, the imagination, and the engagement of our more than 52,000 employees. On behalf of the Executive Board, I would like to cordially thank them.

In business terms, 2017 was a good year. Our company again grew profitably. For 2017, we will propose to the Annual General Meeting a dividend of € 1.25 per share, an increase of € 0.05. Our sales increased to € 15.3 billion. At the same time, EBITDA pre, the key performance indicator used to steer our operating business, amounted to € 4.4 billion, which was at the lower end of our annual forecast, despite unfavorable exchange rate developments. The impact of higher research and development costs in our Biopharma business as well as a challenging market environment in Liquid Crystals can be seen. We will continue to address both these issues in 2018.

We are investing further in the development and launch of new medicines. Our earnings in 2018 will also reflect these expenses. Here, “investing” is the key term because we firmly believe that our financial commitment will pay off. That’s why investing money now is the right thing to do.

In view of limited resources, making targeted investments always also means setting priorities. That is why we divested our Biosimilars business in 2017. And it is why we announced in 2017 that we are analyzing strategic options for our Consumer Health business.

In the Liquid Crystals business, we have been the market and technology leader for many years now. However, the market environment for well-established liquid crystal technologies has become more difficult, above all in China. By contrast, sales of innovative technologies, for instance of energy-saving UB-FFS materials, are growing sharply. This is why we are driving the launch of new liquid crystal products forward and capturing new application fields in this core business. These include, for example, windows with liquid crystal modules, which raise the energy efficiency of buildings. At the end of November, we opened a new factory in the Netherlands for this purpose. In addition, the positive development of the Semiconductor Solutions and Surface Solutions business units should mitigate the consequences of more intense competition in Liquid Crystals.

This shows we are addressing topics that are important to the success of our company. And we are setting clear business priorities. In our Biopharma business, we are focusing on the development of innovative specialty medicines. Additionally, we want to further expand our highly successful Life Science business in a targeted manner. In our Performance Materials business, we will push forward especially with our rapidly growing businesses, for instance materials for semiconductor production.

We will continue to maintain a high level of financial discipline in all of these efforts in 2018. Reducing our acquisition-related net financial debt remains a priority.

What innovations will be the next to define the industries in which we operate? We are intensively addressing this question and setting the course to ensure that our company prospers tomorrow and beyond as it does today.

We are using complex digital data analytics in the fight against cancer and other serious diseases. For instance, to increase the efficacy of drugs that activate the body’s immune system to fight tumors, we have to have a better understanding of the interactions between the immune system and the tumor. To do so, we are building up a powerful data and analysis platform. We want to recognize meaningful patterns and develop new and effective treatment options.

We are creating new opportunities for scientists and biotech companies, for instance genome editing with CRISPR technology, which enables researchers to alter the genes of living cells more efficiently than with previous methods. For example, CRISPR is a key technology that can help to find new treatment options for serious diseases. We have received patents for a future-oriented CRISPR technology in the European Union, Australia, Canada, and Singapore. Despite our strong passion for discovery, we also know that genome editing touches on fundamental ethical questions. We take these topics very seriously. That is why we have clear policies in place for our research and business operations and an international ethics committee (Bioethics Advisory Panel). This too is responsible entrepreneurship.

Our high-tech materials are an important basis for many technologies of the future. For example, organic photovoltaic materials permit entirely new, clean ways of generating power. They can be used to transform building façades into energy sources. This is creating entirely new options for architects – and perhaps soon also for astronauts since we are cooperating with the European Space Agency (ESA) on future materials for outer space. You can read more on this in the magazine section of this Annual Report.

This is no longer science fiction, but rather is increasingly becoming reality – also with help from us. As a vibrant science and technology company, we are proud to be shaping crucial areas of the world we live in. Yet rest assured that we will always keep our feet on the ground, especially in view of our 350-year history. We will continue to run your company prudently, conservatively and successfully. And true to the motto of our anniversary year, we will remain “always curious”. You can count on that.

Sincerely,

Stefan Oschmann
Chairman of the Executive Board and CEO

The Executive Board

Walter Galinat
Member of the Executive Board

Marcus Kuhnert
Member of the Executive Board
Chief Financial Officer

Stefan Oschmann
Chairman of the Executive Board & CEO

Udit Batra
Member of the Executive Board
CEO Life Science

Belén Garijo
Member of the Executive Board
CEO Healthcare

Kai Beckmann
Member of the Executive Board
CEO Performance Materials

Short biographies
More information can be found at www.emdgroup.com →
Company → Who We Are → Management

Our Shares

At a glance

Overall, the performance of our shares was characterized by volatility in 2017. Following an upswing thanks to a favorable market environment in the first half, the share price visibly came under pressure in the second half of the year. Our share price decreased nearly 10% over the entire period, finishing the year at € 89.75. The performance of our shares was significantly weaker than that of the relevant comparative indices, all of which posted an increase during the same period. Our shares were nearly 22 percentage points behind the comparative DAX® index, which rose by 13% over the full year. They were around 20 percentage points lower than the relevant chemical industry index, which increased by over 11% in 2017. The pharmaceutical industry index rose by more than 5% in 2017, thus outperforming our shares by 15 percentage points in the same period.

Since the end of 2016, our shares had seen a positive development that continued until early summer 2017. Among other things, this was driven by the marketing authorization of our immunotherapy Bavencio® (avelumab) for the treatment of patients with metastatic Merkel cell carcinoma (mMCC) as well as locally advanced or metastatic urothelial carcinoma by the U.S. Food and Drug Administration (FDA). The announced divestment of our Biosimilars business to Fresenius on April 24, 2017 also resonated positively with investors and analysts. In addition, equity markets were positively impacted by encouraging signals for the global economic environment as well as the sustained optimism of market participants on the future economic prospects of the United States following the presidential election in November 2016. Our shares also benefited from this, increasing until May 12, 2017 to a new all-time high of € 114.40.

However, as of the middle of the second quarter, a visible share price correction set in for our shares. Various influential factors were responsible for this. Towards the end of the second quarter, the environment for equities became more challenging owing to rising interest rates in important capital markets and the continued strong development of the euro against the U.S. dollar. The latter also had considerably negative effects on our share price since the company has a strong net exposure to the euro due to its geographic set-up. In Performance Materials, competition for liquid crystal materials in China increased in the course of the second quarter. These prolonged adaptation processes are impacting the profit development of our Performance Materials business in addition to the mentioned foreign exchange effects. Although in our report on the second quarter of 2017 we maintained our full-year guidance for EBITDA pre despite the intensification of these burdens compared with early summer 2017, capital market participants again reduced their earnings expectations for our shares. This led to noticeable profit taking and selling of shares by institutional investors.

Positive newsflow from the company could do little to counteract this development and continued uncertainty among investors and analysts. In June 2017, we presented clinical data on key pipeline products at the American Society of Clinical Oncology (ASCO) Annual Meeting in Chicago, Illinois (USA) as well as in a conference call. This was received positively by capital market participants along with other examples such as the European Commission marketing authorizations of our immunotherapy Bavencio® (avelumab) in the treatment of metastatic Merkel cell carcinoma (mMCC) and of cladribine tablets (trade name Mavenclad®) to treat relapsing multiple sclerosis in patients with high disease activity, and the closing of the divestment of our Biosimilars business. Likewise, the announcement on September 5, 2017 concerning the review of strategic options for our Consumer Health business temporarily helped lift our share price in a generally favorable equity market environment.

As part of our annual analyst and investor meeting, capital market participants again had the opportunity for intensive and in-depth discussions with the management of our business sectors on September 28, 2017. Overall, the event resonated well. However, in the period that followed, analysts and investors began lowering their earnings expectations, particularly with respect to fiscal 2018. Although the results of the third quarter were slightly above market expectations and the guidance for 2017 was confirmed despite currency headwinds, capital market participants' uncertainty concerning the future earnings development remained unchanged and adversely impacted our shares in contrast to the general development of the stock market.

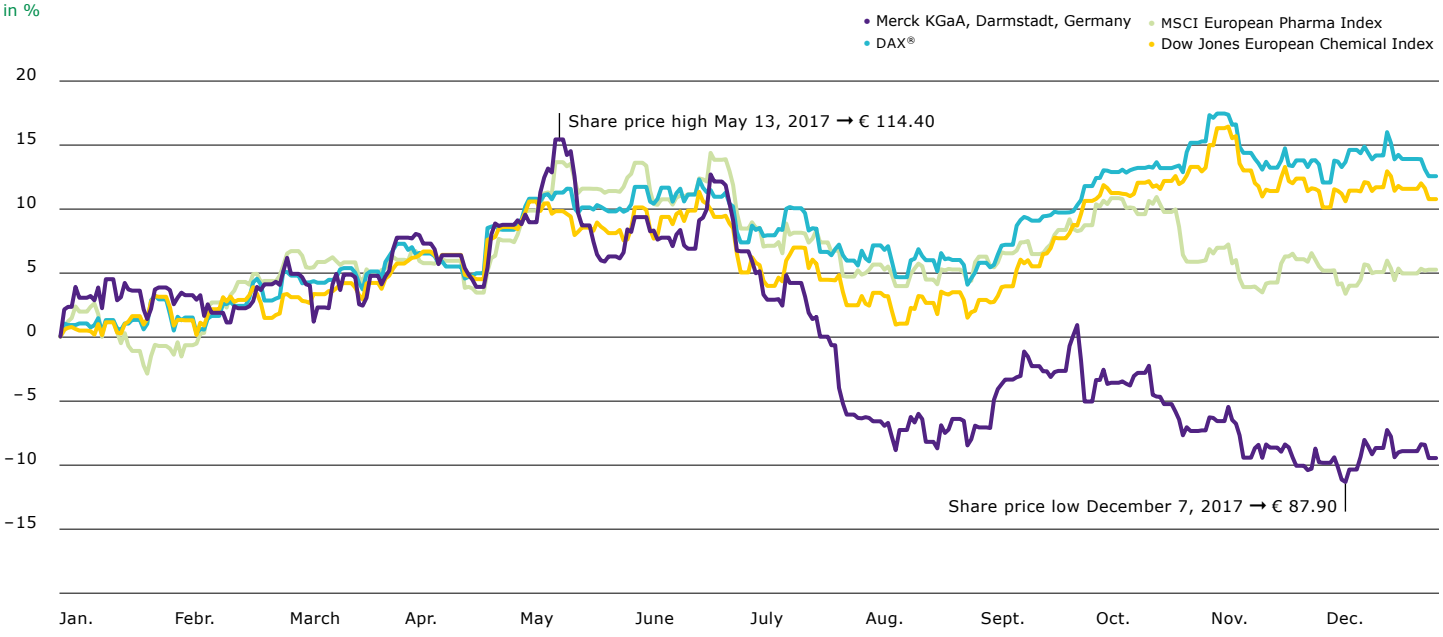
In 2017, the Executive Board and the Investor Relations team gave in-depth briefings to more than 780 investors at investor conferences as well as during roadshows and conference calls. We thus significantly strengthened our presence further among financial market participants compared with the previous year.

The average daily trading volume of our shares increased minimally by around 1% from approximately 468,000 in 2016 to over 474,000 in 2017. The North America region continued to dominate, yet its proportion of the free float decreased to around 28% (2016: 31%) in comparison with the previous year. By investor type, GARP (growth at reasonable price) and value investors dominated, as in the previous year. In 2017, growing interest could be seen among growth-oriented investors, who meanwhile hold approximately 34% of the free float. At the end of 2017, the top five investors held around 19% of the free float (2016: 17%).

OUR SHARES

Share price development from January 1, 2017 to December 31, 2017

in %



Source: Bloomberg (closing rates).

OUR SHARES

Key share price data[1]

		2017	2016
Dividend[2]	€	1.25	1.20
Share price high	€	114.40	100.05
Share price low	€	87.90	71.40
Year-end share price	€	89.75	99.15
Daily average number of shares traded[3]	number	473,740	468,408
Market capitalization[4] (at year-end)	€ million	39,021	43,108
Market value of authorized shares[5] (at year-end)	€ million	11,599	12,814

[1] Share-price relevant figures relate to the closing price in XETRA® trading on the Frankfurt Stock Exchange.
[2] Subject to approval by the Annual General Meeting.
[3] Based on the floor trading systems of all German exchanges and the regulated market on XETRA®.
[4] Based on the theoretical number of shares (434.8 million).
[5] Based on the number of shares in free float (129.2 million).
Source: Bloomberg, ThomsonReuters.

OUR SHARES

Identified investors by region as of December 2017

in %

Source: Nasdaq Shareholder Identification. Total number of shares outstanding: 129.2 million.

OUR SHARES

Identified investors by type as of December 2017

in %

Source: Nasdaq Shareholder Identification.

COMBINED MANAGEMENT REPORT*

COMBINED MANAGEMENT REPORT*

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*The management report for Merck KGaA, Darmstadt, Germany, has been combined with the Group management report and published in both our 2017 Annual Report as well as in the annual financial statements of Merck KGaA, Darmstadt, Germany. The annual financial statements and the combined management report of the Group and Merck KGaA, Darmstadtm Germany, for 2017 are being filed with the electronic German Federal Gazette (elektronischer Bundesanzeiger) and are available on the website of the German company register.

This combined management report contains certain financial indicators such as EBITDA pre, operating result (EBIT), business free cash flow, net financial debt and earnings per share pre, which are not defined by International Financial Reporting Standards (IFRS). These financial indicators should not be taken into account in order to assess the performance of the Group in isolation or used as an alternative to the financial indicators presented in the consolidated financial statements and determined in accordance with IFRS.

The figures presented in this combined management report have been rounded. This may lead to individual values not adding up to the totals presented.

The separate, combined non-financial (Group) report of Merck KGaA, Darmstadt, Germany, which we issue pursuant to sections 289b – 289e and 315b – 315c HGB, is available as an online version on our website as of April 27, 2018 at http://reports.emdgroup.com/2017/cr-report/. It is integrated into the 2017 Corporate Responsibility Report in accordance with DRS 20 subsection 252 (b). We have prepared an overview of the information contained in the combined non-financial (Group) declaration at https://www.emdgroup.com/nfr17.

Fundamental Information about the Group

The Group

We are a global science and technology company headquartered in Darmstadt, Germany. With a history of nearly 350 years, we are the oldest chemical and pharmaceutical company in the world. In line with our strategic direction, our company comprises three business sectors: Healthcare, Life Science, and Performance Materials.

In Healthcare, we discover, develop and manufacture prescription medicines used to treat cancer, multiple sclerosis, and infertility. Our products help millions of people around the world.

In Life Science, we conduct research for researchers, providing scientists with laboratory materials, technologies and services. Our aim is to make research and biomanufacturing easier, faster and more successful.

Performance Materials develops specialty chemicals and materials for demanding applications – from liquid crystals and OLED materials for displays to effect pigments for coatings and cosmetics up to high-tech materials for the manufacture of integrated circuits.

We operate globally under our corporate brand – the only exceptions are Canada and the United States. In these countries, we operate as EMD Serono in the biopharmaceutical business, as MilliporeSigma in the life science business and as EMD Performance Materials in the high-tech materials business.

Apart from our three business sectors, our financial reporting presents the five regions Europe, North America, Asia-Pacific (APAC), Latin America as well as Middle East and Africa (MEA). As of December 31, 2017, we had 52,941 employees worldwide, which compares with 50,414 on December 31, 2016.[1]

Healthcare

Our Healthcare business sector comprises the three businesses Biopharma, Consumer Health, and Allergopharma. Since 2015, Belén Garijo has been the CEO of our Healthcare business sector and member of the Executive Board. In 2017, Healthcare generated 46% of Group sales and 41% of EBITDA pre (excluding Corporate and Other), making it the largest of our three business sectors. The regions Europe and North America generated 57% of Healthcare's net sales in 2017. In recent years, we have steadily expanded our presence in growth markets. In 2017, Asia Pacific and Latin America accounted for 36% of sales. Our divestment of the Biosimilars business to Fresenius closed on August 31.

BIOPHARMA

Our Biopharma business discovers, develops, manufactures and markets innovative pharmaceutical and biological prescription drugs to treat cancer, multiple sclerosis (MS), infertility, growth disorders as well as certain cardiovascular and metabolic diseases. Biopharma is the largest of our Healthcare businesses. We operate in four franchises: Oncology, Neurology & Immunology, Fertility, and General Medicine & Endocrinology. Our streamlined R&D pipeline positions us with a clear focus on becoming a leading specialty innovator in oncology, immuno-oncology and immunology, including multiple sclerosis.

In 2017, we reinforced our commitment to growing our immunology pipeline to provide new options to better the lives of people with immunological diseases with the receipt of regulatory approvals for Mavenclad® (cladribine tablets) in the 28 member states of the EU as well as Liechtenstein, Iceland and Norway; Canada and Australia. We reached important development milestones for atacicept and sprifermin, reporting our results at key medical meetings around the world.

In June, the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) issued a positive opinion for approval of Mavenclad®. Data from clinical trials indicate that Mavenclad® can lead to high and sustained efficacy through selective modulation of B and T cells, resulting in lasting resolution of inflammation. We have robust data relating to the safety and tolerability profile and consider our unique oral shortcourse treatment to be an important therapeutic option for patients with relapsing multiple sclerosis (RMS) with high disease activity. We view Mavenclad® as a complementary new oral treatment option in our MS product portfolio. Our MS treatment Rebif® is and remains a well-established therapy.

In August, the European Commission (EC) granted marketing authorization for Mavenclad® in the treatment of highly active relapsing multiple sclerosis. In December, the Therapeutic Goods Administration (TGA) in Australia updated the registration including the indication, dosing and safety information of Mavenclad® for the treatment of relapsing-remitting (RRMS), and Health Canada approved Mavenclad® as monotherapy for the treatment of adult patients with RRMS. In January 2018, the Israeli Ministry of Health approved Mavenclad® for the treatment of adult patients with highly active relapsing MS as defined by clinical or imaging features.

[1] The Group also has employees at sites which are not fully consolidated subsidiaries. These figures refer to all people directly employed by the Group and therefore may deviate from figures in the financial section of this report.

We presented data on sprifermin, our investigational treatment for knee osteoarthritis, at the ACR/ARHP Annual Meeting held in November. The study of 549 patients met its primary endpoint, demonstrating statistically significant, dose-dependent increases in MRI total femorotibial joint cartilage thickness from baseline in the two sprifermin groups receiving the highest doses as compared with the placebo group after the two-year treatment period.

We presented a total of 11 abstracts at ACR/ARHP, highlighting the momentum of our various clinical programs in immunology. We presented other data of note on a Phase II post-hoc study analysis of atacicept for SLE patients with high disease activity. In the analysis of ADDRESS II, a 24-week, randomized, placebo-controlled Phase IIb study of 306 people, those who had high disease activity at baseline had three to five times the odds of attaining low disease activity at 24 weeks when treated with atacicept 150 mg dose (n=51) as compared to those treated with placebo (n=52).

Erbitux® (cetuximab) remains the second best-selling drug in the portfolio of our Biopharma business and is our flagship product in oncology. The product is a standard of care for patients with epidermal growth factor receptor (EGFR)-expressing, RAS wild-type metastatic colorectal cancer (mCRC) therapy, as well as both recurrent/metastatic and locally advanced squamous cell carcinoma of the head and neck (SCCHN). We continue to invest in Erbitux® and are committed to making it available to those patients whom it will benefit most.

Together with Pfizer Inc., USA, we are developing much-needed new treatment options for patients with hard-to-treat cancers. In 2017, we made key progress in this area. We have obtained a total of six regulatory approvals for our anti-PD-L1 antibody avelumab under the brand name Bavencio®. The U.S. Food and Drug Administration (FDA) granted two accelerated approvals for Bavencio® for the treatment of adults and pediatric patients 12 years and older with metastatic Merkel cell carcinoma (MCC) and previously treated patients with locally advanced or metastatic urothelial carcinoma (UC). These indications were approved under accelerated approval based on tumor response rate and duration of response. Continued approval for these indications may be contingent upon verification and description of clinical benefit in confirmatory trials. The prognosis for both patient groups is very poor, so for patients around the world this may represent a welcome new treatment option. Furthermore, approvals were granted for Merkel cell carcinoma in Switzerland, Japan, Canada and in the 28 member states of the European Union, as well as Iceland, Liechtenstein and Norway.

Approvals followed in Australia and Israel in early 2018. In addition, Bavencio® was approved for the treatment of patients with urothelial carcinoma in Israel in late January 2018.

The Bavencio® approvals were based on data from our comprehensive clinical development program, JAVELIN, which currently comprises at least 30 clinical programs, including various Phase III trials, and over 7,000 patients evaluated across more than 15 different tumor types. In addition to MCC and urothelial carcinoma, these cancers include breast, gastric/gastro-esophageal junction, head and neck, Hodgkin's lymphoma, melanoma, mesothelioma, non-small cell lung, ovarian, and renal cell carcinoma. Key data from the JAVELIN program were presented at major medical congresses in 2017 to help advance understanding of the field of immuno-oncology, and this will continue in 2018.

In November, we announced that our Phase III JAVELIN Gastric 300 study did not meet its pre-specified primary endpoint of superior overall survival. The study set a high bar for success and although the primary endpoint was not met, we believe that the data will provide valuable insights. We will therefore further examine the data in an effort to better understand the results and intend to present the results at an upcoming medical congress.

In addition, as part of our commitment to developing new treatment options for patients with hard-to-treat cancers who would otherwise have a low chance of survival, we are exploring all potential options and have entered into four new strategic collaborations to evaluate avelumab in combination with a range of complementary oncology medicines (further details can be found under "Research & Development").

An important growth driver for our Biopharma business is our portfolio of fertility products that help couples conceive a child, ranging from drugs to technologies. Infertility has become a key topic globally due to the trend towards delaying childbirth. We see steadily increasing demand in growth markets fueling sales. In addition, we are facing a rapidly changing environment in the fertility market, changes in competitive environment trending towards increased price pressure in the drugs business, more educated patients and an increasing importance of technologies in Fertility. The innovative strategic objective of our Fertility business is to develop from the world market leader in fertility drugs into an integrated fertility treatment partner. We are therefore focusing on turning these trends into opportunities for our company to achieve further growth. The first step to achieve this goal was to complement our existing drug portfolio with a continuously expanding innovative technologies offering.

We are the only company to offer recombinant versions of the three natural hormones needed to treat infertility as well as a complete and clinically tested portfolio for every stage of the reproductive cycle. We are continuously supporting patients on their IVF journey. In November, the FDA approved a new version of the Gonal-f® (follitropin alfa injection) prefilled pen that is easy-to-learn and easy-to-use (please refer to the R&D section for details). Earlier in the year we received regulatory approval for the new Pergoveris® pen in Europe (please refer to the R&D section for details).

Our Fertility Technologies business continues to broaden its footprint. In December, we announced U.S. FDA 510(K) clearance of the benchtop embryo incubator Geri™[1]. This innovative technology, designed to improve processes in fertility laboratories, will be commercially available to IVF clinics in the United States as of the first half of 2018. In early 2017, we announced the release of two advanced Fertility Technologies products for improved efficiency in the assisted reproductive treatment (ART) lab, Eeva® Test 3.0 and Geri™ humidified incubation products.

In January, we opened our first Center of Excellence (CoE) for fertility, an international state-of-the-art facility for high-quality training of healthcare professionals, such as physicians and embryologists, to improve clinical practices, protocols and clinical outcomes.

[1] Geri™ is not yet available in the United States.

Every day, more than 60 million patients around the world use our trusted general medicine and endocrinology (GM&E) medicines. Today, Concor®, Euthyrox®, Glucophage® and Saizen® are high-value brands and market leaders in many key markets around the world. As a result, in terms of sales GM&E is the largest business franchise of our Healthcare business sector, with strong double-digit growth in all major therapeutic areas in 2017, contributing significantly to the overall profitability of Biopharma and Merck KGaA, Darmstadt, Germany. Although no longer patent-protected, the brand equity built over decades makes our flagship products cornerstones for the treatment of chronic cardiovascular, metabolic and endocrine diseases.

Concor®, containing bisoprolol, is the leading beta-blocker for chronic cardiovascular diseases such as hypertension, coronary artery disease and chronic heart failure. With a market share above 40% and double-digit sales growth, Euthyrox® (active ingredient levothyroxine) is the worldwide market leader for treating hypothyroidism, a disease with high prevalence but low diagnosis in most emerging markets. Glucophage®, containing the active ingredient metformin, is the drug of choice for first-line treatment of type 2 diabetes. In May, the Medicines and Healthcare products Regulatory Agency (MHRA) in the United Kingdom authorized Glucophage® SR (sustained release formulation; metformin) for the reduction in the risk or delay of the onset of type 2 diabetes in adult, overweight patients with impaired glucose tolerance (IGT) and/or impaired fasting glucose (IFG), and/or increased glycated hemoglobin (HbA1c), when intensive lifestyle changes for three to six months have failed. In addition to the United Kingdom, we have approvals in the indication of prediabetes in 16 markets and see great potential due to an increasing prevalence of diabetes.

We also help to raise awareness and education in the areas we operate in, such as thyroid diseases and diabetes. For example, we took part in International Thyroid Awareness Week and announced a partnership with the International Diabetes Federation (IDF), which will serve as a basis for joint education and communication activities to raise awareness of the importance of type 2 diabetes prevention.

Saizen® (somatropin) is our main endocrinology product and is indicated for the treatment of growth hormone deficiency (GHD) in children and adults. Saizen® is delivered with the easypod™ electromechanical injection device, the only growth hormone injection device of its kind. easypod™ is able to wirelessly transfer data such as injection times, dates and doses to the web-based software system easypod™ connect, making it easier for healthcare practitioners and patients to ensure adherence and reach their treatment goals.

At the 2017 Pharmaceutical Market Excellence Awards, we won in the category “Excellence in Innovation”. We were awarded for our eHealth ecosystem designed to improve treatment outcomes by working with patients, carers and healthcare professionals.

CONSUMER HEALTH

Our Consumer Health business focuses on consumer-centric innovation under the umbrellas of several strategic brands such as Neurobion®, Bion3®, Seven Seas®, Nasivin®, Femibion® and Dolo-Neurobion®, as well as Vivera®/Floratil®, Sangobion®, Vigantoletten®, Apaisyl®, and Kytta®. The aim is to emotionalize these over-the-counter and food supplement brands so that they become irresistible love brands in the eyes of our consumers and customers alike. Most of these brands are fully aligned with the newly established purpose of the Consumer Health business: “We exist to prepare society for a new era of humans living 100 healthy years.”

Global megatrends favor the future growth of our Consumer Health business. People are becoming more health-conscious and looking after their own physical well-being. Preventive healthcare and minimally invasive treatment are growing in importance in both established and developing markets, the latter characterized by a growing middle class with specific needs. As people and societies are growing older than ever before, Consumer Health has established a movement around its new purpose of actively driving change in the societies it operates in, all under the independent label and motto “WE100®.”

Consumer Health currently ranks among the top 15 players in the global OTC market and already generates more than 50% of its annual sales in developing growth markets. In particular, markets such as Mexico, Brazil, Poland, Greece, South Africa, India, Indonesia, Thailand, and Malaysia are delivering significant growth rates. To further align the regional strategies with the strategic brand strategies and to even better focus on efficient region-brand combinations, the business has reorganized its brand structure into a brand-franchise model leveraging its full expertise and capabilities across functions.

On September 5, we announced that we are preparing strategic options for our Consumer Health business, including a potential full or partial sale of the business as well as strategic partnerships. This is consistent with our focus on our innovation-driven Biopharma pipeline.

ALLERGOPHARMA

Our allergy business Allergopharma is one of the leading companies in the field of allergy immunotherapy (AIT). The Allergopharma portfolio includes a diverse spectrum of approved allergen products that meet high quality standards. AIT (hypo-sensitization, desensitization, specific immunotherapy) is the only causal therapy for treating allergies to unavoidable allergens.

We manufacture products to diagnose and treat type 1 allergies such as hay fever or allergic asthma. Our allergy business offers high-dose, hypoallergenic, standardized products for allergen immunotherapy of pollen and mite allergies. These allergoids have a special focus in Allergopharma's product portfolio and constitute a cornerstone in its integrated health approach for patients suffering from these conditions. For effective treatment, reliable diagnosis is key. Allergopharma offers a broad range of diagnostics in the field of allergies with more than 100 single allergens, providing physicians with the specific tools needed to identify the substances causing an allergy. In addition, Allergopharma provides individual allergen extracts on a named patient basis, which are needed to treat less frequent allergies. Personalized medicine has been a reality for Allergopharma for many years now. Products of Allergopharma are available in 18 countries worldwide.

Life Science

In our Life Science business sector, our purpose is to solve the toughest problems in life science by collaborating with the global scientific community – and through that, we aim to accelerate access to health for people everywhere. Udit Batra has been the CEO of our Life Science business sector since 2014 and a member of our Executive Board since 2016. In 2017, Life Science generated 38% of Group sales as well as 38% of EBITDA pre (excluding Corporate and Other).

We serve customers in academia, biotech and pharma – helping them to deliver the promise of their work better, faster and safer. As a leading player in the life science industry, we offer innovative solutions for scientists and engineers at every stage.

Our 300,000 products range from lab water systems to genome-editing tools, antibodies and cell lines, as well as end-to-end bioprocessing systems to support the manufacturing needs of both emerging biotech and large pharma companies. For example, our Life Science business sector created the first-ever commercially available cell line platform for faster, simpler selection and scale-up of high-producing clones for making recombinant protein drugs. Used to produce biopharmaceuticals, the CHOZN® cell line has been proven to shorten bioproduction times in early development, enabling customers to enhance their speed to market and decrease costs.

Another example is our Life Science business sector's Mobius® single-use bioreactors, which help customers move closer to fully disposable manufacturing. Single-use technology is becoming increasingly popular in the industry. With single-use disposable equipment, customers get improved batch turnaround times, reduced risk of product cross-contamination, decreased capital costs and have less equipment to clean.

After successfully orchestrating the largest integration in the history of our company, our Life Science business sector redesigned its organizational structure in the second quarter of 2017 to capture growth opportunities even more nimbly and to align the entire organization to optimally contribute to, and capitalize on the strength of the Group. Strategic Marketing & Innovation units and commercial teams have been streamlined into three distinct business units – Research Solutions, Process Solutions and Applied Solutions – with each designed to increase agility and drive sustained entrepreneurship to better serve our customers.

Our Life Science business sector generates recurring sales and stable, attractive cash flows in an industry characterized by stringent regulatory requirements. A highly diversified and loyal customer base additionally ensures a low-risk profile. We benefit from a broad and relevant portfolio, a highly efficient supply chain that includes an e-commerce platform and global reach.

Our e-commerce platform, www.sigmaaldrich.com, allows customers in nearly every country to easily find the exact products needed to advance their research. Currently, more than 80% of our Life Science business' legacy products are available on the platform. In 2016, we implemented a centralized initiative to manage all customer acquisition channels and scaled search advertising to include more than two million active keywords to drive increased web traffic to the content customers are seeking. In 2017, we continued to optimize our web channel and streamline the customer experience, resulting in increased user sessions and revenue.

We continued our journey to spark curiosity in the next generation of scientists with a year-long Curiosity Cube™ tour across the United States. The tour was built on the business sector's successful Curiosity Labs™ program, where employee volunteers brought leading-edge science, technology and experiments to tens of thousands of students around the globe – aiming to inspire a future career in Science, Technology, Engineering and Math (STEM). Through 2017, the Curiosity Cube™ – a retrofitted shipping container transformed into a mobile science lab – visited 79 schools, held 54 public events and reached 38,040 students.

The Life Science Research Solutions business unit serves customers focused on identifying and developing new medicines. We offer a broad and relevant portfolio of solutions that enables scientific discovery through collaborative partnerships across the customer journey. This includes more than 200,000 products and services, including molecular platforms, protein and pathway technologies, biochemicals, materials science and cell culture workflow tools.

In May, we acquired Grzybowski Scientific Inventions (GSI) to complement our industry-leading e-commerce platform and chemistry portfolio of more than 400,000 building blocks, catalysts and reagents for chemical synthesis. GSI developed a revolutionary computer-aided retro-synthesis tool, used to advance reaction rules and proprietary algorithms to identify synthesis pathways that meet user-defined constraints. Virtual synthesis significantly reduces the time between chemical target conception and route evaluation by using a lab's preferences to filter millions of data points.

The Process Solutions business unit delivers end-to-end products and expertise to customers who take what is developed in labs and manufacture it. We offer a diverse range of products to pharmaceutical and biotechnology companies that enables customers to develop large- and small-molecule drugs safely, effectively and cost-efficiently. The 15,000-plus products and services in this business unit include single-use manufacturing, filtration, chromatography and purification, virus reduction, pharma and biopharma raw materials, drug delivery compounds and engineering and validation services.

As a leader in single-use technology, we launched an industry-first program that allows more flexibility, better supply predictability and shorter lead times for safer and more efficient drug manufacture through the Mobius® MyWAY portfolio. This is critical to customers ranging from contract manufacturing organizations to large pharma companies, whose biggest challenge is getting custom assembly with fast, reliable lead times for quicker turnarounds and more rapid biomanufacturing.

Our single-use chromatography portfolio was boosted in August with an agreement to acquire Natrix Separations, a provider of hydrogel membrane products based in Ontario, Canada. Natrix is known for its unique technology platform, which delivers high productivity and impurity removal in a single-use format. The acquisition complements our efforts to drive next-generation bioprocessing, ultimately enabling faster and more efficient technology for customers.

In September, China's first BioReliance® End-to-End Biodevelopment Center was opened in Shanghai. The center provides a full range of process development capabilities and services, including cell line development, upstream and downstream process development and non-GMP clinical production. The center is designed to meet the specific needs of customers in the APAC region.

The Applied Solutions business unit supports customers in their efforts to ensure that drugs, food and beverages are safe for consumption. We provide trusted products and comprehensive workflow solutions that streamline processes, lower costs and deliver consistent, reliable results. Our 62,000-plus products and services include analytical separation systems, reference materials, lab water instruments with consumables and services, and microbiology and bio-monitoring testing materials.

Our Life Science business sector reinforced its commitment to food safety with the acquisition of BioControl Systems Inc., offering customers a complete workflow solution for food pathogen testing. BioControl's established rapid-detection technology and third-party-validated testing platforms complement our current portfolio of instruments and consumables. The acquisition strengthens our ability to help customers protect the global food supply by providing an extensive portfolio of state-of-the-art testing technology.

Following the acquisition, we opened our first customer food-safety studio, located in Bellevue, Washington, USA, for manufacturers of all types of food. The new center gives customers access to a complete food-safety workflow, from raw materials testing to finished-product safety testing, to help find, correct and prevent hazards within the food supply chain. The investment brings teams together in a workspace designed to foster open innovation and collaboration aimed at our becoming the leader in food-safety testing.

In March, we marked the 50th anniversary of our first lab water system launch and introduced worldwide the Milli-Q® IQ 7000, the seventh-generation Milli-Q® water purification innovation. There have been tremendous advancements in the lab, and today's scientists continue to seek ways to improve reproducibility and reliability of data. The new lab water system addresses these pain points. Milli-Q® water has become synonymous with ultrapure lab water and is the most cited brand in peer-reviewed publications.

Performance Materials

Our specialty chemicals business is combined in our Performance Materials business sector. The portfolio includes high-tech chemicals for applications in fields such as consumer electronics, lighting, coatings, printing technology, paints, plastics, and cosmetics. Performance Materials comprises four business units: Display Materials, Integrated Circuit Materials, Pigments & Functional Materials, and Advanced Technologies. In September 2017, Kai Beckmann, a member of our Executive Board since April 2011, succeeded Walter Galinat as CEO Performance Materials. In 2017, our Performance Materials business sector's share of Group sales amounted to 16% and its share of EBITDA pre (excluding Corporate and Other) was 21%. The EBITDA pre margin amounted to 40.1% of sales.

Global demand for innovative display solutions has continued to grow in recent years. The demand for high-quality consumer electronics, such as high-resolution televisions and smartphones, will rise further in the coming years. This will be accompanied by the building of new capacities and growth in volume demand, driven primarily by large-screen televisions. In Display Materials, our largest business unit, we observed a normalization of our market shares in the liquid crystals sector in 2017. We want to stabilize this situation by further strengthening our position as market and technology leader. Key to this are new, sophisticated liquid crystal technologies, such as SA-VA (self-aligned vertical alignment) and UB-Plus (ultra brightness). Both new technologies are being intensively tested by customers – initial quantities to manufacture the corresponding display panels have already been sold. The innovative, energy-saving liquid crystal technology UB-FFS (ultra-brightness fringe-field switching) for small and medium-sized displays recorded double-digit growth compared with 2016. In addition, we further enhanced our ability to support customers in solving process technology issues. In 2017, we made further progress in developing new applications for liquid crystals. For example, we opened the first production facility for switchable liquid crystal window modules in Veldhoven, the Netherlands. This is an important milestone for capturing a new market segment for liquid crystals. Frost & Sullivan recognized our liquid crystal window technology with the Technology Innovation Award 2017. We also made good progress in applying liquid crystal technologies to smart antennas and automotive headlight systems, where we expect to generate initial sales in 2018.

In 2017, our annual "Displaying Futures" symposium, which took place in Tokyo, focused on the topic of Digital Transformations. We host this symposium in order to stimulate an interdisciplinary dialogue on the development and potential of technologies and their future impact on society. Experts in robotics, artificial intelligence (AI) and design participated, elucidating digital transformation from the various perspectives. Back in 2016, we launched the Displaying Futures Award to promote young entrepreneurs and researchers. The aim of this year's call for proposals was to identify flexible applications in the field of hybrid electronics. The prize, worth US$ 50,000, was awarded to three teams from Canada and the United Kingdom.

Integrated Circuit Materials is our second-largest business unit and supplies products to manufacture integrated circuits and microelectronic systems, for antireflection coatings, and for the miniaturization of transistor structures. Deposition materials and conductive pastes for semiconductor packaging round off the portfolio. As an important partner to leading global electronics manufacturers, the business unit achieved very strong organic sales growth and gained relevant market shares in an overall positively developing semiconductor market. Particularly strong growth was generated by materials for dielectric insulating layers and metal layers deposited from the gas phase used for advanced processors and latest-generation storage chips. At industry events such as the international trade show for semiconductor technology Semicon Korea, SPIE Photonics West in San Francisco, California, USA, and Semicon Taiwan, we presented our portfolio expanded by the acquisitions of SAFC Hitech and Ormet Circuits. At the International Conference on Atomic Layer Deposition (ALD) in Denver, Colorado, USA, we presented our latest advances in coating technology. In order to support our business expansion in Asia, we opened a new research and application center at our site in Kaohsiung, Taiwan. The center houses two laboratories developing applications for coating materials and semiconductor packaging in order to provide future-oriented support to our customers.

The Pigments & Functional Materials business unit develops and markets a comprehensive product portfolio of decorative effect pigments and functional materials. Our effect pigments are primarily used in automotive and industrial coatings, plastics, printing applications, cosmetics and some foods, in order to give products a unique luster. Functional materials include laser marking, conductive additives, applications for counterfeit protection as well as high-quality cosmetic active ingredients, for example for use in skin care, as well as sun protection and insect repellants. In 2017, we introduced Xirallic® NXT Cougar Red as a new product for coating applications. It belongs to the improved product generation of the well-known high-tech effect pigments and stands out due to an attractive bluish red and very intense glitter. We developed a special clear coat for new effect dimensions in automotive coatings in cooperation with Daimler, the coatings specialist PPG Industries and the Fraunhofer Institute for Manufacturing Engineering and Automation. This new development, which was presented at Sucar, the international conference on automotive body finishing in Cannes, France, can significantly intensify the effect on existing OEM base coats, making it possible to create completely new color tones. For its innovative 3D effect printing technology, our company entered into a strategic partnership with Schmid Rhyner of Switzerland. The aim is to further develop this innovative printing process with effect pigments for various surfaces and markets. We added Tivida® FL 3000 to our portfolio of fluorosurfactants. Its competitive differentiation is based on its favorable ecotoxicological profile, and even in very low concentrations it significantly improves the flow and wetting behavior of coating systems.

At the Laser World of Photonics 2017 exhibition, we presented a new pigment for laser marking in a new application field. Iriotec® 8826 is particularly suitable for dark and high-contrast marking of colored polymers and for the first time enables the laser marking of films. Besides materials for technical applications, we are working on innovative materials for cosmetics. In 2017, two new raw materials complemented our portfolio: RonaCare® Pristine Bright liquid, a liquid variant of an active ingredient that makes the skin appear naturally lighter, and an alcohol-free variant of the anti-aging active ingredient RonaCare® CP5.

In 2017, we opened a new application laboratory in Shanghai, China. It is the first application laboratory for pigments and functional materials in China, through which we offer our customers comprehensive tailored services for our products and at the same time work with them to develop new products. China is one of the fastest-growing markets for our pigments and cosmetics businesses. With the new application laboratory, we are continuing our 20-year commitment in this business in China and Southeast Asia, and are underscoring our leading position in pigments and functional materials.

At the International Symposium on Automotive Lighting (ISAL) in Darmstadt, we presented our functional pigments for lighting applications. With these pigments from the Iriotec® 8000 series, circuit layouts can be integrated into injection-molded components or powder-coated components in laser direct structuring processes. Laser structuring of the components offers tremendous design freedom, especially since these pigments also enable light-colored design in addition to dark modules.

In 2017, the Advanced Technologies business unit invested further, particularly in future-oriented research and development in Performance Materials. A very good example of this are our materials for organic light-emitting diodes (OLEDs). The OLED materials business is one of our fastest-growing businesses. We worked intensively to improve materials for televisions, for instance. Brighter displays and a larger color spectrum were two areas of focus. At our debut at the International Motor Show (IAA) in Frankfurt, Germany, we exhibited rear lights with OLED materials, for instance. As OLEDs are extremely thin and lightweight, the parts require only little space. This allows rear lights in new forms, giving vehicle designers even greater possibilities in the future. OLED materials also permit free-form displays in vehicle interiors, which expands the design possibilities even further. The technology permits particularly vivid contrasts, brilliant colors, sharp images, and pleasant readability. We are continuing to drive OLED technology forward. The capacities at the application laboratory in Korea were doubled in 2017. High-quality phosphors are used for the backlighting of liquid crystal displays. We launched our new full-spectrum phosphors for application in violet chip-based LEDs. They are very luminous and achieve a high color rendering index and a spectrum that comes very close to natural sunlight. Apart from the use of OLED materials in displays, we are continuing to target the lighting market.

In the field of organic photovoltaics, more and more pilot projects demonstrate the manifold applications of the technology in architecture. In initial construction projects in Europe and Brazil, printed solar foils turn glass façades and canopies into active power generators. In 2017, we received the Innovation Award Architecture + Building at the BAU 2017 for our organic photovoltaic modules developed in cooperation with Belectric OPV.

Strategic realignment

In 2018, we want to focus even more strongly on the needs of our customers and markets. Therefore, in December 2017, we announced that we will combine our expertise in three newly created business units aligned with our target markets: Display Solutions, Semiconductor Solutions and Surface Solutions.

Objectives and Strategies

General principles and Group strategy

GENERAL PRINCIPLES

Our company is a vibrant science and technology company. Across Healthcare, Life Science and Performance Materials, we bring expert and high-quality products to the world. Our aim is to achieve technological progress that will improve life and make our customers and business associates more successful. This aspiration is embodied by value-based and economically sustainable corporate governance, and steers the strategic development of the Group.

Our annual strategic development process follows firmly defined principles. Our business portfolio is expected to be adequately balanced at all times so as to reflect an optimum mix between entrepreneurial opportunities and risks and ensure the long-term success of the company. We achieve this through our diversification into three complementary business sectors that make the company as a whole less dependent on economic cycles, as well as by further expanding our presence in global growth markets. This exemplifies the long-term direction of our Group strategy. The company structure of Merck KGaA, Darmstadt, Germany, also contributes to this. The Merck family holds approximately 70% of the capital of Merck KGaA, Darmstadt, Germany, via E. Merck KG, Darmstadt, Germany, the personally liable partner. In addition, the structure requires the Executive Board, whose members are also personally liable partners, to pay special attention to the long-term value creation.

For us, the principle of long-term thinking and actions applies not only to economic aspects, but also encompasses corporate responsibility. We pursue three strategic spheres of activity: health, environment as well as culture and education. The focus is always on the future viability of society and the competitiveness of our company. With our current and future product portfolio, we want to help meet global challenges, from urbanization to aging populations.

GROUP STRATEGY

Over the past decade, our company has transformed itself from a classic supplier of chemicals and pharmaceuticals into a global science and technology company. The main driver was the transformation of our business portfolio, particularly through the divestment of our Generics business (2007) and the acquisitions of Serono (2007), Millipore (2010), AZ Electronic Materials (2014), and Sigma-Aldrich (2015). In addition, we focused our businesses on innovation-driven and highly specialized products, extensively revamped our internal structures and processes, and expanded our presence in global growth markets. In line with this strategy, we completed the divestment of our Biosimilars business in 2017. In addition, we are preparing strategic options for our Consumer Health business, including a potential full or partial sale of the business as well as strategic partnerships.

Today, we hold leading positions in the respective markets of our three business sectors Healthcare, Life Science and Performance Materials, and are working to bolster and expand these. To this end, we are pursuing innovation-driven, organic growth. For instance, by 2022 we are targeting sales of around € 4 billion with new products. New medicines from the pharmaceutical pipeline are to contribute around € 2 billion, with Life Science and Performance Materials innovations each contributing around € 1 billion in sales.

Targeted acquisitions capable of meaningfully complementing or boosting our strengths remain a growth option. However, we continue to rule out major acquisitions of more than € 500 million as long as the debt level expressed as the ratio of net financial debt to EBITDA pre is greater than 2, unless divestments could be used to finance them. By the end of 2018, we aim to reduce our debt level to below 2 again. At Group level, we reduced our net debt by around € 1.4 billion in 2017. At the same time, strict financial discipline supports the rating of the Group. Our dividend policy reflects a sustainable earnings trend.

Our Group strategy aims to resolutely continue the transformation of Merck KGaA, Darmstadt, Germany, into a science and technology company and to position the company as a leading player in a changing market environment. We focus on three areas of key priority, namely “Performance”, “People” and “Technology”.

Priority area "Performance"

The priority area "Performance" encompasses all activities that create sustainable, profitable growth. To this end, we are closely aligning our businesses with the wishes and needs of customers and patients, not only through our products, but also best possible proximity. The basis for this is formed by efficient structures and processes as well as sustainable financial management.

In Healthcare, the strategic direction is to become a global specialty innovator and we aim to maximize growth of existing franchises and to deliver pipeline with an average of one product launch or indication per year from 2017. We intend to keep our base business organically stable until 2022. In 2017, the potential of the pipeline materialized with six approvals for Bavencio®, two in the United States, and one in the EU, in Switzerland, in Japan, and in Canada, as well as for Mavenclad® in the EU, Canada and Australia.

In Life Science we deliver above-market organic growth by having a broad portfolio that addresses the needs of the scientific community, particularly in high-growth areas, for instance bioprocessing. We achieve solid organic sales growth consistently, even during the integration. Our profitability is industry-leading, driven by our e-commerce platform and synergies from the rapid integration of Sigma-Aldrich into our Life Science business sector. By the end of 2018, we expect to realize € 280 million in planned synergies.

In Performance Materials, we expect that our Semiconductor and Surface Solutions business units, which are developing well, will continue to mitigate the consequences of the fiercer competitive environment in our Liquid Crystals business in 2018. Going forward, we want to further enhance our degree of diversification. In addition, new technologies are in the testing phase. Our goal is to achieve innovation and technology leadership in all businesses and to push forward with innovative solutions in applications beyond displays.

From a regional perspective, in view of the importance of the Chinese market and China's ambitious plan to become a global leader in innovation and technology, we are placing further importance on bolstering our positioning in this country. China will remain one of the most strategically important markets for us globally. By focusing on growth contributions from China and driving innovation and digitalization across our business sectors, we are fostering the development and evolution of the Chinese innovation landscape. Our Healthcare business sector continues to aim for very strong growth and is improving the lives of millions of patients in China, in particular with medicines from our General Medicines franchise, for example to treat cardiovascular diseases, as well as our Fertility franchise. Our Life Science and Performance Materials business sectors help Chinese companies and research institutes to become more competitive and efficient. We work with Chinese pharmaceutical companies on manufacturing and research processes and we make materials for Chinese electronic and display manufacturers.

Priority area "People"

The priority area "People" addresses how we as a science and technology company can create a working environment that meets our employees' individual needs and allows curiosity to unfold. Our growth strategy calls for people with diverse experience and backgrounds who work together on the basis of shared values to create innovation and respond flexibly to changing demands.

The basis for this is the ability to identify talented employees within the company early on and to systematically promote them – also across business sectors and countries. Moreover, it is crucial to be perceived as an attractive employer in the market in order to continue to capture the interest of potential employees. The fact that we rank among the world's best employers was also confirmed by the distinction as "Global Top Employer 2017" by the Dutch Top Employers Institute. In addition, we were ranked fourth among biotechnology and pharmaceutical companies worldwide by Science magazine, a leading peer-reviewed international scientific publication.

In the course of our transformation, our leaders play a key role. They are responsible for driving our strategy forward by building the right competencies, thereby enabling innovation. We therefore place great importance on the continuous advanced training and further development of our leaders. This is essential for them to address the diverse needs of their team members and the changing requirements of the businesses and of digitalization.

Based on employee feedback and external benchmarking, we are also continuously further developing our existing programs and processes. Our award-winning people analytics approach, which for example empowers our leaders to make data-driven decisions on matters relating to their functions and people, has been rolled out to all people managers globally. Other pilot initiatives focus on, among other things, strengthening the engagement and innovation potential of our research and development units, and on flexible ways of collaborating across national and departmental boundaries.

Priority area "Technology"

The priority area "Technology" covers the closely interlinked areas of innovation and digitalization. Developing and marketing innovative products and services are at the forefront of our Group strategy and all the business strategies. Our objective is to foster innovations both within the businesses and between them as well as beyond existing businesses into areas in which we are not yet active.

In particular, we want to capture the opportunities that digitalization offers in order to create value for patients, customers and business associates. To us, digitalization means the digital integration of our entire value chain, the digitalization of our products, services and communication interfaces to customers as well as the development of new digital business models. This is supported by state-of-the-art methods to collect and analyze vast amounts of data. For example, we generate additional sales from our e-commerce platform www.sigmaaldrich.com using algorithmic optimization of ads and product recommendations. Other examples include a supply chain project with our partner Palantir Technologies, where we are using

advanced analytics to better forecast drug demand and to optimize our inventories. Within the scope of this partnership, we want to leverage Palantir's advanced data analytics capabilities to more rapidly develop and deliver medicines and commercialize new products. This could also play a part in the development of entirely new therapeutic options for patients in the future. Initially, we will use Palantir's technology in cancer treatment and patient services. Later on it can be used in other areas of the company. Our computer-aided retrosynthesis tool Chematica is also using advanced algorithms to help customers in medicinal chemistry and drug discovery to identify synthesis pathways.

Furthermore, we are working Group-wide to expand the physical and virtual infrastructure for technology-driven growth. The centerpiece is formed by our Innovation Center in Darmstadt. A modular Innovation Center was opened in April 2015 in Darmstadt as a prototype of the new Innovation Center that will be opened in spring 2018. The Innovation Center aims to develop entirely new businesses beyond the current scope, bringing together people, technologies, and skills from different areas under one roof.

We seek to establish projects in various strategic innovation fields of interest that we consider promising. The first such innovation field, "Biosensing and Interfaces", focuses on the vast opportunities created by combining new sensor technology with smart algorithms and Big Data technology. This is expected to lead to new predictive and prescriptive approaches to treat and support patients in the therapeutic areas that we address. We want to offer innovation projects ideal conditions in the Innovation Center to grow into viable new businesses in an environment that provides both entrepreneurial freedom and dedicated support.

Additionally, the Innovation Center establishes strong connections to the start-up community, scientific centers of excellence, and external partners across industries, for example via our Accelerator program, that supports early-stage start-ups for a period of three months. The start-ups receive financial support, training and coaching as well as access to our experts from the businesses. Since the program began in September 2015, we have received more than 2,000 applications from over 70 countries and have mentored 30 start-ups.

Within the scope of our innovation strategy, we have established our strategic corporate venture capital fund with a total volume of € 300 million to manage funds focused on Healthcare, Life Science, Performance Materials and New Businesses. Our corporate venture capital fund invests globally in transformational ideas driven by strong entrepreneurs. We take an active role in our portfolio companies and team up with entrepreneurs and co-investors to translate innovation into commercial success. We have a significant focus on early-stage investing and company creation, including the formation of spin-offs to leverage our science and technology base. Our corporate venture capital fund currently has an active portfolio of 30 companies.

Building on our 350-year history, the Darmstadt site is making a vital contribution to the company's future in research-based specialty businesses. It serves as a key site for R&D and high-quality production for all our business sectors in their global markets, as the heart of our company, as our global headquarters as well as the base for the family boards, executive management and our Group functions.

Business strategies

HEALTHCARE

Our Healthcare business sector comprises the three businesses Biopharma, Consumer Health and Allergopharma. The diversity and profound medical expertise we have in these businesses are core strengths and key differentiators in the market. Within each business, we specialize in key therapeutic areas and specific diseases.

Global megatrends such as a growing world population and an increase in average life expectancy are driving the demand for our healthcare products. To meet these demands and respond appropriately to the dynamics of our healthcare markets, we have significantly transformed our Healthcare business sector in recent years. Following on our successes of the past year, we continue to drive pipeline projects with the aim of bringing groundbreaking medicines to patients, maximizing our existing portfolio and continuing our expansion in growth markets.

The ambition of our Healthcare business sector is to become a global specialty innovator, to operate in therapeutic areas with significant unmet medical need and to bring high value to patients and consumers. Therefore, we invest heavily in research and development to discover new treatment options and improve existing ones. Together with our stakeholders and partners, we want to ensure that people can access the medicines they need to stay healthy and live longer.

The first pillar of our strategy is to reinforce our global footprint by developing our tailored portfolio to address unmet medical needs in all regions worldwide. While developed markets such as the United States, Japan and Europe are key strategic markets for our specialty products, sales in growth markets such as China will be driven by both our biologics and broad general medicine and cardiometabolic care portfolios. At the same time, it will be essential for us to continue to focus our efforts on growing in the United States in order to realize our ambition of becoming a truly global leader.

The second pillar of our strategy is the focus on specialty medicine therapeutic areas. Here, we are concentrating our efforts on oncology, immuno-oncology, as well as neurology and immunology. For example, we have made significant investments in R&D, especially in areas of unmet medical need, and refined our focus on mechanisms of action and molecules that are expected to lead to transformative innovations in cancer care and immunological disorders. Our aim is to turn cancer patients into cancer survivors by being at the forefront of changing the future of cancer care. Further development programs for neurology and immunology include evobrutinib as a potential treatment for multiple sclerosis, systemic lupus erythematosus as well as rheumatoid arthritis; atacicept as a potential treatment option for lupus patients with high disease activity; and sprifermin as a potential therapy for patients with osteoarthritis of the knee.

Our aspiration is to develop high-quality, first-to-market and best-in-disease assets, and to build a portfolio in each of our therapeutic areas. We have streamlined our pipeline and expanded our innovation capabilities with strong investigational drug candidates. In order to maximize the impact of our R&D investments and increase our chances of success in discovering and developing new therapies, we focus our expertise on specific therapeutic areas and are exploiting synergies in disease mechanisms and biological pathways.

In this context, strategic collaborations are an integral part of delivering on our commitment to transforming the lives of patients living with serious unmet medical needs. We recognize the value of collaboration in the research and development of breakthrough therapies, as well as in strengthening our current portfolio. Here, we focus on balancing the right blend of internal capabilities and external partnerships, building strong collaborations with other leaders in industry, including Pfizer, Genea Biomedx and Vertex Pharmaceuticals.

We are innovating beyond our pipeline projects with our Medical Devices and Services unit and our Fertility Technologies. In addition to innovative therapeutic approaches, the way in which we engage with patients will be vital to achieving our objective of becoming a global specialty innovator.

Our divestment of the Biosimilars business to Fresenius closed on August 31. On September 5, we announced that we are preparing strategic options for our Consumer Health business, including a potential full or partial sale of the business as well as strategic partnerships. The Biosimilars divestment as well as the decision to examine strategic options for Consumer Health were both aligned with our strategy to focus on our pipeline of innovative medicines.

LIFE SCIENCE STRATEGY

As a leader in the large and growing life science industry, our purpose is to solve the toughest problems in life science by collaborating with the global scientific community.

We have a portfolio of more than 300,000 products, in order to support a broad customer base – including academia, pharma and biotech labs, pharma manufacturing, biotech manufacturing, clinical diagnostics, environmental testing, food and beverage and industrial. We have an industry leading e-commerce platform, www.sigmaaldrich.com, which offers life science solutions, services and expertise across the entire biopharma value chain.

To create sustainable value for the future, Life Science has set a strategy to:

- Deliver the integration to combine the strengths of our legacy life science business and Sigma-Aldrich
- Strengthen the core business by investing in high growth areas, addressing our customer needs and enhancing capabilities
- Place bold bets in areas with transformative potential in order to establish new pillars of growth

The Sigma-Aldrich integration has been ahead of plan and we continue to be on track as we begin year three of the integration. The synergy estimate was raised from € 260 million to € 280 million. We will leverage best practices from both organizations, combine our sales force for one face to the customer, and continue to harmonize processes for employees and customers.

We have tailored our strategy and will continue to manage our business based on scale and growth to optimize the overall performance and portfolio of our Life Science business sector. We have further streamlined our organizational structure to capture growth opportunities even more strongly. Strategic Marketing & Innovation units and commercial teams are now reorganized into three distinct, vertically integrated business units: Research Solutions, Process Solutions and Applied Solutions, with each designed to increase agility and drive sustained entrepreneurship to better serve our customers. We also announced a number of acquisitions in 2017. These include BioControl Systems to strengthen our leadership in biomonitoring, specifically in the food and beverage sector, as well as Grzybowski Scientific Inventions to boost capability in chemical synthesis, and Natrix Separations to advance in next-generation bioprocessing.

Based on a broad assessment of the market, competitive landscape and key industry trends, in 2016 we identified several strategic initiatives in important growth areas. For example, in genome editing and novel modalities, we have built intellectual property in key areas,

with patents granted in the European Union, Australia, Canada, and Singapore. The patents provide protection of our CRISPR technology, while giving scientists the ability to advance treatment options for the toughest medical challenges. In our BioReliance® End-to-End initiative we work with emerging biotech companies in process development, drug production and facility design services that help biopharmaceutical companies accelerate the progression of molecules into the clinic and towards commercialization.

PERFORMANCE MATERIALS

In our Performance Materials business sector, we want to sustainably secure our market and technology leadership in display materials. In addition, we want to leverage our expertise in liquid crystals beyond the application field of displays. At the same time, we benefit from the trends in the semiconductor industry, continue to lead the market in pearlescent pigments, and share in the growth of the cosmetics industry.

Global demand for innovative display solutions grew further in recent years. We assume that increasing demand for high-quality consumer goods will come from an expanding middle class in growth markets in the coming years, too. Therefore, we aim to continue to strengthen our position as the market and technology leader for liquid crystals. Key to this are new, sophisticated liquid crystal technologies for further asserting our market and technology leadership, especially in the highly competitive Chinese market. In 2017, we sold the first quantity of our eco-friendly, resource-conserving and efficient liquid crystal technology SA-VA (self-aligned vertical alignment) for manufacture of large-area LC displays. In 2017, we opened the first production facility for switchable liquid crystal window modules in Veldhoven, the Netherlands. This is an important milestone for capturing an entirely new and attractive market segment for liquid crystals.

The OLED (organic light-emitting diodes) business contributes significantly to the growth of Performance Materials. It is our declared goal to strengthen our position as a leading global supplier of OLED materials. Continuous investments in research and development at the Darmstadt site as well as application laboratories at the Asian sites make an essential contribution to this. The opening of a new application laboratory in Shanghai is planned for 2018.

The great potential of OLED technology is confirmed by the development of the display market. OLED-based smartphone displays are the standard among all premium suppliers. OLED technology is also showing dynamic growth in the TV segment, bolstered by high investments by the leading OLED TV display manufacturer. The advantages offered by self-luminous OLED displays, such as intense colors, an especially deep black, thin structure, flexible use and low energy consumption are of importance here.

The Integrated Circuit Materials business unit supports the entire semiconductor industry with a portfolio of customized solutions. Increasingly higher storage capacity, faster process performance and lower power consumption are being demanded by the semiconductor industry. In addition, market trends such as mobility, Big Data and the Internet of Things are leading to higher demand for semiconductor materials and higher specialization at the same time. By means of novel materials and innovative technologies, we enable our customers to meet these requirements, produce more powerful chips, and counteract rising costs.

In the Pigments & Functional Materials business unit, we are further expanding our leading position in pearlescent pigments for automotive coatings. We are continuing to defend our good market position in plastics, printing and cosmetics applications. Here we are focusing on high-quality products and innovations. In functional materials, the focus of our growth strategy continues to be on niche applications in cosmetics (such as UV filters, insect repellents and anti-aging substances) as well as technical functional materials. In the latter, we see great growth potential for laser-marking additives and for novel coating materials. With these and further innovative product groups we will drive our growth in segments beyond our established markets.

Our Advanced Technologies business unit aims to develop profitable future businesses – both for Performance Materials and for our other business sectors. Besides a broad portfolio for the innovative LED industry, these also include organic photovoltaics and materials for flexible display technologies. In accordance with the Performance Materials strategy, our projects for future business fields are aligned to megatrends such as miniaturization and the Internet of Things.

Strategic initiatives

The LC 2021 strategic initiative is to significantly contribute to our future growth and continue to generate attractive margins. Under the umbrella of the LC 2021 strategic initiative, we are combining future applications of liquid crystals beyond classic displays. In six fields altogether, we are focusing on improved user experience, on the one hand, and light and data management, on the other. First and foremost, this comprises liquid crystal windows. In Veldhoven, the Netherlands, we opened the first production facility for modules used in LC windows with sun protection and privacy control.

Strategic realignment

In 2018, we want to focus even more strongly on the needs of our customers and markets. Therefore, in December 2017, we announced that we will combine our expertise in three newly created business units, which are aligned to our target markets: Display Solutions, Semiconductor Solutions and Surface Solutions.

Strategic finance and dividend policy

We are pursuing a conservative financial policy characterized by the following aspects:

FINANCIAL FLEXIBILITY AND A CONSERVATIVE FUNDING STRATEGY

We ensure that we meet our obligations at all times and adhere to a conservative and proactive funding strategy that involves the use of various financial instruments.

We have diversified and profitable businesses as the basis for our strong and sustainable cash flow generation capacity. Moreover, we have several funding resources in place. A € 2 billion syndicated loan facility through to 2020 exists to cover any unexpected cash needs. The facility is a pure back-up credit facility and has not been drawn on so far. In addition, we have a commercial paper program with a volume of € 2 billion at our disposal. Within the scope of this program, we can issue short-term commercial paper with a maturity of up to one year.

Furthermore, we are using bilateral bank loan agreements with first-class banks in order to optimize the funding structure and cost. Additionally, the bond market generally represents a key element. However, owing to our focus on deleveraging, no bonds were issued in 2017. The most recent bond issues took place in 2014 and 2015 in connection with the acquisition of Sigma-Aldrich. A hybrid bond, a U.S. dollar bond and a euro bond were issued. The use of various instruments provides a broad financing basis and addresses different investor groups.

MAINTAINING SUSTAINABLE AND RELIABLE BUSINESS RELATIONS WITH A CORE GROUP OF BANKS

We mainly work with a well-diversified, financially stable and reliable group of banks. Due to our long-term-oriented business approach, bank relationships typically last for many years and are characterized by professionalism and trust. The banking group consists of banks with strong capabilities and expertise in various products and geographic regions. We regard these banks as strategic partners. Accordingly, we involve them in important financing transactions.

STRONG INVESTMENT GRADE RATING

The rating of our creditworthiness by external rating agencies is an important indicator of the company's financial stability. A strong investment-grade rating is an important cornerstone of our financial policy, as it safeguards access to capital markets at attractive financial conditions. Our company currently has a Baa1 rating from Moody's, an A rating from Standard & Poor's (S&P) and an A- rating from Scope, each with a stable outlook. Continuing to reduce our debt, as in 2017, is of utmost importance to us.

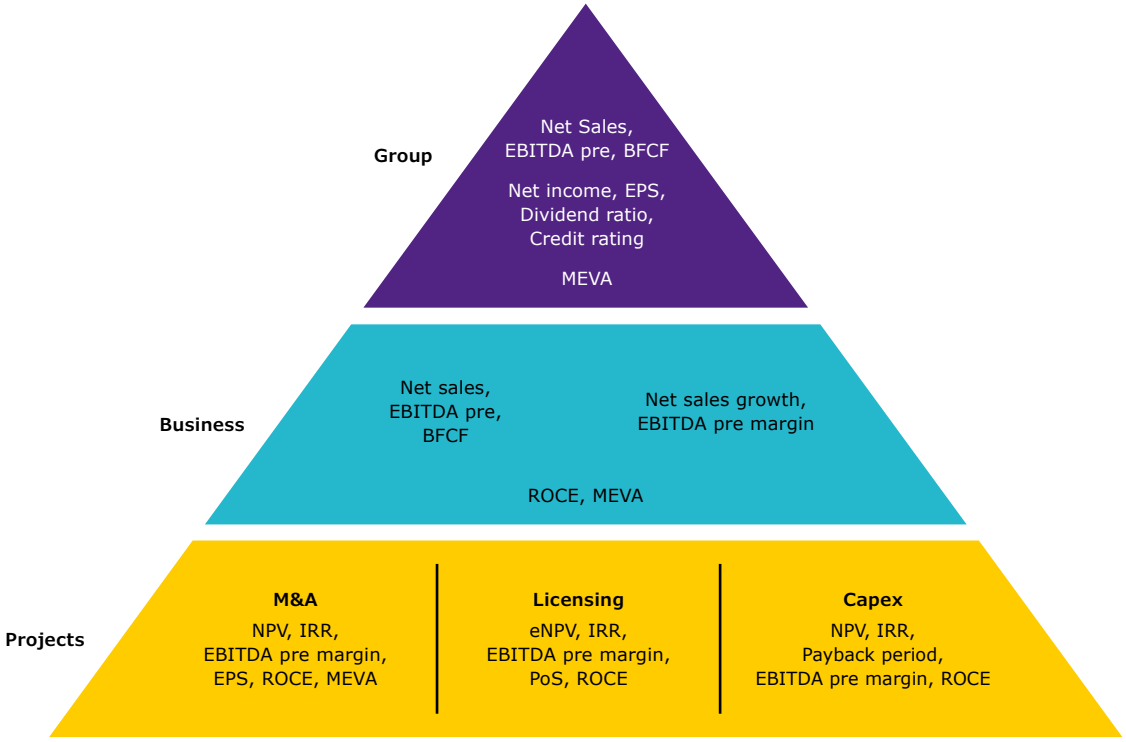
DIVIDEND POLICY

We are pursuing a sustainable dividend policy. Provided that the economic environment develops in a stable manner, the current dividend represents the minimum level for future dividend proposals. The dividend policy is oriented towards the business development and earnings increase of the coming years. However, dividend growth could deviate, for example, within the scope of restructuring or in the event of significant global economic developments. We aim for a target corridor of 20% to 25% of EPS pre.

Internal Management System

As a global company with a diverse portfolio of products and services, we use a comprehensive framework of indicators to manage performance. The most important KPI (key performance indicator) to measure performance is EBITDA pre[1].

The Value Creation and Financial KPI Pyramid, which summarizes the important financial performance measures of the Group, reflects the comprehensive framework of financial KPIs to steer the businesses and prioritize the allocation of cash resources. It consists of three managerial dimensions, namely Group, Business and Projects, each of which require the use of different indicators.



Abbreviations

EBITDA pre = Earnings before interest, income tax, depreciation and amortization as well as adjustments
EPS = Earnings per share
MEVA = Value added of Merck KGaA, Darmstadt, Germany
BFCF = Business free cash flow
ROCE = Return on capital employed
NPV = Net present value
IRR = Internal rate of return
eNPV = expected Net present value
PoS = Probability of success
M&A = Mergers & Acquisitions

[1] Not defined by International Financial Reporting Standards (IFRS).

Key performance indicators of the Group and its businesses

The three key performance indicators net sales, EBITDA pre[1], and business free cash flow[1] are the most important factors for assessing operational performance. Therefore, we refer to these KPIs in the Report on Economic Position, the Report on Risks and Opportunities, and in the Report on Expected Developments. As the most important indicators of financial business performance, the KPIs are key elements of our performance management system.

NET SALES

Net sales are defined as the revenues from the sale of goods, services rendered to external customers, commission income and profit-sharing from collaborations, net of value added tax and after sales deductions such as rebates or discounts. Net sales are the main indicator of our business growth and therefore an important parameter of external as well as internal performance measurement. In addition, acquisition- and currency-adjusted sales are used for internal performance management. Organic sales growth shows the percentage change in net sales versus a comparative period, adjusted for exchange rate and portfolio effects. Exchange rate effects may arise as a result of foreign exchange fluctuation between the functional non-euro currency of a consolidated company and the reporting currency (euro). By contrast, portfolio effects reflect sales changes due to acquisitions and divestments of consolidated companies or businesses.

GROUP

Net sales

			Change	
€ million	**2017**	2016	€ million	in %
Net sales	**15,327**	**15,024**	**303**	**2.0%**

EBITDA PRE

EBITDA pre is the main performance indicator measuring ongoing operational profitability and is used internally and externally. To provide an alternative understanding of the underlying operational performance, it excludes from the operating result depreciation and amortization, impairment losses and reversals of impairment losses as well as adjustments. These adjustments are restricted to the following categories: integration costs, IT costs for selected projects, restructuring costs, gains/losses on the divestment of business, acquisition costs, and other adjustments. The classification of specific income and expenses as adjustments follows clear rules and underlies strict governance at Group level. Within the scope of internal performance management, EBITDA pre allows for the necessary changes or restructuring without penalizing the performance of the operating business.

GROUP

Reconciliation EBIT to EBITDA pre[1]

			Change	
€ million	**2017**	2016	€ million	in %
Operating result (EBIT)[1]	**2,525**	**2,481**	**44**	**1.8%**
Depreciation and amortization	1,758	1,805	–47	–2.6%
Impairment losses/reversals of impairment losses	–1	129	–130	>100.0%
EBITDA[1]	**4,282**	**4,415**	–133	–3.0%
Restructuring costs	84	22	63	>100.0%
Integration costs/IT costs	189	193	–4	–2.2%
Gains (–)/losses (+) on the divestment of businesses	–310	–304	–6	2.1%
Acquisition-related adjustments	63	153	–90	–59.0%
Other adjustments	106	11	96	>100.0%
EBITDA pre[1]	**4,414**	**4,490**	**–76**	**–1.7%**

[1] Not defined by International Financial Reporting Standards (IFRS).

BUSINESS FREE CASH FLOW (BFCF)

Business free cash flow comprises the major cash-relevant items that the operating businesses can influence and are under their full control. It comprises EBITDA pre less investments in property, plant and equipment, software, advance payments for intangible assets, changes in inventories, trade accounts receivable as well as receivables from royalties and licenses. To manage working capital on a regional and local level, the businesses use the two indicators days sales outstanding and days in inventory.

GROUP

Business free cash flow[1]

€ million	2017	2016	Change € million	Change in %
EBITDA pre[1]	**4,414**	**4,490**	**–76**	**–1.7%**
Investments in property, plant and equipment, software as well as advance payments for intangible assets	–1,047	–859	–188	21.9%
Changes in inventories according to the consolidated balance sheet[2]	–23	1	–24	>100.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses according to the consolidated balance sheet	–24	–177	153	–86.3%
Elimination first-time consolidation of Sigma-Aldrich	–	–149	149	–100.0%
Elimination first-time consolidation of BioControl Systems[2]	–2	12	–14	>100.0%
Business free cash flow[1]	**3,318**	**3,318**	**–**	**–**

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments"

Investments and value management

Sustainable value creation is essential to secure the long-term success of the company. To optimize the allocation of financial resources, we use a defined set of parameters as criteria for the prioritization of investment opportunities and portfolio decisions.

NET PRESENT VALUE

The main criterion for the prioritization of investment opportunities is net present value. It is based on the discounted cash flow method and is calculated as the sum of the discounted free cash flows over the projection period of a project. The weighted average cost of capital (WACC), representing the weighted average of the cost of equity and cost of debt, is used as the discount rate. Depending on the type and location of a project different mark-ups are applied to the WACC.

INTERNAL RATE OF RETURN (IRR)

The internal rate of return is a further important criterion for the assessment of acquisition projects and investments in property, plant and equipment as well as intangible assets. It is the discount rate that makes the present value of all future free cash flows equal to the initial investment or the purchase price of an acquisition. A project adds value if the internal rate of return is higher than the weighted cost of capital including mark-ups.

RETURN ON CAPITAL EMPLOYED (ROCE)

In addition to NPV and IRR, when looking at individual accounting periods, ROCE is an important metric for the assessment of investment projects. It is calculated as the adjusted operating result (EBIT) pre divided by the sum of property, plant and equipment, intangible assets, trade accounts receivable and trade accounts payable, as well as inventories.

PAYBACK PERIOD

An additional parameter to prioritize investments in property, plant and equipment as well as intangible assets is the payback period, which indicates the time in years after which an investment will generate positive net cash flow.

VALUE ADDED OF MERCK KGAA, DARMSTADT, GERMANY (MEVA)

MEVA gives information about the financial value created in a period. Value is created when the return on capital employed (ROCE) of the company or the business is higher than the weighted average cost of capital (WACC). MEVA metrics provide us with a powerful tool to weigh investment and spending decisions against capital requirements and investors' expectations.

Capital market-related parameters

NET INCOME, EARNINGS PER SHARE (EPS) AND EARNINGS PER SHARE PRE (EPS PRE)[1]

Earnings per share are calculated by dividing profit after tax attributable to the shareholders of Merck KGaA, Darmstadt, Germany, (net income) by the weighted average number of theoretical shares outstanding. The use of a theoretical number of shares takes into account the fact that the general partner's capital is not represented by shares. To provide an alternative view, we also report earnings per share pre, in other words after the elimination of the effects of integration costs, IT costs for selected projects, restructuring costs, gains/losses on the divestment of businesses, acquisition costs and other adjustments. Moreover, amortization of acquired intangible assets as well as impairment losses on property, plant and equipment and intangible assets are eliminated. The adjustment excludes impairment losses on intangible assets for acquired research and development (R&D) projects below a threshold value of € 50 million. Income tax is calculated on the basis of the company's underlying tax rate. The following table presents the reconciliation of net income to net income pre for the calculation of EPS pre.

RECONCILIATION OF NET INCOME TO NET INCOME PRE[1]

			Change	
€ million	**2017**	2016	€ million	in %
Net income	**2,600**	**1,629**	**972**	**59.7%**
Income taxes	–386	521	–907	>100.0%
Income taxes on the basis of the underlying tax rate	–849	–855	6	–0.7%
Amortization of acquired intangible assets	1,201	1,218	–16	–1.3%
Adjustments[1]	114	191	–77	–40.4%
Net income pre[1]	**2,680**	**2,703**	**–24**	**–0.9%**
Earnings per share pre (€)[1]	**6.16**	**6.21**	**–0.05**	**–0.8%**

[1] Not defined by International Financial Reporting Standards (IFRS).

CREDIT RATING

The rating of our creditworthiness by external agencies is an important indicator with respect to our ability to raise debt capital at attractive market conditions. The capital market makes use of the assessments published by independent rating agencies in order to assist debt providers in estimating the risks associated with a financial instrument. We are currently assessed by Moody's, Standard & Poor's and Scope. The most important factor for the credit rating is the ability to repay debt, which is determined in particular by the ratio of operating cash flow to (net) financial debt.

DIVIDEND RATIO

With the aim of ensuring an attractive return for our shareholders, we are pursuing a reliable dividend policy with a target payout ratio based on EPS pre (see definition above).

INNOVATION

Innovations are the foundation of our business and will also be the prerequisite for future success in changing markets. We are continuously working to develop new products and service innovations for patients and customers. Indicators for the degree of innovation are defined individually depending on the specifics of the respective businesses.

TALENT RETENTION

Employing a highly qualified and motivated workforce is the basis for achieving our ambitious business goals. Therefore, we put a strong focus on establishing the processes and the environment needed to attract and retain the right talent with the right capabilities at the right time. To measure the success of the related measures, we have implemented talent retention as an important non-financial indicator.

Other relevant/non-financial performance measures

Apart from the indicators of the financial performance of the businesses, non-financial measures also play an important role in furthering the success of the company. From a Group perspective, specifically innovations in the businesses as well as the attraction and retention of highly qualified employees are of central importance.

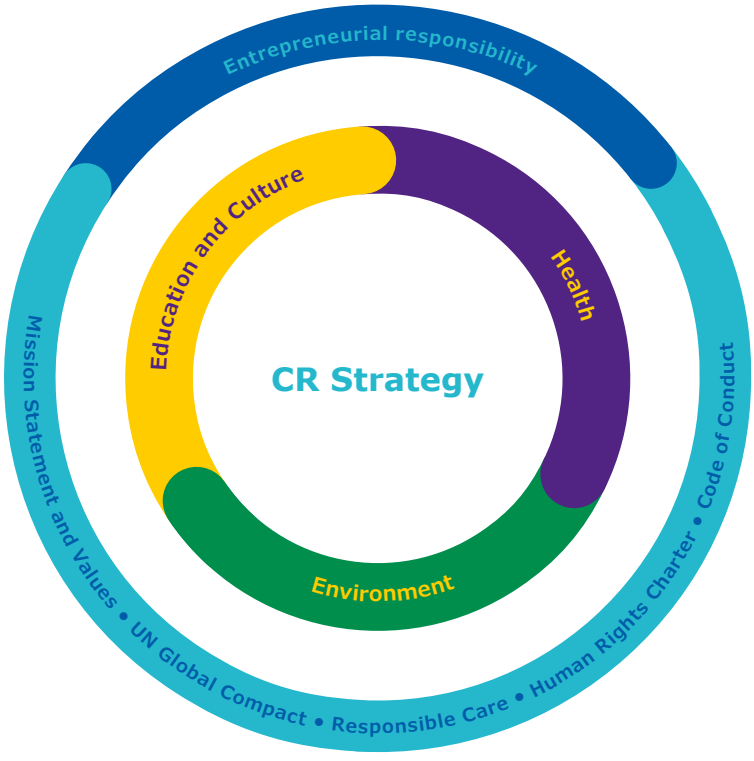
Corporate Responsibility

We take responsibility every day – and have been doing so for 350 years. This commitment is codified in our corporate strategy and values. Responsible conduct with respect to employees, products, the environment, and society is a fundamental prerequisite for our business success.

Strategy and management

Our corporate responsibility (CR) activities are steered by our CR Committee, which consists of representatives from our business sectors and relevant Group functions. Since September 2017, Stefan Oschmann, Chairman of the Executive Board and CEO, has been responsible for the committee, which is chaired by the head of the newly formed Corporate Affairs unit.

Mankind is confronted with global societal challenges such as climate impact, resource scarcity and insufficient access to health in low- to middle-income countries. We believe that we can help resolve these global challenges through our innovative healthcare, life science and performance materials products, as well as through responsible governance. Responsible conduct means looking, listening and doing better. We respect the interests of our employees, customers, investors, and society, and work to minimize ethical, economic and social risks, thereby securing our success. This is an integral part of our corporate strategy, which in turn underpins our CR strategy, the basis for the responsible governance we live each and every day. In realizing our corporate responsibility, we focus our resources on those areas where we can have the greatest impact. We pursue three strategic spheres of activity: namely health, the environment, and culture & education. The focus here is on securing the future of society and our competitiveness.



Health: In low- to middle-income countries, many people lack access to high-quality health solutions. We are applying our expertise here and joining forces with strong partners to develop solutions for patients locally. Our fight against the worm disease schistosomiasis in Africa is a good example.

Environment: We are constantly working to improve the sustainability footprint of our products and are furthermore helping our customers achieve their own sustainability goals. The development of new display technologies both with liquid crystals and organic light-emitting diodes (OLEDs) are an example. They lower the power consumption of televisions, smartphones, and tablet PCs.

Education and culture: Research and development throughout the world thus benefit from curiosity, creativity, and enthusiasm. Cultural offerings inspire people and expand their horizons. Cultural inspiration also opens people up to new ideas. It favorably influences society's acceptance of science, technological progress and innovations. That is why we promote global educational offers and cultural initiatives.

Our commitment to corporate responsibility is aligned with the UN Sustainable Development Goals and we are attempting to contribute to this ambitious agenda by 2030. Furthermore, we support relevant responsible governance initiatives. We are a member of the United Nations Global Compact and are committed to complying with the compact's principles regarding human rights, labor standards, environmental protection, and anti-corruption. Moreover, we also live our corporate responsibility through our commitment to follow the guidelines of the Responsible Care Global Charter, an initiative of the International Council of Chemical Associations (ICCA). Responsible Care aims to drive continuous improvement and achieve excellence in environmental, health, safety, and security performance in the chemical industry. Furthermore, we are also a member of the Chemie[3] initiative in Germany, a collaboration between the German Chemical Industry Association (VCI), the German Employers' Federation of the Chemical Industry (BAVC), and the German Mining, Chemical and Energy Industrial Union (IG BCE). As part of this globally unique alliance, the partners want to make sustainability a core part of the chemical industry's guiding principles and to jointly drive the sector's position within the German economy as a key contributor to sustainable development.

To us, corporate responsibility means taking action and listening. The dialogue with our various stakeholder groups is therefore highly important to us. These stakeholders include employees, business associates, the Merck family, investors, regulatory agencies, and associations. We also engage in this continuous exchange to create transparency and clearly demonstrate how we live our company values.

Thanks to good performance with respect to responsible and sustainable entrepreneurial conduct, we were again included in the FTSE4Good index in 2017. To be included in this leading international sustainability index, a company must demonstrate socially conscientious, ecological and ethical conduct. In 2017, we also maintained our good standing in other major sustainability indices. For instance, we are included in the STOXX Global ESG Leaders index, as well as the Euronext Vigeo Eurozone 120 index and the Ethibel Sustainability Index (ESI) Excellence Europe. In 2017, EcoVadis, an independent rating agency, granted us gold status for our sustainability performance. EcoVadis assesses suppliers from 120 countries across the four categories of Environment, Labor Practices, Fair Business Practices, and Sustainable Procurement.

Strategic sphere of activity: Health

Ensuring access to health for underserved populations and communities in low- and middle-income countries is one of our strategic priorities. Through our A2H approach, which spans all our businesses, we aim to help improve sustainable access to high-quality health solutions. Since we realize that access is a complex and multifaceted challenge with no one-size-fits-all solution, our programs and initiatives are tailored to global, regional and local needs. We consider partnerships, collaboration and dialogue to be key instruments in delivering sustainable results, focusing on four areas known as the "4As": Availability, Affordability, Awareness, and Accessibility. In the Access to Medicine Index, which is published every two years, our company ranked fourth in 2016, moving up two places.

Availability

Availability entails the research, development and refinement of health solutions that address unmet needs and are tailored to local environments.

With our newly formed Global Health Institute, we seek to improve healthcare in developing countries. Our focus is on schistosomiasis, malaria, bacterial infections, and antimicrobial resistance. The Institute's initiatives and programs particularly address key unmet medical needs of women and children. Our objective is not only to develop medicines, but also to improve diagnosis, disease control, and reduce disease transmission, as well as strengthen local health systems. The portfolio also covers the development of a new pediatric formulation of praziquantel to treat the worm disease schistosomiasis in children under the age of six through a public-private partnership. In addition, we are conducting research into innovative schistosomiasis diagnostics in partnership with key international stakeholders to identify vulnerable populations. And we are looking for new schistosomiasis biomarkers as well as new anti-schistosomiasis compounds.

We are developing a new anti-malarial compound that has the strong potential to not only treat, but also prevent malaria reinfection. Through a strategic collaboration with the University of Cape Town in South Africa and the Medicines for Malaria Venture, we are seeking to identify new compounds that are already efficacious in the liver stage and those that can provide long-lasting efficacy to improve post-treatment protection. We are currently developing a kit for malaria diagnosis based on our Muse® cell analyzer. This kit will accurately detect and type the malaria pathogen and identify the stage of infection. In 2017, we achieved promising results in preclinical trials.

Our product IR3535® is used in insect repellents to help protect against infections transmitted by mosquito and tick bites. Products containing this active ingredient stand out due to their particularly good tolerability in young children and pregnant women. They protect against Zika, Chikungunya and Dengue fever. Work is underway on a formulation to fight malaria. In several countries, products formulated with IR3535® were recently approved for head lice prophylaxis in school children.

Affordability

We seek to address affordability challenges through our efforts to provide assistance to those people who are unable to pay for the health solutions they need. To tackle these challenges, we have taken a pro-access approach through our intellectual property initiatives and are engaging in equitable pricing strategies. We provide transparent information about our patents and patent applications in publicly available databases. To strengthen our commitment to the London Declaration to fight neglected tropical diseases, in 2017 we joined the DNDi NTD Drug Discovery Booster consortium and opened our compound library. The objective is to find potential cures for leishmaniasis and Chagas disease. Moreover, we are one of more than 100 members of WIPO Re:Search, an open innovation platform sponsored by the World Intellectual Property Organization (WIPO). Through intellectual property and knowledge sharing, platform partners seek to accelerate early discovery for infectious diseases.

Apart from the collaboration already underway with the University of Buea in Cameroon, in 2017 we started cooperating under the auspices of this program with the University of California in San Diego. The focus is on potential treatments for leishmaniasis, Chagas disease, and African trypanosomiasis (sleeping sickness).

Furthermore, we continue to work with the World Health Organization (WHO) to combat the worm disease schistosomiasis in Africa. Through our Praziquantel Donation program, we are donating Cesol® 600 tablets containing the active ingredient praziquantel to WHO. Since the start of this program, around 150 million patients – primarily school-aged children – have been treated. In total, we have donated nearly 700 million praziquantel tablets to WHO since 2007. As a founding member of the Global Schistosomiasis Alliance, we are helping to eliminate schistosomiasis worldwide.

Through our Global Health Institute, we are also an active member of the Pediatric Praziquantel Consortium, a partnership we initiated. Within this consortium, we are working hand in hand with partners on developing a pediatric formulation of praziquantel to also treat children under six with this medicine.

Awareness

We help to raise awareness by empowering health professionals, communities and patients with the appropriate tools, knowledge and skills to make informed decisions with respect to prevention, diagnostics, treatment, and care. We regularly conduct campaigns to increase awareness of certain diseases globally. Here we are focusing on diseases that we have extensive expertise in, for instance cancer, thyroid disorders, diabetes and multiple sclerosis. In 2017, we established a charitable organization that combines some of our activities in underserved regions of the world. Through our Access Dialogues series, we are promoting discourse on access-to-health challenges with numerous public and private stakeholders. In 2017, the topics of focus were intellectual property and supply chain challenges in developing countries.

Through our Su-Swastha project we are working with various non-governmental organizations and the Indian Health and Family Ministry to improve healthcare in rural India. Among other things, we provide inexpensive medicines while also educating the local population and health professionals on everyday health issues and their treatment. In 2017, more than 11,000 people were reached in 482 community meetings.

The Global Pharma Health Fund (GPHF), a non-profit organization funded by our company, works to combat counterfeit medicines in developing and emerging countries. To date, the GPHF has supplied 836 Minilabs at cost to detect counterfeit medicines to around 100 countries; 41 Minilabs were provided in 2017 alone. According to a report published by WHO at the end of 2017, the Minilab made it possible to identify more than 1,000 counterfeit medicines out of 20,000 tested medicines.

Accessibility

We promote initiatives to strengthen supply chains and to develop localized health solutions in order to deliver and reach out efficiently at the point of care. We are a founding member of the Accessibility Platform, an informal, private-sector initiative that is working on a comprehensive approach to meeting supply chain and distribution challenges in developing countries. The platform promotes information exchanges between the various stakeholders and creates joint options for action.

Together with two other Accessibility Platform members Roche and Novartis, in 2017 we co-hosted a panel session at the World Health Summit. Attendees included the Ghanaian Ministry of Health, the World Health Organization, and the Global Fund to Fight AIDS, Tuberculosis and Malaria. We support training and knowledge sharing with our manufacturing partners in Africa, Asia and Latin America with the aim of strengthening local manufacturing quality standards.

In India, we are cooperating with the non-profit organization known as Narmada Samagra. Our River Ambulance transports health workers and provides healthcare solutions to local populations living in the remote region along the Narmada River. In 2017, we funded the maintenance of the boat donated in the previous year. Additionally, in the northeastern Indian state of Jharkhand, we are funding a health center that gives the region's approximately 20,000 inhabitants access to medical personnel. In 2017, our Global Health Institute sponsored a new gynecology ward in the district hospital of Akonolinga in the African country Cameroon.

Strategic sphere of activity: Environment

Through our products, we are helping overcome global challenges such as climate impact and resource scarcity. In doing so, we are also helping our customers to reduce the negative impacts of their own activities and to achieve their own sustainability goals.

Performance Materials: Increasing the sustainability of manufacturing processes and final products

In 2017, our Performance Materials developed the new liquid crystal technology SA-VA (Self-Aligned Vertical Alignment) to market readiness. We have been developing the materials and process in the scope of close technical partnerships with our customers. SA-VA is an eco-friendly and resource-conserving technology that requires less energy and creates less waste products than conventional technologies during display manufacture. SA-VA also provides a more efficient display manufacturing process and could allow improved design features for display manufacturers. SA-VA can be used in all types of display applications, above all in large-size TVs.

To utilize our market and technological leadership in liquid crystals beyond applications in energy-saving displays, we opened a new production facility for liquid crystal window modules in Veldhoven in the Netherlands. According to initial measurement results, our smart windows can cut energy use in climate-controlled buildings by up to 40% and replace conventional sun shading solutions. In this way, we help builders to save resources and costs. The principle behind this is as follows: These windows can be manually or automatically controlled to darken and provide sun protection – and to do so in a variety of colors. This technology is made possible thanks to the special properties of our liquid crystals. In combination with customized dyes, the liquid crystals control the amount of incident light by either absorbing and blocking electromagnetic waves (dark state) or allowing them to pass through (transparent state). In contrast to competing technologies, our long-lasting licrivision™ materials switch within seconds and are highly color-neutral. Architects and builders can customize the desired color to suit the setting. For the semiconductor industry, we have developed a series of environmentally sustainable specialty chemicals and materials – including PFOS-free antireflective and photoresists. In the cosmetics industry, we are addressing the continuing trend for ingredients that meet stringent sustainability criteria. Our portfolio of fillers dispenses entirely with microplastic particles criticized for polluting waters and marine life enrichment. We are also committed to continuously increasing the energy efficiency of our production processes. Many of our cosmetic raw materials are registered and approved in accordance with the COSMOS standard. COSMOS is an international association that developed and manages the COSMOS standard AISBL, an international standard for organic and natural cosmetics.

Life Science: Reducing environmental impacts in various product life cycle stages

We want to lower the environmental and health impact of our products. This applies to the entire life cycle – from production and use through to the disposal of our products. With our Design for Sustainability (DfS) program implemented in 2014, we have developed a comprehensive approach for more sustainable life science products. It keeps sustainability criteria in the foreground during product development or re-engineering and documents them in a scorecard. Since the acquisition of Sigma-Aldrich, we have expanded the DfS program so that it is now an umbrella concept that encompasses all our portfolio offerings. The objective is to lower environmental impacts of devices and instruments, also during use by customers. Beginning with the concept stage, product teams identify potential environmental impacts and opportunities to make improvements. In 2017, we achieved improvements in 35% of our new Life Science product developments. One of our notable product releases in 2017 was the new Milli-Q® IQ 7000 Ultrapure Lab Water System, which uses mercury-free UV oxidation lamps.

In addition, our researchers are developing innovative solutions in line with the "12 Principles of Green Chemistry" developed by chemists Paul T. Anastas and John C. Warner. The objective is to permit research that is as environmentally compatible as possible, and to minimize adverse effects on human health. With DOZN®, we have developed a web-based quantitative Green Chemistry analysis tool. We are working to make the DOZN® tool available for our customers so that they will also be able to measure their environmental footprint impact for life science research.

We are expanding our portfolio to include greener alternatives, such as the new solvent, Cyrene™. This product was named the "Bio-based Chemical Innovation of 2017" – an accolade that can be attributed to proving that safer, greener alternatives can also offer superior performance. Cyrene™ is derived from waste cellulose and is employed as an alternative to solvents that are widely used but are under increasing regulatory restriction due to their associated toxicity. We not only think about the current life of our products but also look ahead to end-of-life considerations and potential future product lives as well. The application of single-use products – many of which pose a challenge to recycle in the current infrastructure – is growing as life science markets are expanding and adopting new technologies. We have therefore developed innovative recycling programs which have led to the recycling of more than 1,300 tons of our customers' products from 2015 to 2017.

Strategic sphere of activity: Education and culture

Cultural promotion is a core element of our commitment to society, building on our centuries-old tradition of supporting art and culture. We thus further characteristics that are essential to our business activities as a high-tech company: creativity, a passion for discovery, curiosity, as well as the courage to transcend boundaries.

Boosting scientific education

We view education as a key component of culture – and vice versa. Education can help us understand culture. But culture can also build a bridge to education; it can stimulate curiosity and creativity. We therefore support educational projects at many of our sites and grant scholarships, for instance, or help define the curricula of selected classes in schools. We want to spark an interest in science, particularly among young people. This is why we have been supporting the "Jugend forscht" (Young Researchers) competition for more than 30 years. Since 1996, we have been organizing the state-level competition for the German Federal State of Hesse and have also hosted the nationals twice.

Through our Junior Labs, we want young people to enjoy conducting experiments. These learnings labs at the Technical University of Darmstadt combine classroom instruction with trending topics and modern research methods. In 2017, around 2,500 school students used the chemistry laboratory with an extended program and around 1,000 school students experimented in the biology laboratory.

In 2017, we launched our first continuing education program for teachers outside Germany by conducting a project in India. Indian teachers were trained in organic electronics, with a special focus on energy-saving, sustainable technologies. As part of SPARK, our global volunteer program, employees from our Life Science business sector share their skills and experience with students and support our local communities. The program is intended to spark curiosity in science and inspire them to consider a STEM-related career. In 2017, more than 2,500 employees invested more than 13,700 hours in the SPARK program. As part of SPARK, in 2017 we sent a Curiosity Cube™ on a journey through the United States. This is a freight container that transforms into a mobile laboratory and is equipped with state-of-the-art technology. In 2017, the Cube traveled more than 29,000 km across the United States and made stops in over 85 schools and city centers. More than 38,000 students have visited the Cube. Each of the nearly 23,000 experiments conducted were supervised by one of our employees.

The Deutsche Philharmonie, sponsored by Merck KGaA, Darmstadt, Germany

The Deutsche Philharmonie, sponsored by Merck KGaA, Darmstadt, Germany, is our musical ambassador. We consider classical music to be the universal language that brings people together; as such, it is an important part of our culture. The concerts of this professional ensemble represent an integral part of the cultural life in the vicinity of our Group headquarters in Darmstadt and remain highly popular, with around 21,000 people attending them in 2017. In addition, the orchestra again toured internationally. Concerts took place in Austria, the Czech Republic and Morocco in 2017. One particular aim is to make classical music more accessible to young people, for instance through special partnerships for children and adolescents as well as cooperation programs with schools, such as the orchestra workshop.

Promoting literature

Like music, literature is an important mediator between cultures. That is why we support five literary prizes around the world, some of which every two years: the Johann Heinrich Merck Award for Literary Critique and Essay of Merck KGaA, Darmstadt, Germany, in Germany, the Premio Letterario of Merck KGaA, Darmstadt, Germany, in Italy, the Kakehashi Literature Award of Merck KGaA, Darmstadt, Germany, in Japan, the Tagore Award of Merck KGaA, Darmstadt, Germany, in India, and the Translation Award of Merck KGaA, Darmstadt, Germany, in Russia. The awards primarily recognize those authors who build bridges between cultures, as well as between literature and science.

The Johann Heinrich Merck Award for Literary Critique and Essay of Merck KGaA, Darmstadt, Germany, which we have been presenting since 1964 and is worth € 20,000, went to Jens Bisky, a culture editor at the Süddeutsche Zeitung. With the Premio Letterario of Merck KGaA, Darmstadt, Germany, we recognize authors in Italy who build bridges between literature and science with their works. The 2017 prize, worth € 10,000, was awarded to U.S. writer Sam Kean for his work "The Violinist's Thumb". The jury decided on an honorable mention for Italian mathematician, author and professor Paolo Zellini.

Responsibility for our products

The safety of our products is at the core of our corporate responsibility. When used properly, they must pose no risk to customers, patients, consumers, or the environment. Our goal is to ensure a positive benefit/risk profile for our products, which is why we regularly examine safety across their entire life cycle and continuously take steps to minimize risks. We provide patients, consumers and customers with extensive informational material so that they can use our products in a safe, responsible and proper manner.

In our pharmaceutical marketing activities, the focus is always on the health and well-being of patients because we want them to receive effective and high-quality treatment. All guidelines pertaining to marketing and advertising are part of our Group-wide compliance program, which is complemented by our internal guidelines and various voluntary commitments that, in many cases, exceed the applicable statutory regulations.

Safety of our chemical products

Numerous regulations are in place to ensure that chemicals pose no risk to humans or the environment. Compliance with these regulatory requirements is an important part of our work. Through a Group-wide policy, we have established global processes for defining, directing and implementing product safety, as well as the corresponding management structures. We incorporate all relevant national and international chemical regulations into our policies and guidelines and adhere to them. This includes the EU chemicals regulation REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) and CLP (Classification, Labelling and Packaging of Substances and Mixtures, EU GHS). Furthermore, we are committed to transparency. For instance, in line with the Global Product Strategy, an international initiative of the chemical industry, we provide our customers with product safety summaries for hazardous materials.

For the final REACH registration phase, we are also working to register all the relevant chemical substances within the stipulated period. We successfully completed the two registration phases in 2010 and in 2013. The next step, or phase III, requires us to evaluate and register by June 2018 all substances annually produced or imported in quantities ranging from one to 100 metric tons. This process also includes substances added to our portfolio from the Sigma-Aldrich acquisition and is on schedule.

Safety of our Healthcare products

Patient and consumer safety has top priority in everything we do. During the entire life cycle of our medicines and consumer health products, we provide patients, consumers and physicians with up-to-date risk-benefit evaluations. To this end, company experts process safety-relevant information from various sources such as clinical trials, adverse reaction reports and scientific literature. Ultimate responsibility for the safety of our biopharmaceuticals is borne by our Global Chief Medical Officer, with support from the Medical Safety and Ethics Board. Our Global Drug Safety unit continuously monitors and evaluates the safety and risk-benefit ratio of our medicines worldwide (pharmacovigilance). For our Consumer Health products, this function is performed by the Global Product Safety unit. Overall responsibility for the safety of our over-the-counter products is borne by the Chief Medical Officer for the Consumer Health business, supported by the Safety & Labelling Committee.

For products in our Allergopharma business, we have also developed comprehensive clinical efficacy and safety profiles that we continuously update. For the safety of patients, we have established a global pharmacovigilance system that we are always working to enhance.

Quality of our products

Our goal is to provide customers and patients with high-quality brand-name products. Through our quality vision – "Quality is embedded in everything we do!" – we remind our employees of their responsibility – across all business sectors, all Group functions and all levels of the company.

Supplier management

We procure many raw materials, packaging materials, technical products, components, and services worldwide. Our overarching goal is to protect the stability of these supply chains and always provide our customers with the best products and services, while offering them optimal quality and service. Our supplier management focuses on compliance with fundamental environmental and social standards, in addition to high quality, delivery reliability and competitive prices. They are primarily derived from the core labor standards of the ILO (International Labour Organisation), from the UN Global Compact, and from the Code of Conduct of the BME (German Federal Association for Materials Management, Purchasing and Logistics). Our Group Procurement Policy and Responsible Sourcing Principles define our procurement practices.

Due to the growing significance of emerging markets as sourcing markets for our company, we have reinforced our efforts to ensure adherence to our supply chain standards. At the end of 2014, we joined the Together for Sustainability (TfS) chemical industry initiative. Since then, we have been utilizing the supplier assessment and audit results shared among all member companies, who in turn abide by all restrictions stipulated within competition law. Through TfS, we so far have access to assessments for more than 730 of our most important suppliers. We initiated assessments of 463 of them in 2017.

Responsibility for our employees

Employees are crucial to the success of a company. They therefore play a central role in our business endeavors. In accordance with our company values, we live a culture of mutual esteem and respect. We seek to further our entrepreneurial success by recruiting, developing and motivating the most suitable employees, which is why we focus our employee strategy on employee development, compensation, and performance management. We furthermore strive to foster diversity among our employees (more information can be found under “People”).

Responsibility for the environment

In the manufacture of our products, we seek to impact the environment as little as possible. This especially includes efficiently conserving resources such as energy, water and raw materials while also continuously reducing our emissions and waste.

Environmental management system

In our Corporate Environment, Health and Safety Policy, which is applicable Group-wide, we have defined our principles and strategies for environment, health and safety. It is an integral component of our EHS management system, which is certified annually by external auditors in accordance with the international standard OHSAS 18001. At all our sites, local EHS managers oversee operational environmental protection measures. These employees continually receive training and obtain additional qualifications. Since our businesses are constantly changing, our environmental management system is subject to internal and external audits on a regular basis to ensure that the ISO 14001 requirements are still being met. In 2017, we obtained an ISO 14001 group certificate for the ninth consecutive year. This certificate covers 83 sites around the world. Additionally, our environmental management system was successfully adapted to the new ISO standard 14001:2015. Our spending on environmental protection, health and safety efforts totaled € 200 million in 2017, which also includes investments made during the year.

Focus areas: Energy efficiency, greenhouse gas emissions, water, waste and recycling

Climate impact and resource scarcity are key challenges facing society in the 21st century. As a responsible company, it is especially important for us to do our part. We have therefore set ourselves the goal of reducing total direct and indirect greenhouse gas emissions by 20% by 2020 (2006 baseline), irrespective of production growth. In 2017, the CDP (formerly the Carbon Disclosure Project) gave our efforts to conserve water a “B” rating (2016: A–). The CDP assesses companies in terms of their performance and transparency in climate impact and water management.

To achieve our climate impact mitigation goals, we have launched the EDISON program that consolidates all our climate impact mitigation and energy efficiency activities. Through the more than 300 EDISON projects initiated since 2012, we aim to annually save around 98 metric kilotons of CO_2 in the medium term. Overall, thanks to the EDISON projects we have saved approximately 75,000 megawatt hours of energy since 2012.

At the same time, we are pushing forward with the changeover to regenerative power generation. In 2017, we installed solar power panels at the Jigani and Peenya sites of our Life Science business sector in Bangalore, India. These generate a total of 1,265,000 kilowatt hours of power per year. Since each of the installations covers approximately 30% of the sites’ power requirements, we will lower our annual emissions by around 1,200 metric tons. We also installed a solar voltaic system in Burlington, Massachusetts (USA). With an output of 182 kilowatts, this is to generate 218,000 kilowatt hours of power annually, thus reducing our emissions by around 60 metric tons.

ENERGY CONSUMPTION[1]

in gigawatt hours	2014	2015	2016	**2017**
Total energy consumption	**2,162**	**2,260**	**2,241**	**2,270**
Direct energy consumption	**1,354**	**1,452**	**1,445**	**1,386**
Natural gas	1,207	1,206	1,267	1,256
Liquid fossil fuels[2]	120	111	37	34
Biomass and self-generated renewable energy	27	135	141	96
Indirect energy consumption	**808**	**808**	**796**	**884**
Electricity	711	712	701	740
Steam, heat, cold	97	96	95	144
Total energy sold	**0.6**	**0.5**	**0.5**	**0.3**
Electricity	0.6	0.5	0.5	0.3
Steam, heat, cold	0	0	0	0

in terajoules	2014	2015	2016	**2017**
Total energy consumption	**7,783**	**8,137**	**8,068**	**8,172**
Direct energy consumption	**4,874**	**5,228**	**5,202**	**4,990**
Natural gas	4,345	4,342	4,561	4,522
Liquid fossil fuels[2]	432	400	133	122
Biomass and self-generated renewable energy	97	486	508	346
Indirect energy consumption	2,909	2,909	2,866	3,182
Electricity	2,560	2,563	2,524	2,664
Steam, heat, cold	349	346	342	518
Total energy sold	**2.2**	**1.8**	**1.8**	**1.1**
Electricity	2.2	1.8	1.8	1.1
Steam, heat, cold	0	0	0	0

[1] In line with the Greenhouse Gas Protocol, for all previous years (up to the 2006 baseline) the energy consumption has been calculated based on the current corporate structure of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).

[2] Light and heavy fuel oil, liquefied petroleum gas (LPG), diesel and gasoline.

TOTAL GREENHOUSE GAS EMISSIONS (SCOPE 1 AND 2 OF THE GHG PROTOCOL)[1]

in metric kilotons	2006[2]	2014	2015	2016	**2017**
Total CO_2eq[3] emissions	**793**	**731**	**726**	**711**	**731**
thereof					
direct CO_2eq emissions	379	390	393	387	374
Indirect CO_2eq emissions	414	341	333	324	357
Biogenic CO_2 emissions	**6**	**11**	**54**	**56**	**38**

[1] In line with the Greenhouse Gas Protocol, for all previous years (up to the 2006 baseline) the greenhouse gas emissions have been calculated based on the current corporate structure of the reporting year and retroactively adjusted for acquisitions (e.g. Sigma-Aldrich in 2015) or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).
[2] Baseline for our emission targets is 2006.
[3] eq = equivalent.

Energy management plays a key role in our efforts for energy efficiency and climate impact mitigation. Our production sites in Darmstadt and Gernsheim account for around 28% of our global energy consumption. Both these facilities have fulfilled the international energy management standard ISO 50001 since 2012. Currently, 12 of our production sites have a certified energy management system. We intend to maintain our climate targets in the future. In 2017, the Executive Board confirmed the greenhouse gas reduction target and the required measures to achieve it, for instance through projects to raise energy efficiency levels and to reduce process-related greenhouse gas emissions.

In addition to energy, we also focused on the topic of water in 2017. Since 2016, we have been pursuing the goal of implementing a sustainable water management system at sites with high consumption levels by 2020. At sites with relevant water use located in areas of high water stress, we are aiming to cut our water consumption by 10% by 2020 (2014 baseline). At the end of 2017, we had lowered our water consumption at the relevant sites by around 9% in comparison with 2014. In 2017, the CDP gave our efforts to conserve water a “B”, two scores better than in the previous year.

Natural resources are becoming scarcer. We therefore want to use raw materials as efficiently as possible and to limit the loss of raw materials. Consequently, we intend to minimize the environmental impacts of our waste as far as possible. In 2016, we developed a company Waste Score, which allows us to compare the amount of waste our sites are producing and monitor the development of the amount of waste we produce. In 2017, the Executive Board resolved for the first time to reduce the environmental impact of our waste by 5% by 2025 (2016 baseline). For this purpose, we are analyzing the improvement potential of production processes and disposal routes employed by our sites. In principle, all sites are to contribute to the waste reduction efforts.

Responsibility for society

We see ourselves as part of society – both at our individual sites and worldwide. Taking responsibility towards society is an integral part of our entrepreneurial approach. We believe that we can make an important contribution to the community through our knowledge, our skills and our products.

Our social responsibility activities are primarily focused on those areas in which we have problem-solving expertise stemming from our core businesses. We are thus engaged in health and environmental projects and furthermore support education, especially in the natural sciences. We provide disaster relief in emergency situations, particularly in those regions in which we operate.

Our subsidiaries are engaged in a wide variety of local projects. We have defined a general set of criteria for selecting projects, and the decisions concerning specific projects are made by our subsidiaries. In 2017, we spent a total of € 34 million on community engagement activities.

Research and Development

We conduct research and development (R&D) worldwide in order to develop new products and services designed to improve the quality of life of patients and to satisfy the needs of our customers. Further optimizing the relevance and efficiency of our research and development activities – either on our own or in cooperation with third parties – is one of our top priorities.

Approximately 6,800 employees work for our company researching innovations to serve long-term health and technology trends in both established and growth markets.

Our company spent around € 2.1 billion on research and development in 2017. In our research and development activities, we focus on both in-house research and external collaborations which enable us to increase the productivity of our research while simultaneously reducing financial outlay. The organizational set-up of our research and development activities reflects the structure of our company with three business sectors.

Healthcare

BIOPHARMA

Oncology and Immuno-Oncology

In 2017, we achieved a number of significant milestones with avelumab, an anti-PD-L1 antibody that we are co-developing and co-commercializing with Pfizer. The first regulatory milestone took place in March, when the U.S. Food and Drug Administration (FDA) granted accelerated approval for avelumab under the brand name Bavencio® for the treatment of adults and pediatric patients 12 years and older with metastatic Merkel cell carcinoma (MCC), based on tumor response and duration of response. Continued approval for this indication may be contingent on verification and description of clinical benefit in confirmatory trials. Metastatic MCC is a rare and aggressive skin cancer that previously had no approved treatment options, making this the first indication for Bavencio® and the first FDA-approved treatment and immunotherapy for metastatic MCC. Since fewer than half of patients with metastatic MCC survive more than one year and less than 20% survive beyond five years, Bavencio® offers patients a much-needed treatment option that could make a meaningful difference in the treatment of this.

The FDA in 2015 granted avelumab Orphan Drug Designation for MCC, as well as Fast Track and Breakthrough Therapy Designations for the treatment of patients with metastatic MCC whose disease has progressed after at least one previous chemotherapy regimen. Breakthrough Therapy Designation is intended to expedite the development and review of treatments for serious or life-threatening disease where preliminary clinical evidence indicates that the drug may demonstrate substantial improvement over existing therapies for one or more endpoints.

This FDA approval was based on data from JAVELIN Merkel 200, an international, multicenter, single-arm, open-label, Phase II study with two parts. The first, part A, included 88 patients with metastatic MCC whose disease had progressed after at least one chemotherapy treatment. The objective response rate was 33%, with 11% of patients experiencing a complete response and 22% of patients experiencing a partial response. At the time of analysis, tumor responses were durable, with 93% of responses lasting at least six months (n=25) and 71% of responses lasting at least 12 months (n=13). Duration of response ranged from 2.8 to more than 24.9 months.

The second, part B, at the time of the data cut-off included 39 patients with histologically confirmed metastatic MCC who were treatment-naïve to systemic therapy in the metastatic setting. The objective response rate was 62%, with 14% of patients experiencing a complete response and 48% of patients experiencing a partial response. 67% of patients experienced a progression-free survival rate of three months.

The next regulatory milestone followed in May, when the FDA granted Bavencio® accelerated approval for the treatment of patients with locally advanced or metastatic urothelial carcinoma (UC) who have disease progression during or following platinum-containing chemotherapy, or who have disease progression within 12 months of neoadjuvant or adjuvant treatment with platinum-containing chemotherapy. This indication was also approved under the Accelerated Approval Program based on tumor response and duration of response, and continued approval for this indication may be contingent upon verification and description of clinical benefit in confirmatory trials.

Advanced urothelial carcinoma is an aggressive disease with a high rate of recurrence. Bladder cancer accounts for approximately 90% of urothelial carcinomas and is the sixth most common cancer in the United States. Despite advances in the treatment of locally advanced or metastatic disease, the prognosis for patients remains poor, with the five-year survival rate at approximately 5%, meaning more treatment options are urgently needed.

The efficacy and safety of Bavencio® in urothelial carcinoma were demonstrated in the corresponding cohorts of the JAVELIN Solid Tumor trial, a Phase I, open-label, single-arm, multicenter study of Bavencio® in the treatment of various solid tumors. These urothelial carcinoma cohorts (n=242) enrolled patients with locally advanced or metastatic urothelial carcinoma with disease progression on or after platinum-containing chemotherapy, or who had disease progression within 12 months of treatment with a platinum-containing neoadjuvant or adjuvant chemotherapy regimen. Patients with six months or more of follow-up experienced an overall response rate of 16.1%. Duration of response was not precisely estimable, with a range of response from 1.4 to 17.4 months.

In September, we gained three further regulatory approvals for Bavencio®. The first was from the regulatory authority in Switzerland (Swissmedic) for the treatment of patients with metastatic MCC whose disease has progressed after at least one chemotherapy treatment. In mid-September, the European Commission granted approval for Bavencio® as a monotherapy for the treatment of adult patients with metastatic MCC, making it the first and only approved treatment for metastatic MCC in the 28 member states of the European Union as well as Liechtenstein, Iceland and Norway. A few days later, the Japanese Ministry of Health, Labour and Welfare (MHLW) granted the first Asian approval for Bavencio®, making it the first-ever treatment indicated for curatively unresectable MCC and the first anti-PD-L1 to become available in Japan. Regulatory approval for the treatment of metastatic MCC followed in December in Canada and in January 2018 in Australia as well as in Israel. In addition, Bavencio® was approved in Israel at the end of January to treat patients with urothelial carcinoma.

Through our strategic alliance with Pfizer, we continue to explore the therapeutic potential of avelumab. Our clinical development program known as JAVELIN involves more than 30 clinical programs, including various Phase III trials and over 7,000 patients being evaluated across more than 15 different tumor types. In addition to MCC and UC, these cancers include breast, gastric/gastro-esophageal junction, head and neck, Hodgkin's lymphoma, melanoma, mesothelioma, non-small cell lung, ovarian, and renal cell carcinoma (RCC).

On December 21, the FDA granted Breakthrough Therapy Designation for avelumab in combination with INLYTA® (axitinib) for treatment-naïve patients with advanced RCC.

In addition to the host of abstracts presented at key congresses in 2017 – including the 2017 American Society of Clinical Oncology (ASCO) Annual Meeting and the 2017 European Society for Medical Oncology (ESMO) Congress – we provided an update on our Phase III JAVELIN Gastric 300 study in November. The study is the first global trial of a checkpoint inhibitor versus an active chemotherapy comparator rather than placebo in patients with pre-treated advanced gastric cancer. The trial did not meet its pre-specified primary endpoint of superior overall survival. The data are being further examined in an effort to better understand the results and we will present them at a medical congress in 2018. We remain committed to our ongoing gastric clinical development program with avelumab.

As part of our commitment to developing new treatment options for patients with hard-to-treat cancers who would otherwise have a low chance of survival and to exploring all potential options, we entered into several strategic collaborations in 2017. The first of these was in March, when our collaboration with EpiThany to evaluate avelumab in combination with EP-101 STEMVAC, an investigational multi-antigen, polyepitope cancer vaccine, in a Phase II trial in women with breast cancer was announced. The second was announced in May, with Swiss/German biotech company VAXIMM AG to evaluate avelumab in combination with VAXIMM's VXM01. VXM01 is an investigational oral T-cell immunotherapy designed to activate T-cells to attack the tumor vasculature, and, in several tumor types, attack cancer cells directly. Under the terms of the agreement, VAXIMM will be responsible for conducting two open-label Phase I/II trials – one in glioblastoma and one in metastatic colorectal cancer (CRC).

In June, we announced a collaboration with eFFECTOR Therapeutics to evaluate a novel immuno-oncology combination in microsatellite stable colorectal cancer. Together we plan to initiate a Phase II, open-label, randomized, non-comparative study to evaluate the safety, tolerability and efficacy of avelumab in combination with eFFECTOR's investigational small molecule MNK1/2 inhibitor, eFT508, in microsatellite stable relapsed or refractory CRC patients.

In September, we entered into a collaboration with Phosplatin Therapeutics to evaluate avelumab in combination with PT-112, a novel small molecule inducer of apoptosis with evidence of downstream immunogenic cell death (ICD) properties, currently in Phase I development in solid tumors and hematological malignancies.

At the 53rd ASCO Annual Meeting (June 2 – 6 in Chicago), we shared results from our increasingly broad oncology portfolio, from immuno-oncology to DNA damage response (DDR) approaches, in a wide range of hard-to-treat cancers. Over 40 abstracts showcased the impact of our commitment to shaping cancer care today and tomorrow, including data for avelumab, Erbitux® (cetuximab), and pipeline updates on the anti-PD-L1/TGF-β trap M7824, the DNA-PK inhibitor M3814, the BTK inhibitor M7583, and tepotinib, an investigational small-molecule inhibitor of the c-Met receptor tyrosine kinase.

Multiple presentations on avelumab at ASCO included data in first-line metastatic Merkel cell carcinoma and previously treated metastatic urothelial carcinoma, as well as results from the Phase Ib trial of avelumab in combination with axitinib in RCC. Beyond metastatic MCC, locally advanced or metastatic UC and RCC, we also presented further avelumab abstracts in non-small cell lung cancer and metastatic castrate-resistant prostate cancer, locally advanced squamous cell carcinoma of the head and neck, and relapsed or refractory diffuse large B-cell lymphoma.

We also featured new research at ASCO on our investigational bifunctional immunotherapy anti-PD-L1/TGF-β trap (M7824), which is thought to have the potential to simultaneously block both PD-L1 and TGF-β. An oral presentation showcased dose escalation Phase I clinical data exploring the potential of M7824 in advanced solid tumors.

Pipeline updates at ASCO also included early clinical results for tepotinib, M7583, an oral, highly selective, covalent inhibitor of Bruton's tyrosine kinase (BTK), and the first clinical data for M3814, an investigational DNA-dependent protein kinase (DNA-PK) inhibitor.

We are investing significant resources in the promising area of DDR. In January, we signed a licensing agreement with Boston-based Vertex Pharmaceuticals that covers the worldwide development and commercialization of four research and development programs that investigate novel approaches to the treatment of cancer. The addition of the DDR portfolio in-licensed from Vertex to our own in-house DDR platform has positioned us as one of the key players in the DDR field. Our broad DDR portfolio includes inhibitors for enzymes of major DDR pathways, such as Ataxia Telangiectasia and Rad3-related kinase (ATR), DNA-PK and Ataxia Telangiectasia Mutated kinase (ATM).

At the ESMO congress (September 8 – 12 in Madrid), we presented a total of 23 abstracts representing five therapeutic agents, which highlighted our company's expanding scientific expertise. Data were presented on the role of established medicine Erbitux® (cetuximab), with quality of life (QoL) data in colorectal cancer and real-world data in both CRC and squamous cell carcinoma of the head and neck. With respect to avelumab, we presented updated efficacy and safety data in metastatic MCC and UC (12-month follow-up data in pre-treated patients with locally advanced or metastatic disease). We also presented new data and updates from our rapidly evolving pipeline, including first stand-alone data in metastatic triple negative breast cancer from potential first-in-class ATR inhibitor M6620. M6620 is currently being investigated in several ongoing Phase I trials across a variety of tumor types. Other pipeline updates included data on the potential first-in-class dual p70S6K/Atk inhibitor M2698 and tepotinib in patients with advanced hepatocellular carcinoma (HCC).

In January, we kicked off a collaboration and licensing agreement with Domain Therapeutics of Strasbourg, France, to explore the potential of adenosine inhibition in the development of novel immuno-oncology agents. Domain Therapeutics is a company focused on the discovery and development of first-in-class compounds against transmembrane targets, and in particular against G protein-coupled receptors (GPCRs). This collaboration strengthens our combination strategy in immuno-oncology and underscores our science-driven approach to discovering and developing novel compounds through both internal capabilities and external collaborations.

Also in January, we announced a three-year strategic collaboration with The University of Texas MD Anderson Cancer Center, the aim of which is to accelerate the development of investigational cancer therapies in four cancers – breast, colorectal, glioblastoma and leukemia. The collaboration will enhance the value of our future oncology/immuno-oncology pipeline, with a goal of starting multiple registration phase studies in novel indications in the next two to three years.

In June, we announced our entry into a new strategic collaboration with the biopharmaceutical company F-star of Cambridge, United Kingdom, for the development and commercialization of five bispecific immuno-oncology antibodies. Beyond these, we will have further rights to replace, as well as to add to these antibodies using F-star's bispecific antibody platform. This collaboration will further strengthen our immuno-oncology pipeline and underscores our commitment to discovering and developing breakthrough cancer therapies that make a meaningful difference to patients' lives.

On July 6, we introduced the winners of our seventh Biopharma Innovation Cup. The winning team received € 20,000 for its innovative idea around the role of natural killer cells in cancer immunology. The Biopharma Innovation Cup is designed to support the professional development of post-graduate students and to foster innovation from a promising new generation of academic talent. It showcases our strong commitment to leveraging innovation, curiosity and collaboration. With more than 1,400 applications from 60 countries, the Biopharma Innovation Cup in 2017 achieved a new level of popularity.

In September, we announced the recipients of the fourth annual Grant for Oncology Innovation (GOI) awards. The three winners of this program shared prize money totaling € 1 million to progress their research. A scientific steering committee of internationally renowned oncology experts selected the winning proposals from around 100 applicants worldwide based on relevance to patient care, innovative approach, scientific impact, feasibility and relevance for the personalization of treatment.

Neurology & Immunology

Multiple sclerosis (MS) is one of the world's most common neurological disorders and there are still significant unmet needs for MS patients, particularly those with highly active relapsing MS (RMS). Following a positive opinion from the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) in June, the European Commission (EC) granted marketing authorization in August for Mavenclad® 10 mg (cladribine tablets) for the treatment of highly active relapsing multiple sclerosis in the 28 countries of the European Union (EU) as well as in Norway, Liechtenstein and Iceland. Mavenclad® is the first oral short-course treatment to have shown efficacy across key measures of disease activity in patients with highly active RMS, including disability progression, annualized relapse rate and magnetic resonance imaging (MRI) activity.

On November 30, Health Canada approved Mavenclad® as monotherapy for the treatment of adult patients with relapsing-remitting multiple sclerosis (RRMS) to reduce the frequency of clinical exacerbations and delay the progression of disability.

On December 7, our company received approval (Updated Registration) for Mavenclad® in Australia. The Therapeutic Goods Administration (TGA) updated the registration including the indication, dosing and safety information of Mavenclad® for the treatment of RRMS in Australia.

In January, the Israeli Ministry of Health approved Mavenclad® for the treatment of adult patients with highly active RMS as defined by clinical or imaging features.

The Mavenclad® marketing authorizations in Europe, Canada, Australia, and Israel are based on more than 10,000 patient-years of data with over 2,700 patients included in the clinical trial program, and up to ten years of observation in some patients. Mavenclad® is the first treatment in relapsing multiple sclerosis (RMS) to show sustained clinical efficacy for up to four years with a maximum of 20 days of oral treatment over two years. The efficacy and safety results of these studies allowed for a detailed characterization of its benefit-to-risk profile. Mavenclad® is a selective immune reconstitution therapy that simplifies treatment administration by giving patients two short annual courses of tablets in four years without the need for frequent monitoring. The most clinically relevant adverse reactions were lymphopenia and herpes zoster.

Several Mavenclad® submissions are currently under review and we plan to conduct additional filings for regulatory approval in other countries, including the United States.

Data for approved multiple sclerosis treatments Mavenclad® and Rebif® (interferon beta-1a) and investigational product evobrutinib were presented at the MSParis 2017, 7th Joint ECTRIMS-ACTRIMS Meeting (October 25 – 28 in Paris). A post hoc analysis in high disease activity sub-groups from the two-year CLARITY study confirmed that Mavenclad® significantly increased the proportion of patients with no evidence of disease activity (NEDA) compared with placebo (43.7% vs 9.0%). Efficacy data from the CLARITY, CLARITY Extension and ORACLE-MS trials highlighted that Mavenclad® delivers and sustains four years of disease control with a maximum of 20 days of oral treatment in the first two years. An additional safety analysis assessing malignancy and infection risk was presented along with data for Mavenclad®, which further detailed how the treatment is thought to selectively target the adaptive immune system.

Additionally, the recipients of the fifth annual Grant for Multiple Sclerosis Innovation (GMSI) were announced during the 7th Joint ECTRIMS-ACTRIMS Meeting. In 2017, 77 proposals from 25 countries were submitted. Three research teams from Canada, Portugal and the United States were selected to share the € 1 million grant.

We presented 11 abstracts in oral and poster sessions for clinical programs in systemic lupus erythematosus (SLE), osteoarthritis (OA), rheumatoid arthritis (RA) and fibrotic diseases, including one late-breaker, at the 2017 American College of Rheumatology/Association of Rheumatology Health Professionals (ACR/ARHP) Annual Meeting held from November 3 – 8, 2017 in San Diego. Noteworthy data included a late-breaking abstract on FORWARD, a five-year Phase II study of sprifermin in OA of the knee, providing insights into its potential disease-modifying properties. The study of 549 patients met its primary endpoint, demonstrating statistically significant, dose-dependent increases in MRI total femorotibial joint cartilage thickness from baseline in the two sprifermin groups receiving the highest doses as compared with the placebo group after the two-year treatment period. Demonstration of an increase in cartilage thickness as opposed to a delay in decreasing cartilage thickness has not been previously reported.

On September 12, we announced that a Phase IIb study of evobrutinib, a Bruton's tyrosine kinase inhibitor (BTKi) discovered by us, had been initiated in rheumatoid arthritis (RA) following a Phase IIa study which met the pre-defined criteria for progressing to a dose-finding study in this disease. Evobrutinib is now in Phase IIb studies in three immunological indications: RA, MS, and SLE. Evobrutinib was discovered in our own laboratories and is an example of the innovation of our R&D activities within Healthcare.

We presented data at the American Academy of Neurology (AAN) 69th Annual Meeting (April 22 – 28 in Boston). A total of 15 abstracts on MS, including studies evaluating Rebif® (interferon beta-1a) and Mavenclad®, were presented.

On June 26, at the European Association of Neurology meeting held in Amsterdam, analyses of data from three clinical studies (CLARITY, CLARITY Extension and ORACLE-MS) were announced which suggest that Mavenclad® selectively and discontinuously reduces both B and T lymphocytes in patients with early and relapsing forms of MS. An early reduction of peripheral blood B cells was seen, with cell numbers reaching a nadir at 13 weeks after treatment, followed by a rapid reconstitution toward baseline. A moderate reduction in T cell counts was also shown, although to a lesser degree than B cells; this reduction was more pronounced in CD4+ than in CD8+ lymphocytes.

Fertility

In early 2017, the CHMP granted a positive opinion for the new Pergoveris® Pen, followed by a European Commission approval in May. The pen addresses an unmet medical need by providing a convenient and ready-to-use fertility combination treatment option for women with severe follicle stimulating hormone (FSH) and luteinizing hormone (LH) deficiency. The liquid version of Pergoveris® was created by evolving the original freeze-dried powder and solvent combination – which required patients to mix the product vials themselves before daily injection – towards a ready-to-use pre-filled Pen solution. The new Pergoveris® Pen is the only premixed combination of human FSH and human LH on the European market available in a pre-filled injection device for self-administration.

We further underscored our commitment to innovation in fertility in July, when we awarded € 1.25 million to external research projects, supporting the advancement of medical science through the Grant for Fertility Innovation (GFI). Launched as the first of our company's Grants for Innovation in 2009, it is dedicated to transforming innovative translational fertility research projects into actual solutions aimed at improving fertility treatment outcomes. In 2017, the GFI Award Ceremony included the announcement of the Lifetime Achievement Award in Fertility Innovation of Merck KGaA, Darmstadt, Germany, granted to Professor Bruno Lunenfeld for his revolutionary work within the fertility field since 1954.

In November, the FDA approved a new version of Gonal-f® (follitropin alfa injection) pre-filled pen. Known as Gonal-f® RFF Redi-ject™ pre-filled pen in the United States and originally approved by the FDA in 2013, the new version of the pen, based on input from people who use the pen, is easy both to learn and to use. Gonal-f® is the only gonadotropin that comes in a pre-filled, ready-to-use pen in the United States. The new Gonal-f® pen, like its predecessor, enables a fine-tuning of treatment allowing for minimum increments of 12.5 IU to titrate a wide range of doses and precisely target the dosing to patient needs. In addition, its new design features include an amendment to the dose display window for enhanced readability.

General Medicine & Endocrinology

In May, the Medicines and Healthcare Products Regulatory Agency (MHRA) in the United Kingdom authorized Glucophage® SR (sustained release formulation; metformin), for the reduction in the risk or delay of the onset of type 2 diabetes in adult, overweight patients with impaired glucose tolerance (IGT) and/or impaired fasting glucose (IFG), and/or increased glycated hemoglobin (HbA1c), when intensive lifestyle changes for 3 to 6 months have failed.

On September 18, we announced the recipients of the Grant for Growth Innovation (GGI) for 2017 during the 10th International Meeting of Pediatric Endocrinology in Washington, D.C. Sixty-five applications were received from 28 countries and reviewed by an independent scientific steering committee consisting of six internationally renowned endocrinologists and researchers. Research groups based in France and Denmark were each awarded a grant for innovation projects in the field of growth and growth disorders.

BIOPHARMA PIPELINE

as of December 31, 2017

Therapeutic area Compound	Indication	Status
Neurology		
Cladribine tablets (lymphocyte-targeting agent)	Relapsing multiple sclerosis	Registration[1]
Evobrutinib (BTK inhibitor)	Multiple sclerosis	Phase II
Oncology		
Tepotinib (c-Met kinase inhibitor)	Non-small cell lung cancer	Phase II
Tepotinib (c-Met kinase inhibitor)	Hepatocellular cancer	Phase II
M2698 (p70S6K and Akt inhibitor)	Solid tumors	Phase I
M3814 (DNA-PK inhibitor)	Solid tumors	Phase I
M9831 (VX-984, DNA-PK inhibitor)	Solid tumors	Phase I
M6620 (VX-970, ATR inhibitor)	Solid tumors	Phase I
M4344 (VX-803, ATR inhibitor)	Solid tumors	Phase I
M3541 (ATM inhibitor)	Solid tumors	Phase I
M8891 (MetAP2 inhibitor)	Solid tumors	Phase I
M7583 (BTK inhibitor)	Hematological malignancies	Phase I

BIOPHARMA PIPELINE

as of December 31, 2017

Therapeutic area Compound	Indication	Status
Immuno-Oncology		
Avelumab (anti-PD-L1 mAb)	Non-small cell lung cancer, 1st line	Phase III
Avelumab (anti-PD-L1 mAb)	Non-small cell lung cancer, 2nd line	Phase III
Avelumab (anti-PD-L1 mAb)	Gastric cancer, 1st line maintenance	Phase III
Avelumab (anti-PD-L1 mAb)	Ovarian cancer platinum-resistant/-refractory	Phase III
Avelumab (anti-PD-L1 mAb)	Ovarian cancer, 1st line	Phase III
Avelumab (anti-PD-L1 mAb)	Urothelial cancer, 1st line maintenance	Phase III
Avelumab (anti-PD-L1 mAb)	Renal cell cancer, 1st line	Phase III
Avelumab (anti-PD-L1 mAb)	Locally advanced head and neck cancer	Phase III
Avelumab (anti-PD-L1 mAb)	Merkel cell cancer, 1st line	Phase II
Avelumab (anti-PD-L1 mAb)	Solid tumors	Phase I
Avelumab (anti-PD-L1 mAb)	Hematological malignancies	Phase I
M9241 (NHS-IL12, cancer immunotherapy)	Solid tumors	Phase I[2]
M7824 (anti-PD-L1/TGFβ trap)	Solid tumors	Phase I
M4112 (cancer immunotherapy)	Solid tumors	Phase I
Immunology		
Sprifermin (fibroblast growth factor 18)	Osteoarthritis	Phase II
Atacicept (anti-BLyS/anti-APRIL fusion protein)	Systemic lupus erythematosus	Phase II
Atacicept (anti-BLyS/anti-APRIL fusion protein)	IgA nephropathy	Phase II
Abituzumab (anti-CD51 mAb)	Systemic sclerosis with interstitial lung disease	Phase II
Evobrutinib (BTK inhibitor)	Rheumatoid arthritis	Phase II
Evobrutinib (BTK inhibitor)	Systemic lupus erythematosus	Phase II
M1095 (ALX-0761, anti-IL-17A/F nanobody)	Psoriasis	Phase I[3]
M6495 (anti-ADAMTS-5 nanobody)	Osteoarthritis	Phase I
General Medicine		
M5717 (PeEF2 inhibitor)	Malaria	Phase I

[1] As announced on August 25, 2017, the European Commission has granted marketing authorization for cladribine tablets for the treatment of highly active relapsing multiple sclerosis in the 28 countries of the European Union in addition to Norway, Liechtenstein and Iceland.
[2] Sponsored by the National Cancer Institute (USA).
[3] As announced on March 30, 2017, in an agreement with Avillion, anti-IL-17 A/F nanobody will be developed by Avillion for plaque psoriasis and commercialized by our company.
More information on the ongoing clinical trials can be found at www.clinicaltrials.gov.
Pipeline products are under clinical investigation and have not been proven to be safe and effective.
There is no guarantee any product will be approved in the sought-after indication.

ADAMTS-5	A disintegrin and metalloproteinase with thrombospondin motifs
Akt	Protein kinase B
APRIL	A proliferation-inducing ligand
ATM	Ataxia Telangiectasia Mutated kinase
ATR	Ataxia Telangiectasia and Rad3-related kinase
BLyS	B-lymphocyte stimulator
BTK	Bruton's tyrosine kinase
IgA	Immunoglobulin A
IL	Interleukin
mAb	Monoclonal antibody
MetAP2	Methionine aminopeptidase 2
PD-L1	Programmed cell death ligand 1
PeEF2	*Plasmodium* eukaryotic elongation factor 2
PK	Protein kinase
TGFβ	Transforming growth factor β

Consumer Health

Our Consumer Health business develops and sells over-the-counter medicines and food supplements as well as several prescription medicines in Europe, in particular in France, Germany and the United Kingdom, and in growth markets in Latin America, the Middle East, Africa, and Southeast Asia. The focus of our research and development activities is on the continuous improvement of existing formulations as well as on the development of new products and line extensions. For example, in 2016/2017 we successfully launched the all-new brand Vivera® across several Latin American markets, containing one of the most researched and most effective probiotics in the world for the treatment of gastro-intestinal upset. We are following a consumer-centric innovation approach based on intensive market research across all our key markets. Since 2014, we have been establishing cooperation agreements with independent third-party research facilities to leverage their specific capabilities and expertise for the development of new products that meet the specific needs of consumers.

Allergopharma

Allergopharma, our allergy business, is one of the leading manufacturers of diagnostics and prescription drugs for allergen immunotherapy. With its own research department and in cooperation with research institutes and other partners, Allergopharma is developing a better understanding of the immunological mechanism that underlies the development of allergies and is working on the next generation of drugs for allergen immunotherapy.

Life Science

Across our three Life Science business units of Research Solutions, Process Solutions and Applied Solutions, our R&D teams are dedicated to finding innovative solutions to our customers' toughest challenges. In our Life Science business sector, we invest significantly in R&D, with more than 1,500 employees working in various R&D functions around the world.

In 2017, we continued to focus on delivering the promise of accelerating access to health for people everywhere. We launched 15,000 products, including nearly 9,000 chemicals, while aiming to:

- Improve and expand our portfolio
- Invest in new and disruptive technologies for the long term
- Partner with the global scientific community
- Meet customer needs

Improve and expand our portfolio

We launched innovations across all segments of our portfolio throughout 2017. In Research Solutions, we introduced a next-generation high-sensitivity protein detection platform, SMCxPRO™ technology, which allows scientists to detect and quantify low-abundance biomarkers that traditional methods cannot measure.

In addition, we introduced the Stericup® Quick Release 500mL vacuum filtration system, a filter bottle system ideally suited for sterile filtration of cell culture media, buffers and reagents. Even routine processes like microfiltration must be reliable and consistent because quality and reproducibility are critical to the cell culture process. The improved liquid sterile filtration system offers ergonomic design updates that optimize user control and streamline the filtration process, while safeguarding results with the proven performance of Millipore® membranes.

In Process Solutions, we launched CAN MultiFlow™ screening services to more accurately predict genotoxic and mode-of-action properties of substances, ingredients and drug compounds. We were the first company to provide this service in the United States. Assessing toxicity is one of the most important steps in the development of chemicals, ingredients and drugs for use in pharmaceuticals, agriculture or consumer goods.

We took a significant step towards increasing manufacturing flexibility and enabling higher productivity with the launch of the Ex-Cell® Advanced™ HD Perfusion Medium. This first off-the-shelf, high-density cell culture medium supports perfusion processes and facilitates high productivity at low perfusion rates, increasing production yield and speed to clinic.

We also introduced Millistak+®HC Pro, the first portfolio of high-capacity, fully synthetic depth filters for non-treated Chinese Hamster Ovary harvest clarification and downstream filtration applications. The product provides a cleaner and more consistent depth filtration process than traditional diatomaceous earth (DE) and cellulose-based filtration processes.

In Applied Solutions, we introduced a new testosterone calibrator kit for in vitro diagnostic use. The certified kit allows users to calibrate assays and verify calibrations and is the first of its kind to receive CE mark approval – indicating compliance with the European Union's Medical Device Directive.

We also launched MC-Media Pads for convenient food and beverage testing. The product offers streamlined, convenient indicator organism testing for robust quality control of food and beverages, helping customers improve their sample-testing workflows by increasing efficiency without compromising quality.

Invest in new and disruptive technologies for the long term

CRISPR genome-editing technology is advancing treatment options for some of the toughest medical challenges faced today, including chronic illnesses and cancers for which there are limited or no treatment options. Our company has a 12-year history in the genome-editing field and was the first company to globally offer custom biomolecules for genome editing (TargeTron™ biomolecules and zinc finger nucleases), driving adoption of these techniques within the worldwide research community.

In 2017, we developed an alternative CRISPR genome-editing tool that makes CRISPR more efficient, flexible and specific, giving researchers more experimental options and faster results, which can accelerate drug development and access to new therapies. Our research on proxy-CRISPR, "Targeted Activation of Diverse CRISPR-Cas Systems for Mammalian Genome Editing via Proximal CRISPR Targeting," was published in the April 7, 2017, edition of *Nature Communications*.

The Australian Patent Office granted our company patent rights relating to the use of CRISPR in a genomic-integration method for eukaryotic cells. With this CRISPR genomic-integration technology, scientists can replace a disease-associated mutation with a beneficial or functional sequence, a method important for creation of disease models and gene therapy. Additionally, scientists can use the method to insert transgenes that label endogenous proteins for visual tracking within cells.

We further strengthened our patent portfolio in August, when the European Patent Office (EPO) issued a "Notice of Intention to Grant" for a patent application covering our CRISPR technology used in a genomic-integration method for eukaryotic cells. The patent provides protection for our CRISPR technology, which gives scientists the ability to advance treatment options for the toughest medical challenges we face today.

In addition, the Canadian Patent Office issued a "Notice of Allowance" for the patent application covering CRISPR technology used in a genomic-integration method for eukaryotic cells. And, in December, we were granted a patent for CRISPR technology by the Singapore Intellectual Property Office. Patents have also been filed for the insertion CRISPR method in the United States, Brazil, China, India, Israel, Japan, and South Korea.

We recognize the potential benefits of conducting properly defined research with genome editing because of the breakthrough therapeutic potential. Therefore, we support research with genome editing under careful consideration of ethical and legal standards. The Group has established the Bioethics Advisory Panel of Merck KGaA, Darmstadt, Germany, to provide guidance for research in which its businesses are involved, including research on or using genome editing.

Beyond basic gene-editing research, our company supports development of gene- and cell-based therapeutics and manufacturing viral vectors.

In October, our Carlsbad, California-based manufacturing facility for the production of BioReliance® viral and gene therapy products completed both a U.S. Food and Drug Administration pre-license inspection and a European Medicines Agency marketing authorization application inspection. As a leading contract manufacturing organization for the production of next-generation gene therapies, the achievement underscores our commitment to bring our customers closer to commercialization of novel therapies. In December, we signed a commercial supply agreement to manufacture viral vectors for bluebird bio for use in potentially transformative gene therapies.

Partner with the global scientific community

In collaboration with Stelis Biopharma, we opened a new joint process scale-up lab in Bengaluru, India, to provide end-to-end solutions – from process development to scale-up manufacturing – for pre-clinical, clinical and commercial supply. Both companies bring technological expertise and an extensive bioprocess development and manufacturing portfolio that will help customers accelerate development of biopharmaceuticals for clinical trials and manufacturing with greater reliability and cost effectiveness.

In 2017, we also formed a strategic alliance with Baylor College of Medicine, Houston, Texas, and its vaccine product development partnership, Texas Children's Hospital Center for Vaccine Development, to advance vaccine research and development for neglected and emerging infections. The collaboration focuses on bringing vaccines through development to efficiently deliver them to societies in need. Together, we are working to optimize the vaccine manufacturing process to increase vaccine stability and yield.

Progress continued within the scope of our participation in Horizon 2020, the EU Framework Program for Research and Innovation, to improve biopharmaceutical downstream processing. The nextBioPharmDSP, a consortium of seven organizations, is developing a more efficient, cost-effective and environmentally friendly downstream process to manufacture monoclonal antibodies and biosimilars. The biopharmaceutical industry faces pressures to reduce manufacturing costs and deliver greater efficiencies while being environmentally responsible. Through the Horizon 2020 program, consortium members are already delivering important advances for downstream processing.

In addition, we extended our strategic alliance with Samsung BioLogics after a memorandum of understanding (MoU) was signed in November. The alliance aims to accelerate process development and clinical material production at small biotech start-ups focusing on novel drug development for which Samsung BioLogics acts as a contract manufacturer. The new MoU is an extension of an MoU signed in 2014 that encompasses a long-term supply agreement under which we provide raw materials for biopharmaceutical manufacturing.

Meet customer needs

We expanded our BioReliance® End-to-End Biodevelopment Centers in North America, China and Europe to meet increasing customer demand for their turnkey portfolio of bioprocessing products, manufacturing capabilities and industry-leading technological expertise. The expansion includes the opening of two new process development centers, located in the United States and China, following the commercial success of our biodevelopment center in Martillac, France. The two new facilities provide a full range of process development capabilities and services, including cell line development services and both upstream and downstream process development, as well as non-GMP clinical production. The United States facility will be open to customers in 2018.

Angiex Inc., Cambridge, Massachusetts, will be the first project undertaken by the new U.S. BioReliance® End-to-End Biodevelopment Center. We formed a collaboration with Angiex Inc. to help accelerate clinical readiness of a new cancer therapy. Our goal is to support the biotechnology start-up's ability to speed its lead oncology antibody drug candidate to clinical use by providing access to end-to-end process development tools, education programs and training.

Performance Materials

We are the undisputed market and technology leader in liquid crystals (LCs) and photoresist materials, which are primarily used in televisions and mobile communication applications. We are also one of the leading suppliers of OLED materials as well as decorative and functional effect pigments. Materials for integrated circuits round off the portfolio.

Display Materials

In 2017, we continued to work with our customers, the display manufacturers, to further develop high-performance liquid crystal technologies. The systematic introduction of new liquid crystal materials and the development of higher-performance liquid crystal mixtures led to numerous newly qualified and commercialized products in all applications, including large-screen TVs, public information displays, as well as mobile devices and automotive applications. We developed and commercialized a number of new photoresist formulations for producing the thin-film transistor backplanes that are used for both LC and OLED display manufacture. Our high-resolution photoresist technology is especially important for the more complex and demanding electronic patterning required in increasingly high-resolution displays. Our innovative liquid crystal technology UB-FFS (ultra-brightness fringe-field switching) also saw growth in the mobile device display sector. UB-FFS is highly attractive for mobile applications. It provides the highest light efficiency as pixel sizes become increasingly smaller due to the demand for higher-resolution smartphones and tablets. We also further developed this energy-saving technology for larger display applications, including TVs and public information displays, where high light efficiency is particularly valuable in the highest-resolution displays, for example 8K.

Our new liquid crystal technology SA-VA (self-aligned vertical alignment) is eco-friendly and resource-conserving; it requires less energy and creates fewer waste products than conventional modes during display manufacture. We have been developing the materials and process within the scope of close technical partnerships. The technology also provides a more efficient display manufacturing process and could offer improved design features for display manufacturers. SA-VA has the potential to be used in all types of display applications, including mobile IT applications, but most importantly large-screen TVs. We expect the first products in mid-sized applications, but extending quickly to large-screen and high-end TV applications. We also made further progress with the development of new liquid crystal technologies to enable free-form LC displays. Here we aimed to enable the use of low-cost plastic substrates rather than the thin glass commonly used in LC displays to date. We are working closely with display makers in Asia to optimize the materials and process for our innovative polymer wall LC technology. This could provide robust and bendable plastic displays without the defect patterns that typically occur when an LC display is pressed or bent.

Beyond classic displays, we have more strongly positioned liquid crystals under the licrivision™ brand as an innovative material for windows in architectural and automotive applications. We are currently focusing on three variants: sun protection, glare protection, and privacy control where the windows switch to opaque. At the end of November, we opened our first production facility for switchable liquid crystal window modules in Veldhoven, the Netherlands. In addition, we presented our liquid crystal window technology for automotive sunroofs at the International Motor Show (IAA) in Frankfurt, Germany. We continued to advance the development of smart antennas, which can also be used in the automotive industry. Thanks to a thin functional layer of liquid crystals, the antenna can be electronically pointed to a satellite without the need to move the device mechanically. Together with Hella, a light and electronics expert, and other partners, we have developed a smart automotive headlight system based on an LC display. With a total of 30,000 pixels, the smart adaptive lighting can be set in a continuously variable manner and in real time to various driving situations. Hella is to bring the developed technology to series production.

To accelerate the development of free-form displays, our company is cooperating with FlexEnable of the United Kingdom. This company is working in the field of conformable, large area, full color and video rate organic liquid crystal displays (LCDs) on polymer substrates. With a bend radius that can go below 30 millimeters, organic LCDs can meet new market requirements, for example in automotive applications, where thin, conformable and shapeable displays are needed. It will soon be possible to curve organic LCDs around complex surfaces and shapes when our innovative polymer wall LC technology is used. In order to develop new digital optical applications with liquid crystals, in May we entered into a five-year collaboration with the University of Leeds. This is one of the United Kingdom's most renowned research institutions for liquid crystal applications and has recently built a reputation in particular for non-display applications such as switchable contact lenses.

Integrated Circuit Materials

Gas-phase deposition materials are a growth area within our semiconductor chemicals business. To meet the constantly growing challenges in chip production, increasingly more chemical elements are being used in advanced semiconductor fabrication processes; this is often enabled by atomic layer deposition technology. For the deposition of layers that often are only a few atoms thick, novel materials such as precursor chemicals are required, which can be applied at lower temperatures and/or selectively to only certain parts of a wafer. Such surface-selective processes automatically carry the target materials to the right position. This provides advantages for our customers as they can eliminate costly photolithography steps and at the same time automatically avoid overlay registration errors.

In order to better support our customers in Asia, in 2017 we opened a new research center in Taiwan, where we are conducting research in atomic layer deposition and gas phase deposition for front-end applications, as well as very thermally conductive, economically sustainable, high-performance sinter pastes for chip packaging applications. At our sites in Shizuoka, Japan, and Darmstadt, Germany, we are developing innovative dielectrics that can be used at lower application temperatures and are thus suitable for novel chip types. Our thick-film photoresist technology found new applications for the production of 3D NAND storage chips that enable higher storage capacity than conventional planar technology with the same surface area. Besides other applications, these new-generation storage chips are increasingly being used in solid-state drives (SSDs), successors of classic hard drives.

Pigments & Functional Materials

The exceptional color saturation and brilliance of Meoxal® effect pigments based on aluminum flakes is finding increasing use in automotive and plastic coatings. In addition, Xirallic® NXT Cougar Red, a pure, bluish red pigment with an extraordinary sparkle, was introduced for automotive coatings as the latest addition to the Xirallic® NXT series. Further pigment developments support the market trend towards achromatic coatings. In the plastics field, the extremely pure, silver-white Iriodin® 6163 WAY was added to the WAY series of weather-proof pigments for outdoor applications. For the cosmetics sector, both new sparkle effects and matte effect pigments were successfully launched as part of the Smart Effects initiative. In the fillers area, new formulations, such as an alcohol-free variant of the anti-aging active ingredient RonaCare® CP5, were added to the portfolio. Based on two-dimensional and three-dimensional skin models, we developed a technology to more efficiently assess new cosmetic actives. Particularly in efficacy testing of natural substances, we expect to already have marketable products in 2018.

In technical applications, we intensified our activities in additives for 3D laser direct structuring with a focus on 3D printing of plastics. Together with our partners, we also developed laboratory prototypes which we presented at the LASER World of Photonics 2017 in Munich, Germany and the International Motor Show (IAA) 2017 in Frankfurt, Germany. Laser additives enable computer-controlled fabrication of three-dimensional components with integrated electronic parts and laser-assisted circuit board bonding. We made good progress in high-voltage technology. Within the scope of the iShield research project, which is funded by the German Federal Ministry of Education and Research (BMBF), we are collaborating with academic and industrial partners to develop and qualify a novel material to shield generators and engines.

We further developed our range of fluorosurfactants, which strongly differentiates itself from competing products owing to its favorable ecotoxicological profile. In early 2017, Tivida® FL 3000 was added to our portfolio of nonionic surfactants. Even in very low concentrations, it significantly improves the flow and wetting behavior of coating systems.

Advanced Technologies

In 2017, we made significant progress with our material and technology developments for flexible displays. At major exhibitions, for example, together with strategic partners we presented prototypes demonstrating the market readiness of our materials and the related technologies. During SID Display Week in May, we additionally reported on the development of printing inks. In 2017, our printed red, green and blue layers demonstrated first-ever efficiency values comparable to those of vacuum evaporation technology. This will allow flexible or rollable screens to be manufactured in the future, such as for automotive applications or large-area displays. Printed displays achieve greater brightness and better energy efficiency. In reflective displays, our partner Clearink Displays won the prestigious Best in Show Award at SID 2017. To respond to the growing demand from the industry for our innovative material solutions, we started investing in our R&D site in Chilworth, United Kingdom, to increase our lab capacity.

In electronic packaging, we strengthened our research activities by participating in a consortium led by the Fraunhofer Institute for Reliability and Microintegration in Berlin. We are further advancing material and technology development in hybrid electronics. At the LOPEC 2017 exhibition in Munich in March, we presented the prototype of a flexible display consisting of a backplane with organic thin-film transistors as well as liquid crystals from Merck KGaA, Darmstadt, Germany. We will continue to focus strongly on the development of these technologies.

In 2017, a number of lighthouse projects demonstrated the diversity of use of printable organic solar cells (OPV). For example, OPV modules integrated into a glass façade in São Paulo, Brazil, provide shade, innovative design and energy efficiency. We presented a novel façade concept combining OLED and OPV module design with functionality at the Biennale of Architecture and Urbanism in Seoul, Korea. The growing interest of architects in this innovative construction material was reflected in the Innovation Award for Architecture and Construction, which went to OPV at BAU 2017, the world's leading exhibition for architecture, materials and systems. The upcoming technology trend in the LED lighting market – human centric lighting (HCL) – places the focus of light planning on people's health and well-being. This trend is impressively confirmed by the 2017 Nobel Prize in Physiology or Medicine, which was awarded for discoveries of molecular mechanisms controlling the circadian rhythm, which is significantly affected by light. Our product developments specifically address this up-and-coming market for HCL LED lighting. Micro-LED displays are also currently attracting great attention. From our broad portfolio for the LED industry, we have already supplied our customers with first materials for this new application.

Strategic realignment

In 2018, we want to focus even more strongly on the needs of our customers and markets. Therefore, in December 2017, we announced that we will combine our expertise in three newly created business units aligned with our target markets: Display Solutions, Semiconductor Solutions, and Surface Solutions. In the future, all activities pertaining to research, business development and external partnerships will be united in a central research and innovation unit.

People

The success of our company depends crucially on the dedication of our employees. We want to offer them framework conditions that meet their individual needs. This encompasses an exciting range of tasks and advanced training possibilities, furthering flexible forms of cooperation and a culture of mutual esteem and respect. Our objective is to create a working environment in which curiosity can best unfold.

A career with Merck KGaA, Darmstadt, Germany, is enriching – both from a professional and a personal perspective. It is important to us to create an inclusive work environment in which all employees have the possibility to maximize their potential. To support our company's growth and innovation course, the focus of our human resources work is on furthering engaged people, capable talents and empowered leaders.

In line with the new development of our corporate brand in 2015, we also adapted our employer brand and launched it globally in May 2017. At the core, it is based on the passion, creativity and curiosity of our employees, through whom our company has become a global science and technology company. We are convinced that curiosity leads to positive outcomes.

Our promise as an employer is thus "Bring Your Curiosity To Life." We have formulated four core messages that characterize our employer brand and are applicable to us as a whole. They determine how we collaborate, how we advance our business, how our employees can develop within the company and who we are:

- Experience the joy of curiosity
- Foster fruitful partnerships
- Fulfill your personal ambitions
- Advance technologies for life

OVERVIEW OF OUR HEADCOUNT FIGURES

As of December 31, 2017, we had 52,941 employees worldwide (2016: 50,414). In 2017, we were represented by a total of 217 legal entities with employees in 66 countries.[1]

DISTRIBUTION OF EMPLOYEES

by region

Driving innovation through engaged people

Our human resources work is founded on a company culture that values and motivates people and promotes the right framework conditions for innovation and engagement.

REGULAR GLOBAL EMPLOYEE SURVEYS

To strengthen employee retention and generate impetus for the future of our company, we pay special attention to honest and continuous feedback. Having used various methods to obtain feedback for many years, in 2016 we reintroduced our global employee survey. Based on the results, strategic focal topics were identified and corresponding initiatives derived. In October 2017, another employee survey was conducted in 22 languages and the status of implementation reviewed. Around 42,100 employees (84%) took part. Our Group-wide score, which shows how attached our employees feel to the company, was 59%. We are thus on a par with other pharmaceutical and chemical companies. As of 2018, these results will be incorporated across the Group.

[1] The Group also has employees at sites which are not fully consolidated subsidiaries. These figures refer to all people directly employed by the Group and therefore may deviate from figures in the financial section of this report.

FOSTERING INNOVATIVE POTENTIAL

Innovation is absolutely essential to the success of a science and technology company. Curiosity and a focus on new ideas provide a fruitful basis for innovation and have a positive impact on company performance. The modular Innovation Center in Darmstadt, which opened in 2015, offers our employees the opportunity to embrace new ideas and work on select projects in an inspiring environment. Sufficient scope and adequate support, also in the form of a suitable working environment, actively promote the innovative strength of our employees. Apart from initiatives to generate ideas and advance projects, the Innovation Center offers our employees various training courses on topics such as innovative methods, creative techniques and developing business models. Internal project teams, start-ups from our Accelerator program as well as many interested colleagues from various areas throughout our company benefit from this offer. Recently, the training courses offered by the Innovation Center were digitalized, making them available to all employees worldwide.

VALUING CULTURAL DIVERSITY

Our success is based on courage, achievement, responsibility, respect, integrity and transparency. These values determine how we perform our work daily, the way in which we approach challenges, as well as our dealings with customers, business associates and colleagues. Openness and respect characterize our company culture. The objective is to create a culture of mutual respect and esteem in which the strengths of a diverse workforce and individual differences are appreciated.

The Chief Diversity Officer and a council of high-ranking executives from all business sectors and select Group functions play a key role in strategically defining and managing our diversity and inclusion policies. Their work focuses on operationalizing the resolutions we passed in 2015 on the topics of diversity and inclusion. Key elements of this are recruiting people representing a breadth of qualifications, skills and experiences, developing and retaining them. In addition, we support specific employee networks in order to foster exchange among like-minded individuals. Apart from our women's networks in various countries, we also support networks that promote the interests of the LGBTIQ community as well as Afro-American and foreign employees.

In September 2017, the Group-wide Diversity Days were held for the sixth time with a campaign entitled "Different Perspectives". Various events and activities took place to heighten awareness of diversity and inclusion among our workforce. Globally, employees in 32 countries across six continents took part in numerous events and shared their experiences on the intranet and in social networks.

As a global employer with intercultural expertise, people from a total of 131 nations work for our company; 23.2% of our employees are German citizens and 74.9% work outside Germany. At our headquarters in Darmstadt, 11% of our staff comes from 89 different countries.

Women currently make up 43.1% of the workforce. However, the ratio of women to men varies widely across the different regions, businesses and functions. We are therefore working to raise the proportion of women wherever they are underrepresented, taking into account the situation typical for the industry as well as regional differences.

Demographic change is posing challenges in Germany as well as several other EU countries, the United States, and Japan. The average age of our employees is slightly more than 41. We assume that this figure will continue to rise in the coming years and are preparing for this situation. As part of our range of "Health and Well-being" offers, we specifically promote employee physical and psychological well-being. These offers vary from country to country and are adapted to local circumstances. In addition, we offer multifaceted continuing education throughout the entire professional careers of our employees.

In Germany, our company signed the Diversity Charter in 2013, the Equal Opportunity Charter in 2015 and the Inclusion Action Plan of the German Mining, Chemical and Energy Industrial Union (IG BCE) in 2017. By joining these initiatives, we underscore our commitment to fairness and tolerance at the workplace.

Furthering and asking more of talent

We endeavor to identify and develop the abilities of our employees early on. Our objective is to extensively further current and future employees and offer them interesting advanced training opportunities in order to prepare them for future and more challenging tasks.

A HOLISTIC RECRUITMENT APPROACH

When filling job vacancies, we pursue a holistic recruitment approach coupled with globally uniform and binding procedures. This starts with an internal job posting before external channels such as job portals and recruitment agencies are used. On the one hand, this process enables us to offer employees better development opportunities, and on the other hand it minimizes the costs of external recruitment. For employees with leadership responsibility, we offer targeted interview coaching to support them in selecting candidates and to establish uniform quality standards.

A globally accessible welcome portal is available to new employees in order to help them prepare for their new job at Merck KGaA, Darmstadt, Germany, and to support their onboarding phase. To further improve the onboarding process, various initiatives were started in 2017. For instance, supervisors, Human Resources and new employees can already exchange information and documents before the employee's first day of work. In addition, all new employees are assigned an experienced colleague who can help them to familiarize themselves with the daily working routine. Our managers are also given detailed information such as onboarding plans and process descriptions to support them with this task.

VOCATIONAL TRAINING TO RECRUIT YOUNG PEOPLE

In 2017, we again maintained a constant, high vocational training rate in Darmstadt, our largest site. A total of 535 young people were enrolled in apprenticeships in 23 different occupations at our headquarters in 2017. We give unlimited employment contracts to all apprentices working in occupations for which we have sustainable demand. On average, the post-apprenticeship hiring rate – taking voluntary terminations into account – was more than 90% over the past five years. We also offer vocational training at other sites in Germany, in which a total of 53 apprentices participated in 2017.

We promote the professional expertise of our apprentices through numerous regional and global project activities. In 2017, these included supporting a center for homeless children in South Africa. Furthermore, through our "Start in die Ausbildung" program, we help prepare young people who have not been able to find an apprenticeship. With a total of 20 young people between the ages of 16 and 25 in 2017, the number of participants was slightly lower than in the previous year. Although they have a school leaving qualification, they had been searching for an apprenticeship for at least one year without success.

Since 2016, we have also been working on a specially developed program to help refugees enter the job market. As part of the "Integrating refugees through training" program, a further group of 12 young people who were forced to flee their home countries started linguistic, technical, cultural, and job-specific training to prepare them for vocational training and thus for the labor market.

TARGETED ADVANCED TRAINING AND MAXIMIZING PERFORMANCE CAPABILITY

Our focus on systematic personnel development allows us to sustainably strengthen the performance potential within our company and to increase the motivation of our people. Only by expanding the abilities of each individual can we count on innovative and curious employees and managers in the future and flexibly respond to different requirements.

Employee development at our company is founded on regular exchanges and a culture in which employees aspire to high levels of performance and engagement. As the basis for internal strategic talent management, the performance and potential management process is globally aligned for all employees in accordance with the same principles and is part of a shared IT system. We systematically combine talent recognition with performance assessments based on employee target agreements, as we are convinced that regular feedback helps all employees to grow in terms of their performance and potential. Regular individual assessments permit us to more readily identify high-potential employees and to further them accordingly. Clear objectives, differentiated and open feedback and individual development plans are thus important prerequisites for both the personal development of every individual and the success of the company. Through software-supported intensive analysis of our personnel data, we can identify the potential of talented employees early on, which helps to optimize our succession planning efforts and find even better matches for internal positions.

Global classroom training courses and workshops developed specifically for teams help our employees develop and build individual abilities in line with new requirements and perspectives. In 2017, more than 5,700 employees participated in global classroom training courses to prepare themselves for new opportunities and challenges. Digital solutions in the form of more than 4,000 e-learning and languages courses are available to our employees. To enable our employees to realize their full potential, we also provide local business- and function-related offers. All measures are documented in a development plan introduced globally.

Individual development opportunities are also supported by a new job architecture, which was introduced in 2017. It applies globally and enables us to harmonize all positions and to simplify their classification. This job architecture defines three fundamental and equivalent career paths: managers, experts and project managers. Employees who wish to advance in their careers and aim for a top position within the company can also do so via the expert and project manager career paths.

Building empowered leaders

One of the major duties of our leaders is to motivate and encourage employees to show their innovative strength. A dialogue in a spirit of partnership, the development of strategic competencies and the continuous further development of our leaders help to build trust and to strengthen our company's success over the long term.

STRATEGIC COMPETENCY DEVELOPMENT

A transparent competency model is a further pillar of our personnel development efforts. Managers and employees should show strategic competence by being purposeful, future-oriented, innovative, results-driven, collaborative, and empowering. By demonstrating these qualities, our leaders can build a strong culture of collaboration based on curiosity, creativity and trust. In addition, our leaders are expected to set an example, for instance by living our company values and taking responsibility for their own decisions. To assess the performance and potential of every individual and to establish an effective leadership culture, regular and differentiated feedback is of utmost importance. This way, employees and supervisors can develop a shared vision, execute the business strategy and further develop a unifying culture.

PERSONNEL DECISIONS BASED ON DATA AND FACTS

Digitalization and data-based decisions are also taking hold in Human Resources management at our company Merck KGaA, Darmstadt, Germany, particularly with respect to the development and use of personnel management tools. With People Analytics, Human Resources has developed a modern, data-supported approach that features greater transparency and deeper insights into relevant personnel information from the businesses and Group functions. It is based on globally integrated data management and state-of-the-art analytics. People Analytics supports our managers with data and facts that can serve as the basis for major personnel decisions. This makes it possible to advise the company management more precisely and purposefully in its decision-making. People Analytics helps Human Resources to build strategic advisory capacities.

Additionally, we introduced predictive analytics based on the data now available, which enables us, for example, to identify factors that have a substantial impact on employee turnover.

DIVERSITY AND MANAGEMENT

In order to manage our global and diverse organization, we need leaders who can build international teams and promote international cooperation so as to contribute to a productive and flexible working atmosphere. We seek managers whose inclusive leadership style also reflects different employee and customer traits. This opens up career opportunities for talented employees from all areas of our company and ensures a broad experience base as well as differentiated decision-making.

At Merck KGaA, Darmstadt, Germany, many teams work across sites and internationally. The diversity of competencies and experiences among the team members offers tremendous potential that our leaders can make use of. Internationality and a global mindset characterize our company culture and are therefore mirrored by our international management team. In 2017, 64.4% of our executives were not German citizens. Altogether, 65 different nationalities are represented in such positions. Our goal for the period until 2021 is to maintain the proportion of female leaders at a stable level of 30%, and we are working to further increase the representation of women in leadership positions and business units where they are still underrepresented. To achieve this objective, in 2017 we formed special teams that are responsible for developing goals and measures at departmental level to help us move female candidates into positions in different areas and hierarchies. At the end of 2017, women occupied 30.3% of leadership roles Group-wide. These figures are steadily increasing across the company as a whole, but not consistently across business units, Group functions and hierarchical levels. The report on stipulations to promote the proportion of women in leadership positions at Merck KGaA, Darmstadt, Germany, pursuant to section 76 (4) and section 111 (5) of the German Stock Corporation Act can be found in the Corporate Governance section of this report.

MANAGEMENT PROGRAM FOR EXECUTIVES

We use targeted advanced training to further the professional career paths of our top talent and senior executives. One of the aims of the nine-month International Management Program is to promote global thinking among aspiring executives and to strengthen their leadership competencies. In cooperation with top international universities, our Company University has been offering a multi-regional, modular program since 1999. To date, 373 members of top management have taken part. Furthermore, our company cooperates globally with universities in order to support employees who wish to study for an MBA. In 2015, we launched the Growth Markets Management program for local people managers in India and Latin America, which focuses on business management and Group-specific topics. This program is also offered in China as well as in Europe for the Middle East and Africa region, with participants from a variety of countries and regions such as Africa, the Middle East, Japan, and Russia. Moreover, in 2017 we ran the Managerial Foundation Program for new people managers in 21 countries with 917 participants, and the Advanced Management Program, which was attended by 179 experienced people managers in four countries.

In 2017, we once again expanded our workforce pool to internally fill management positions when they become vacant. The vast majority of management position vacancies were filled by internal candidates again in 2017. In addition, we recruited highly qualified external executives in order to add new perspectives to our long-standing in-house expertise.

Differentiated solutions to support employee well-being

As an employer, we take on responsibility for the well-being of our people and offer a wide range of opportunities to optimize work-life balance and to protect their health and safety.

FOSTERING WORK-LIFE BALANCE

As a responsible employer, the physical and mental well-being of our employees is extremely important to us. To enable employees to plan their lives independently and to boost their long-term satisfaction, providing a flexible and health-oriented working environment is a special focus of our human resources work.

A healthy work-life balance is a crucial precondition for the performance ability and motivation of our people. That is why we offer our employees at many sites around the world flexible and innovative working models. The Mywork at Merck KGaA, Darmstadt, Germany, working model allows employees at the German sites in Darmstadt and Gernsheim to freely choose their working hours and location in agreement with their teams and supervisors. In addition, we also introduced the Mywork at Merck KGaA, Darmstadt, Germany, for Merck Accounting Solutions & Services Europe GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, Merck Export GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, Merck Schuchardt OHG, Hohenbrunn, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, Merck Selbstmedikation GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, Merck Versicherungsvermittlung GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, and Merck Chemicals GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. Employees no longer record their time electronically and must only document their hours if they exceed their standard working hours within the agreed working time framework. At the end of December 2017, a total of 5,267 employees made use of this model. In 2017, 4.6% of our employees worldwide worked part-time, 10.7% of whom are men.

By offering information, advice and assistance in finding childcare, nursing care, as well as home and garden services, we help employees to reconcile the demands of their professional and personal lives. At various sites, employees benefit from childcare options that we subsidize. A daycare center has been operating at the Darmstadt site, looking after children between the ages of one and twelve for the past 50 years. The adjacent new building houses a nursery for up to 60 children between the ages of one and three years. During the orientation phase, our employees can make use of additional offices for parents at the daycare center premises. In addition, a good ratio of staff to children is important to us to reliably supervise the children.

A TRANSPARENT AND FLEXIBLE EMPLOYEE REWARD SYSTEM

At our company, we reward the performance of every individual through appropriate and competitive total compensation. For years, we have been achieving this through global processes and programs that are supported by digital platforms. We also offer our managers flexible, market- and needs-oriented compensation tools. These support well-informed decisions and thus provide comprehensible, performance- and position-based compensation. Apart from monetary compensation components, we also offer our employees attractive fringe and social benefits. Our “benefits4me” offer comprises three pillars:

- Company benefits including a company pension
- Health and well-being
- Service offers

Worldwide, we offer various benefit packages to meet the different needs of our employees using well-established programs. Focusing more closely on individualized fringe and social benefits in the future will continue to enable our employees to individually choose those benefits that best meet their personal situation and stage of life.

A CONSTANT FOCUS ON HEALTH AND SAFETY

Workplace safety and health protection are a very high priority at Merck KGaA, Darmstadt, Germany. It is especially important to us to do everything in our power to prevent workplace-related illnesses and accidents. We apply the lost time injury rate (LTIR) as an indicator to determine the success of measures aimed at accident prevention as well as occupational health and safety. This key performance indicator describes the number of workplace accidents resulting in lost time of one day or more per one million working hours. After having reached the goal of 2.5 that we had set in 2010, in 2015 we set ourselves a new, ambitious goal: By 2020 we intend to sustainably lower the LTIR to 1.5. With an LTIR of 1.5 in 2017, we attained this goal.

Since 2010, we have been using the “BeSafe!” program to further expand our occupational safety activities. Uniform standards as well as local modules to meet specific safety requirements at individual sites can help to improve conditions. The program focuses on engaging managers in the safety culture and building their buy-in; it aims to make safety an intrinsic value and empower our employees to take responsibility for their own safety. In 2017, we continued to sensitize our employees to workplace hazards through numerous awareness campaigns.

Since 2010, our company has been presenting the Safety Excellence Award annually in order to underscore the importance of safety. It is granted to all production sites with no workplace accidents on record for the year; in 2017, it was awarded to 59 out of 97 sites.

OVERVIEW OF EMPLOYEE FIGURES[1]

			Group (overall) Dec. 31, 2015	Group (overall) Dec. 31, 2016	**Group (overall) Dec. 31, 2017**
Number of employees	global, total		49,613	50,414	52,941
	by region	Asia-Pacific (APAC)	11,096	10,754	11,294
		Europe	23,429	24,438	25,980
		Latin America	4,352	4,140	4,050
		Middle East and Africa (MEA)	942	1,045	1,097
		North America	9,794	10,037	10,520
Number of employees (FTE - full-time equivalents)	global, total		48,911.1	49,652.7	52,223.5
	by region	Asia-Pacific (APAC)	11,068.2	10,725.3	11,272.1
		Europe	22,785.7	23,727.1	25,302.5
		Latin America	4,344.2	4,136.5	4,046.2
		Middle East and Africa (MEA)	940.6	1,041.8	1,096.1
		North America	9,772.4	10,022.0	10,506.7
Number of countries			66	66	66
Number of legal entities	global, total		211	215	217
Number of nationalities	global, total		122[2]	129	131
Number of nationalities working in Germany			77[2]	91	97
Percentage of employees with German citizenship			26.1%[2]	23.1%	23.2%
Percentage of employees working outside Germany			75.9%	75.3%	74.9%
Percentage of employees with global managers			8.1%	9.7%	10.2%
Percentage of women in the workforce	global, total		41.6%	42.8%	43.1%
	in Germany		38.2%	38.6%	39.1%
Percentage of women in leadership positions (= role 4 or higher)[5]	global, total		26.8%[2]	28.8%	30.3%
	in Germany		27.3%[2]	28.7%	29.7%
Percentage of executives (= role 4 or higher)[5]	global, total		5.9%[2]	5.7%	7.9%
	Percentage of executives who are not German citizens		61.0%[2]	64.7%	64.4%
	Number of nationalities		64[2]	70	65
Number of apprentices in Germany			506[3]	576[4]	588[4]
Vocational training rate			5.3%	5.1%	4.4%
Number of employees in the model (Germany) of the Mywork at Merck KGaA, Darmstadt, Germany			4,122	4,507	5,267
Percentage of employees working part-time	global, total		4.7%	4.7%	4.6%
	Men		11.3%	10.6%	10.7%
Percentage of employees aged 17-29 years	global, total		15.2%	14.7%	14.5%
Percentage of employees aged 30-49 years	global, total		62.6%	62.5%	62.1%
Percentage of employees aged 50+	global, total		22.2%	22.8%	23.4%
Average age globally			41.1	41.3	41.4
Average age by region	Asia-Pacific (APAC)		36.7	36.7	36.9
	Europe		42.4	42.4	42.5
	Latin America		39.5	39.9	40.3
	Middle East and Africa (MEA)		39.5	39.3	39.4
	North America		44.2	44.3	44.1
	Germany		43	42.9	43
Average length of service	global, total		10.0	9.9	9.8
Average length of service in Germany			14.4	14.2	14

[1] The Group also has employees at sites which are not fully consolidated subsidiaries. These figures refer to all people directly employed by the Group and therefore may deviate from figures in the financial section of this report.
[2] Excluding Sigma-Aldrich.
[3] Relates only to Merck KGaA, Darmstadt, Germany, (around 19% of the workforce of the entire Group in 2015).
[4] All company sites in Germany (around 25% of the workforce of the entire Group in 2016 and 2017).
[5] Not including Sigma-Aldrich legal entities in Germany or Allergopharma.

Report on Economic Position

Macroeconomic and sector-specific environment

According to the most recently available figures from the International Monetary Fund (IMF), industrial countries faced heightening growth expectations in 2017. In this context, the recovery of the global economy strengthened. In around 120 economies that account for three-quarters of global GDP, growth increased in 2017 compared with the previous year. This has been the most extensive synchronized global growth since 2010.

According to the latest IMF forecasts, global gross domestic product (GDP) rose by 3.7% in 2017, equivalent to an increase of 0.5 percentage points in comparison with 2016. As in the previous year, strong regional differences could be seen. Industrial nations registered an increase in growth to 2.3% (2016: 1.7%). At 4.7% (2016: 4.4%), emerging economies and developing countries again achieved an increase in growth rates. The GDP of the United States, the world's largest economy, grew by 2.3% (2016: 1.5%). The eurozone also registered an increase in GDP growth to 2.4% (2016: 1.8%). The emerging economies of Asia registered an increase in growth to 6.5% (2016: 6.4%). As in 2016, India (6.7%) and China (6.8%) were the strongest growth drivers. In the industrialized countries of Asia, the GDP of Japan grew by 1.8% (2016: 0.9%) and that of Taiwan by 2.0% (2016: 1.5%). Korea registered growth of 3.0% (2016: 2.8%).

In 2017, organic sales growth of the Group was largely attributable to the Asia-Pacific and Latin America regions. While Asia-Pacific accounted for approximately 60% of Group-wide growth, Latin America accounted for 18%. In the aforementioned regions, our Healthcare and Life Science business sectors contributed positively to organic sales growth. By contrast, however, sales of our Performance Materials business sector decreased organically in both regions. While North America still generated around 36% of organic growth in 2016, it accounted for roughly 3.5% in 2017. This was due to declining business in our Healthcare business sector. Healthcare sales in North America decreased organically by –4.5%.

	Development 2017[1]	Development 2016
Healthcare		
Global pharmaceutical market	3.0%	4.7%
Market for multiple sclerosis therapies[2]	7.4%	8.4%
Market for type 2 diabetes therapies[2]	9.6%	11.3%
Market for fertility treatment[2]	7.2%	12.5%
Market for the treatment of colorectal cancer[3]	0.3%	–6.7%
Market for OTC pharmaceuticals	4.6%	4.2%
Life Science		
Market for laboratory products	2.8%	2.4%
Share of biopharmaceuticals in the global pharmaceutical market[2]	25.6%	23.8%
Performance Materials		
Growth of LC display surface area	3.8%	5.2%
Global automobile sales volumes	2.0%	5.3%
Materials for production of cosmetics	1.8%	1.8%
Semiconductor industry sales	19.7%	2.6%

[1] Predicted development. Final development rates for 2017 were not available for all industries when this report was prepared.
[2] Growth rates based on market data in local currency, translated at a constant euro exchange rate. The IQVIA market data on the growth of indications are based on current figures, including the third quarter of 2017. Annual growth based on the values for the past 12 months. The type 2 diabetes market excludes the United States since this market is insignificant to the Group.
[3] Growth rates based on market data stated in U.S. dollars. Market data from EvaluatePharma on the growth of indications are based on published company reports and are subject to exchange rate fluctuations.

HEALTHCARE

In the latest study published in September 2017 by the pharmaceutical market research firm IQVIA entitled "Market Prognosis 2017–2021", the growth of the global pharmaceutical market for 2017 is quantified at 3.0%. By comparison, in 2016, sales growth was still 4.7%. As was already the case in 2016, the EMEA region was a main contributor to growth in 2017. Latin America (excluding Venezuela) also fueled growth. Whereas growth in the United States fell significantly to 1.7%, (2016: 5.2%), at 6.2% the Latin American market (excluding Venezuela) continued to see strong growth (2016: 7.6%). The EMEA region was also robust with growth of 4.0% (2016: 4.7%). At 3.2%, the Asia-Pacific region recorded a decline in growth (2016: 6.2%).

Not only the growth of the pharmaceutical sector as a whole, but also in particular the development of the biopharmaceutical market is relevant for our business. According to IQVIA, the market volume of biological pharmaceuticals was approximately € 222 billion in 2017. In recent years, the share of the global pharmaceutical market accounted for by these products has grown continuously and already amounted to 25.6% in 2017 (2016: 23.8%). Globally, the largest share, or 34.7%, was attributable to the U.S. market.

A look at the therapeutic areas of relevance to Merck KGaA, Darmstadt, Germany, shows the following developments, which reflect robust growth, albeit with a weakening trend. The markets for the therapeutic areas multiple sclerosis grew by 7.4% (2016: 8.4%), type 2 diabetes[1] by 9.6% (2016: 11.3%) and fertility by 7.2% (2016: 12.5%). The market for oncology drugs for the treatment of colorectal cancer showed a positive trend and grew by 0.6% (2016: –6.7%).

According to the market research firm Nicholas Hall, the growth of the global over-the-counter pharmaceutical market was 4.6% in 2017, which represents an increase of 0.4 percentage points in comparison with 2016. At 8.6%, India again fueled growth in 2017 (2016: 8.2%). In Japan, growth was again weak at 0.6% (2016: 0.9%).

[1] Excluding the United States.

LIFE SCIENCE

Our Life Science business sector is a leading supplier of products and services for both research and applied laboratory applications, as well as for formulating, purifying, manufacturing, and quality-assuring drug therapies of biological and chemical origin.

According to the market research firm Frost & Sullivan, the laboratory product market relevant to Research Solutions and Applied Solutions achieved growth of 2.8% in 2017 (2016: 2.4%). Following a slow start to 2017, growth picked up. Growth was primarily driven by biopharmaceutical industry customers, specifically emerging biotech start-ups. In comparison with 2016, European market growth increased to 1.9% (2016: 1.5%), driven by stronger GDP forecasts and easing of the uncertainty over Brexit. The U.S. market grew by 3.2% (2016: 2.5%), with increased National Institutes of Health (NIH) funding and the expected tax reform spurring investment in 2017 and possibly also in 2018. Emerging countries recorded higher growth rates, with growth being mainly driven by China and India. Although the GDP growth of China slowed down, investments in research and development grew as one of the key priorities of the 13th five-year plan. India generated high single-digit growth with laboratory products and is focusing more strongly on supporting academic and government research.

The demand for Process Solutions products depends heavily on the sales of biopharmaceutical companies as well as the productivity of their research & development activities.

According to IQVIA, the market volume of biotechnological pharmaceuticals grew in 2017 to US$ 222 billion (equivalent to 25.6% of the global pharmaceutical market). More than 8,000[1] biotechnological drug candidates were in preclinical and clinical development. In 2016, monoclonal antibodies accounted for 26%[1] of these drug candidates (2015: 25%[1]). Biosimilars are a small, but fast-growing part of the pharmaceutical market. For 2016, annual sales of biosimilars were estimated at US$ 1.8 billion[1]; this figure is expected to increase to US$ 10.8 billion[1] by 2022.

PERFORMANCE MATERIALS

With its Liquid Crystals business, Merck KGaA, Darmstadt, Germany, is the leading producer of liquid crystal mixtures for the display industry. The dynamic growth rates of display surfaces have declined to an average of 4% in recent years according to surveys by the market researchers at IHS DisplaySearch. This growth was mainly attributable to increasing average display size amid slightly declining sales volumes. The display industry remains a growth sector in which the leading display technology is based on liquid crystals. OLED technology, for which Merck KGaA, Darmstadt, Germany, also ranks among the leading material suppliers, is gaining importance in the high-quality display sector.

The markets for automotive coatings and cosmetics are crucial to our Pigments business. As reported by IHS, global automobile sales volumes rose by approximately 2% in 2017. The growth drivers were China and Europe whereas the U.S. market declined slightly for the first time after a long period of growth. According to Euromonitor International, global consumption of materials used to produce cosmetics grew by around 2%.

The semiconductor industry is the most important sales market for the business with integrated circuit materials (IC Materials). The long-term growth of the semiconductor industry has a cyclical demand pattern. According to Gartner, a market research institute specializing in the technology and electronics markets, in 2017 the industry's sales grew by around 20%, above all owing to strong demand for the storage technologies DRAM and NAND.

[1] Evaluate Pharma.

Review of Forecast against Actual Business Developments

NET SALES

For 2017, we had forecast slight to moderate organic net sales growth for the Group. The positive organic development of net sales in our Healthcare and Life Science business sectors more than offset the declining business development in Performance Materials. Overall, we thus generated a moderate organic net sales increase of 3.8%. Furthermore, we expected a neutral exchange rate effect on our net sales. Here we assumed that the positive euro/US$ development would roughly compensate for negative exchange rate developments in various growth markets, yet we expected high volatility of exchange rates owing to political and macroeconomic developments. This assessment was confirmed because as of mid-2017, and in contrast to the previous trend, the euro started to significantly appreciate in value against the U.S. dollar and various emerging market currencies. As a result, for the full year 2017 we saw a slightly negative exchange rate effect of –1.5% on our net sales, contrary to our original forecast.

In 2017, our Healthcare business sector generated solid organic sales growth of 4.7%, thus exceeding our forecast for slight organic growth. Sales growth in 2017 was again driven by the continued good dynamics in our growth markets, which exceeded our expectations, as well as positive effects from the full takeover of the commercialization of the antidiabetic agent Glucophage® in China from BMS. Our other franchises developed as expected. As forecast, a low negative portfolio effect of –1.0% stemmed from the divestment of the business in Pakistan.

For our Life Science business sector, at the beginning of the year we had forecast solid organic growth of net sales; slightly above expected market growth of around 4% per year. In fiscal 2017, the business sector achieved organic growth of 5.3%, in line with our forecast. As expected, Process Solutions was the most dynamic business unit, delivering the largest contribution to organic sales growth within Life Science. As expected, Research Solutions and Applied Solutions also contributed positively to organic sales performance, albeit to a lesser extent than Process Solutions. The low positive portfolio effect of +0.4% met the forecast we gave at the beginning of the year and was mainly due to the acquisition of BioControl Systems.

Contrary to our original expectations of slight organic sales growth, our Performance Materials business sector recorded a slight organic sales decline of –1.7% in 2017. In the first quarter, signs of a normalization of our market shares in the Liquid Crystals business, particularly in China – which had been unusually high in recent years – intensified. This development became increasingly visible in the following quarters, and the price pressure typical in this industry could no longer be offset by corresponding volume growth. The good organic development in the Integrated Circuit Materials and Pigments & Functional Materials business units could not fully offset the decline in the Display Materials business unit.

EBITDA PRE

For the Group, we had forecast an approximately stable EBITDA pre[1] in 2017 with either a slightly positive or negative fluctuation from the year-earlier figure. Due to the difficult foreign exchange environment in the second half of the year and because of the adjustment processes in our Liquid Crystals business, in our report on the second quarter we assumed that our EBITDA pre would be at the lower end of this implied range of € 4.4 billion to € 4.6 billion. For 2017 as a whole, EBITDA pre amounted to € 4,414 million, which was –1.7% below the year-earlier level.

For our Healthcare business sector, we expected a high single-digit percentage decrease in EBITDA pre owing to the continued rise in research and development costs resulting from the ongoing development of our pipeline, particularly in immuno-oncology, a negative product mix due to the continued decline in sales of Rebif®, as well as the absence of one-time income from the previous year. In 2017, Healthcare generated EBITDA pre of € 1,949 million, which corresponded to a decline of –8.4% and was thus in line with our forecast.

For Life Science, we had expected an increase in EBITDA pre in the high-single digit to low teens range due to the expected organic sales growth and the realization of synergies from the acquisition of Sigma-Aldrich as planned. With EBITDA pre of € 1,786 million, the business sector delivered growth of 8.1%, which was within the forecast range we had given at the beginning of the year.

[1] Not defined by International Financial Reporting Standards (IFRS).

For our Performance Materials business sector, at the beginning of the year we still had assumed a slight increase in EBITDA pre compared with the year-earlier level of € 1,106 million. However, the correction in our Liquid Crystals business that materialized in the course of the year as well as the increasingly difficult foreign exchange environment that particularly affects our Performance Materials business sector, required a reassessment of this original assumption. Stringent cost discipline and the good performance in our other business units could only partly offset the decline in the highly profitable Liquid Crystals business. In our report on the second quarter, we assumed that EBITDA pre of Performance Materials would decline in the mid single-digit to mid teens range to between € 950 million and € 1,050 million. For 2017 as a whole, Performance Materials achieved EBITDA pre of € 980 million. This corresponded to a decline of –11.4% compared with the previous year and was thus within the adjusted range we had predicted.

EBITDA pre of Corporate and Other, which had reached a level of € –301 million in 2017, was 24% below the year-earlier level of € –396 million. Our expectation at the beginning of the year of a slight improvement over the previous year was thus exceeded. This development was mainly due to currency hedging losses, which were not as high as we had expected at the beginning of the year owing to the more difficult foreign exchange environment as of the second half of the year. Consequently, in the course of the year we had specified our forecast for EBITDA pre of Corporate and Other at € –300 million to € –350 million, and reached the lower end of this range.

BUSINESS FREE CASH FLOW

For 2017, we expected business free cash flow of the Group to see a single-digit percentage decline. We exceeded this forecast with stable business free cash flow. This was mainly driven by higher EBITDA pre of Corporate and Other as well as the positive development of inventories and receivables.

	Actual results 2016 in € million	**Forecast for 2017 in the Annual Report for 2016**	Main comments
Group			
			Slight organic sales growth in Healthcare
			Solid organic growth slightly above market growth in Life Science
			Slight organic growth in Performance Materials
		Slight to moderate organic growth	Neutral exchange rate effect due to positive €/US$ development and negative foreign exchange developments in various growth markets
Net sales	15,023.5	Neutral exchange rate effect	
			Increasing research and development spending in Healthcare
		Approximately stable compared with the previous year; this comprises a slightly positive or negative percentage fluctuation from the year-earlier figure	Continued realization of synergies from the integration of Sigma-Aldrich in Life Science
EBITDA pre[1]	4,490.4		Slight sales recovery and active cost management in Performance Materials
Business free cash flow[1]	3,318.2	Single-digit percentage decline	Increasing investments in property, plant and equipment, as well as digitalization initiatives
EPS pre[1]	6.21	–	
Healthcare			
			Organic sales growth in growth markets offsets the ongoing decline in Rebif® sales
			Continued price pressure in Europe, Asia-Pacific as well as Middle East and Africa
			Full takeover of the commercialization of the antidiabetic agent Glucophage® in China from BMS contributes slightly to sales growth
Net sales	6,855.0	Slight organic growth	Slightly negative portfolio effect due to the divestment of the business in Pakistan, which had generated sales in the mid double-digit million range in 2016
			Continued rise in research and development spending due to further pipeline development, particularly in immuno-oncology
			Negative product mix effect due to the decline in Rebif® sales
			Absence of exceptional income recorded in 2016, such as the release of provisions for research projects discontinued in prior years and the divestment of a minority interest
			Royalty income for Avonex® due to a patent granted in the United States in 2016
EBITDA pre[1]	2,127.9	High single-digit percentage decrease in EBITDA pre compared with 2016	Agreement on a one-time payment for future license payments
			Decline in EBITDA pre
Business free cash flow[1]	1,648.1	Low double-digit percentage decline	Continued investments in property, plant and equipment as well as digitalization within the scope of strategic initiatives

[1] Not defined by International Financial Reporting Standards (IFRS).

Forecast for 2017 in:			
Q1/2017 Interim Report	Q2/2017 Interim Report	Q3/2017 Interim Report	**Results 2017 in € million**
€ ~15,500 million to € 16,600 million	€ ~15,300 million to € 15,700 million	€ ~15,300 million to € 15,700 million	15,326.6 (+2.0%: +3.8% Organic, −0.3% Portfolio, −1.5% Currency)
€ ~4,400 million to € 4,600 million	€ ~4,400 million to € 4,600 million	€ ~4,400 million to € 4,600 million	4,414.5 (−1.7%)
€ ~2,930 million to € 3,150 million	€ ~2,960 million to € 3,260 million	€ ~3,040 million to € 3,340 million	3,318 (0.0%)
6.15 to 6.50	6.15 to 6.50	6.15 to 6.50	6.16
Slight organic growth Low portfolio effect due to the divestment of our business in Pakistan	Slight organic growth	Slight organic growth Low portfolio effect due to the divestment of our business in Pakistan	6,999.0 (+2.1%: +4.7% Organic, −1.0% Portfolio, −1.6% Currency)
€ ~1,900 million to € 2,000 million	€ ~1,900 million to € 2,000 million	€ ~1,900 million to € 2,000 million	1,949.3 (−8.4%)
€ ~1,340 million to € 1,430 million	€ ~1,340 million to € 1,430 million	€ ~1,320 million to € 1,410 million	1,447.9 (−12.1%)

	Actual results 2016 in € million	**Forecast for 2017 in the Annual Report for 2016**	Main comments
Life Science			
			Process Solutions likely to remain the strongest driver of growth
			Research Solutions and Applied Solutions also contribute positively to organic sales development to a smaller extent
Net sales	5,657.9	Solid organic growth, and thus slightly above the expected market growth of approximately 4% per year	Low positive portfolio effect due to the acquisition of BioControl Systems, which generated sales of US$ 34 million in 2015
			Positive development resulting from expected sales growth
EBITDA pre[1]	1,652.3	Percentage growth compared with the previous year in the high single-digit to low teens range	Realization of additional synergies as planned from the Sigma-Aldrich acquisition amounting to € 80 million compared with the previous year
			Higher EBITDA pre
Business free cash flow[1]	1,144.0	Increase in the twenties percentage range	Improved inventory management
Performance Materials			
			Volume increases in all businesses driven, among other things, by a recovery in the display market visible since the end of 2016
			Continued price decline typical for the Liquid Crystals business
Net sales	2,510.7	Slight organic growth	Continued initial signs of a normalization of our high market shares in the Liquid Crystals business cannot be ruled out
EBITDA pre[1]	1,106.4	Slight increase	Recovery in the display market, broader earnings base and active cost management can more than offset the continued price decline in liquid crystals
Business free cash flow[1]	1,010.7	Low double-digit percentage decline	Higher investments in property, plant and equipment, as well as digitalization initiatives
Corporate and Other			
EBITDA pre[1]	–396.2	EBITDA pre of Corporate and Other should improve slightly in 2017 in comparison with the previous year.	
Business free cash flow[1]	–484.7	–	

[1] Not defined by International Financial Reporting Standards (IFRS).

Forecast for 2017 in:			
Q1/2017 Interim Report	Q2/2017 Interim Report	Q3/2017 Interim Report	**Results 2017 in € million**
Solid organic sales growth Low portfolio effect due to the acquisition of BioControl Systems	Solid organic sales growth, slightly above expected market growth of around 4% per year	Solid organic sales growth, slightly above expected market growth of around 4% per year	5,881.5 (+4.0%: +5.3% Organic, +0.4% Portfolio, –1.7% Currency)
€ ~1,780 million to € 1,850 million	€ ~1,780 million to € 1,850 million	€ ~1,780 million to € 1,850 million	1,785.8 (+8.1%)
€ ~1,310 million to € 1,380 million	€ ~1,350 million to € 1,440 million	€ ~1,400 million to € 1,490 million	1,401.7 (+22.5%)
Slight organic sales decline	Slight to moderate organic decline in sales	Slight to moderate organic decline in sales	2,446.0 (–2.6%: –1.7% Organic, 0.0% Portfolio, –0.9% Currency)
€ ~1,050 million to € 1,130 million	€ ~950 million to € 1,050 million	€ ~950 million to € 1,050 million	979.8 (–11.4%)
€ ~820 million to € 890 million	€ ~820 million to € 890 million	€ ~820 million to € 890 million	905.8 (–10.4%)
€ ~–350 million to € –400 million	€ ~–350 million to € –400 million	€ ~–300 million to € –350 million	–300.5 (–24.2%)
€ ~–540 million to € –590 million	€ ~–500 million to € –550 million	€ ~–450 million to € –500 million	–437.4 (–9.8%)

Course of Business and Economic Position

Group

Overview of 2017

- Group net sales increase slightly by 2.0% to € 15.3 billion
- Healthcare and Life Science deliver organic sales growth
- EBITDA pre of € 4.4 billion nearly meets high year-earlier level
- At 28.8%, Group profitability (EBITDA pre margin) remains at a high level (2016: 29.9%).
- U.S. tax reform leads to significant deferred tax income and a corresponding increase in profit after tax as well as earnings per share
- Stable earnings per share pre of € 6.16 (2016: € 6.21).
- Business free cash flow of € 3.3 billion on a par with year-earlier figure
- Net financial liabilities decline by –11.9% to € 10.1 billion (December 31, 2016: € 11.5 billion)

GROUP

Key figures

			Change	
€ million	**2017**	2016	€ million	in %
Net sales	15,327	15,024	303	2.0%
Operating result (EBIT)[1]	2,525	2,481	44	1.8%
Margin (% of net sales)[1]	16.5%	16.5%		
EBITDA[1]	4,282	4,415	–133	–3.0%
Margin (% of net sales)[1]	27.9%	29.4%		
EBITDA pre[1]	4,414	4,490	–76	–1.7%
Margin (% of net sales)[1]	28.8%	29.9%		
Profit after tax	2,610	1,633	977	59.9%
Earnings per share (€)	5.98	3.75	2.23	59.5%
Earnings per share pre (€)[1]	6.16	6.21	–0.05	–0.8%
Business free cash flow[1]	3,318	3,318	–	–

[1] Not defined by International Financial Reporting Standards (IFRS).

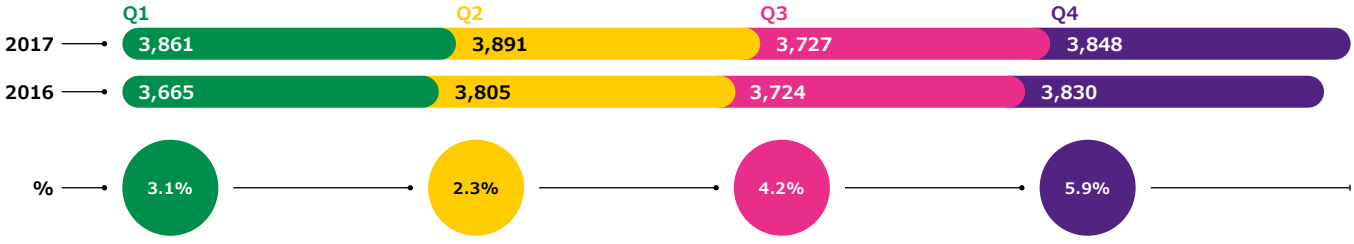
DEVELOPMENT OF NET SALES AND RESULTS OF OPERATIONS

In 2017, net sales of the Group increased by € 303 million or 2.0% to € 15,327 million (2016: € 15,024 million). This increase was mainly attributable to organic sales growth of € 578 million or 3.8%, driven by our Healthcare and Life Science business sectors. In 2017, the stronger euro resulted in negative foreign exchange effects of –1.5%. In particular, this affected North America due to the exchange rate development of the U.S. dollar, as well as Asia-Pacific as a result of negative exchange rate effects from the Chinese renminbi and the Japanese yen. Acquisitions and divestments caused Group net sales to decline by –0.3%. The divestment of the subsidiaries in Pakistan in December 2016 had a negative impact on net sales of our Healthcare business sector, whereas the first-time consolidation of BioControl Systems, Inc., (USA), led to higher sales in Life Science.

The development of net sales in the individual quarters as well as the respective organic growth rates in 2017 are presented in the following overview:

GROUP

Net sales and organic growth[1] by quarter[2]
€ million/organic growth in %

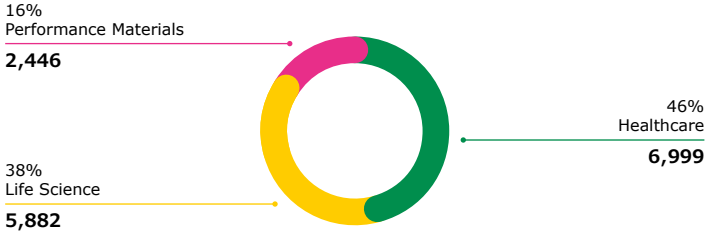


[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

With organic sales growth of 4.7%, our Healthcare business sector achieved an increase in sales of € 144 million to € 6,999 million (2016: € 6,855 million). Consequently, Healthcare remained the strongest business sector in terms of sales with a one percentage point higher share of 46% (2016: 45%) of Group sales. In 2017, Life Science achieved organic sales growth of 5.3%. Including negative foreign exchange effects (–1.7%) and acquisition-related sales increases (+0.4%), sales of this business sector rose by € 224 million to € 5,882 million (2016: € 5,658 million). In 2017, Life Science accounted for an unchanged 38% share of Group sales. Owing to slight organic sales declines (–1.7%) as well as slight negative exchange rate effects (–0.9%), the net sales of Performance Materials amounted to € 2,446 million (2016: € 2,511 million). Consequently, this business sector accounted for 16% (2016: 17%) of Group net sales.

GROUP

Net sales by business sector – 2017
€ million/% of net sales



GROUP

Net sales components by business sector – 2017

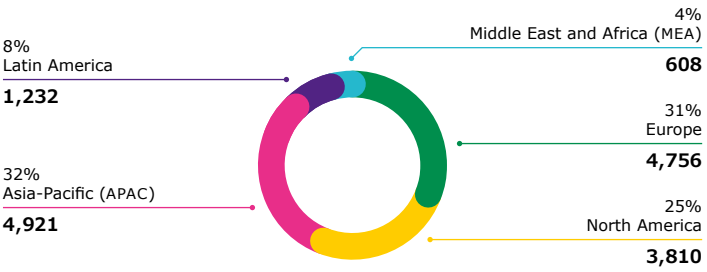
€ million/change in %	Net sales	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change
Healthcare	6,999	4.7%	–1.6%	–1.0%	2.1%
Life Science	5,882	5.3%	–1.7%	0.4%	4.0%
Performance Materials	2,446	–1.7%	–0.9%	–	–2.6%
Group	**15,327**	**3.8%**	**–1.5%**	**–0.3%**	**2.0%**

[1] Not defined by International Financial Reporting Standards (IFRS).

GROUP

Net sales by region – 2017

€ million/% of net sales



In Asia-Pacific, the Group's largest region in terms of sales, our company generated net sales of € 4,921 million in 2017 (2016: € 4,736 million), which represents an increase of € 185 million or 3.9%. The very strong organic growth of 7.3%, which was due to the business performance of our Healthcare and Life Science business sectors, was partly canceled out by negative foreign exchange effects (–1.8%) and divestment effects (–1.5%). The contribution to Group sales by the Asia-Pacific region rose by one percentage point to 32% (2016: 31%).

In 2017, sales in Europe amounted to € 4,756 million (2016: € 4,735 million), thus remaining at the year-earlier level. The organic growth driven by Life Science and Performance Materials was almost completely offset by negative foreign exchange effects, which were primarily due to the British pound. As a result, Europe's share of Group sales remained unchanged at 31%.

The decrease in net sales in North America by –1.3% to € 3,810 million (2016: € 3,858 million) was mainly due to the exchange rate development of the U.S. dollar. The organic sales growth of Life Science (4.5%) and the decline in sales of Healthcare largely offset each other. Consequently, the share of Group sales attributable to North America declined to 25% (2016: 26%).

The very positive development of net sales in Latin America resulted in sales growth of 8.4% to € 1,232 million (2016: € 1,136 million). This was mainly attributable to the good operating business of Healthcare, which generated double-digit organic growth rates in the region. In 2017, the share of Group sales attributable to Latin America remained unchanged at 8%.

In the Middle East and Africa region, the 8.8% increase in sales to € 608 million (2016: € 559 million) was mainly due to organic growth in Healthcare, which is the most important business sector for the region. The share of Group sales attributable to the region remained unchanged at 4%.

GROUP

Net sales components by region – 2017

€ million/change in %	Net sales	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change
Europe	4,756	1.1%	–0.8%	0.1%	0.4%
North America	3,810	0.5%	–2.3%	0.5%	–1.3%
Asia-Pacific (APAC)	4,921	7.3%	–1.8%	–1.5%	3.9%
Latin America	1,232	9.1%	–0.9%	0.2%	8.4%
Middle East and Africa (MEA)	608	9.7%	–1.0%	0.1%	8.8%
Group	**15,327**	**3.8%**	**–1.5%**	**–0.3%**	**2.0%**

[1] Not defined by International Financial Reporting Standards (IFRS).

The consolidated income statement of the Group is as follows:

GROUP

Consolidated Income Statement

					Change	
€ million	**2017**	**in %**	2016	in %	€ million	in %
Net sales	**15,327**	**100.0%**	**15,024**	**100.0%**	**303**	**2.0%**
Cost of sales	–5,320	–34.7%	–5,201	–34.6%	–119	2.3%
(of which: amortization of intangible assets)[1]	*(–179)*		*(–181)*		*(2)*	*(–1.0%)*
Gross profit	**10,007**	**65.3%**	**9,823**	**65.4%**	**184**	**1.9%**
Marketing and selling expenses	–4,702	–30.7%	–4,526	–30.1%	–175	3.9%
(of which: amortization of intangible assets)[1]	*(–1,017)*		*(–1,032)*		*(15)*	*(–1.5%)*
Administration expenses	–930	–6.1%	–854	–5.7%	–76	8.8%
Research and development costs	–2,140	–14.0%	–1,976	–13.2%	–165	8.3%
(of which: amortization of intangible assets)[1]	*(–5)*		*(–4)*		*(–1)*	*(10.6%)*
Other operating expenses and income	290	1.9%	14	0.1%	275	>100.0%
Operating result (EBIT)[2]	**2,525**	**16.5%**	**2,481**	**16.5%**	**44**	**1.8%**
Financial result	–300	–2.0%	–326	–2.2%	26	–8.0%
Profit before income tax	**2,224**	**14.5%**	**2,154**	**14.3%**	**70**	**3.2%**
Income tax	386	2.5%	–521	–3.5%	907	>100.0%
Profit after tax	**2,610**	**17.0%**	**1,633**	**10.9%**	**977**	**59.9%**
Non-controlling interests	–10	–0.1%	–4	–0.0%	–6	>100.0%
Net income	**2,600**	**17.0%**	**1,629**	**10.8%**	**972**	**59.7%**

[1] Excluding amortization of internally generated or separately acquired software.
[2] Not defined by International Financial Reporting Standards (IFRS).

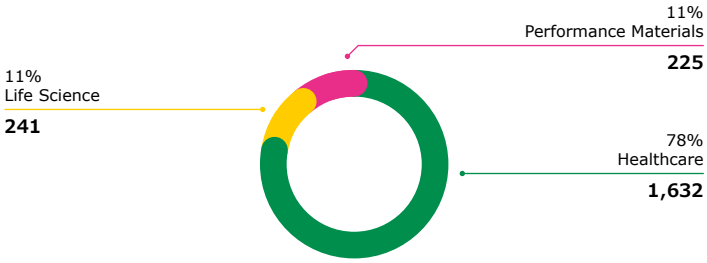
In 2017, gross profit of the Group increased by € 184 million or 1.9% to € 10,007 million (2016: € 9,823 million). This increase was due to our Life Science business sector, where gross profit rose by € 315 million, whereas the other two business sectors did not meet the year-earlier level. The gross margin of the Group, i.e. gross profit as a percentage of net sales, amounted to 65.3% (2016: 65.4%).

The development of marketing and selling expenses was mainly influenced by our Healthcare business sector, which reported higher marketing and selling expenses particularly owing to imminent market launches and higher license expenses.

The increase in Group research and development costs by 8.3% to € 2,140 million, which was primarily attributable to our Healthcare business sector, led to a research spending ratio (research and development costs as a percentage of net sales) of 14.0% (2016: 13.2%). Accounting for 78% of Group R&D spending (2016: 76%), Healthcare was the most research-intensive business sector of the Group.

GROUP

Research and development costs by business sector[1] – 2017
€ million/in %



[1] Not presented: Research and development costs of € 42 million allocated to Corporate and Other.

Other operating expenses and income (net) showed an income balance of € 290 million in 2017 (2016: € 14 million). The strong increase resulted primarily from transactions in our Healthcare business sector. In particular, the gain on the divestment of the Biosimilars business amounting to € 319 million had an impact. This gain was eliminated in the calculation of EBITDA pre. Reversals of impairment losses, the receipt of compensation for future license payments and the receipt of milestone payments also contributed to this (see explanations in the section entitled "Healthcare"). Furthermore, this item also includes expenses in connection with the company's 350th anniversary in 2018. On the occasion of this anniversary, a promise of a one-time payment as well as a gift in the form of shares in Merck KGaA, Darmstadt, Germany, was made to employees. These expenses were also eliminated during the calculation of EBITDA pre. In 2017, a provision in a mid double-digit million amount was set up for an ongoing European Commission antitrust review proceeding relating to the acquisition of Sigma-Aldrich (see Note (27) "Other provisions" in the Notes to the Consolidated Financial Statements). The corresponding negative impact on earnings, which was allocable to our Life Science business sector, was reported under other operating expenses and eliminated during the calculation of EBITDA pre. Detailed information about the development and composition of other operating expenses and income can be found in Note (11) "Other operating income" and Note (12) "Other operating expenses" of the Consolidated Financial Statements.

Overall, the development of income and expenses in the Group income statement led to a 1.8% increase in the operating result (EBIT), which amounted to € 2,525 million (2016: € 2,481 million).

The improvement in the negative financial result by € 26 million to € –300 million (2016: € –326 million) resulted mainly from exchange rate gains in connection with the financing activities of the Group. At € –271 million, the interest result contained in the financial result was on a par with the previous year (2016: € –270 million) (see Note (13) "Financial result" in the Notes to the Consolidated Financial Statements).

The income balance of € 386 million (2016: expense balance of € –521 million) under income taxes was due to one-time effects in connection with tax reform in the United States. The new U.S. tax regulations led in particular to a reduction in the deferred tax liabilities of the Group and thus to corresponding deferred tax income. Further information about income taxes in general and U.S. tax reform in particular can be found in Note (14) "Income taxes" in the Notes to the Consolidated Financial Statements.

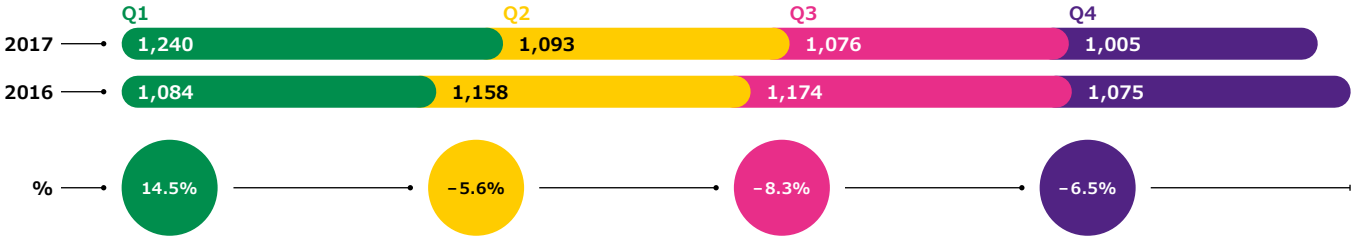
Thanks to the successful operating business and especially owing to the exceptional tax income in connection with the tax reform in the United States, the excellent level of net income rose by € 972 million or 59.7% to a record level of € 2,600 million (2016: € 1,629 million). Earnings per share increased accordingly to € 5.98 (2016: € 3.75).

EBITDA pre, the key financial indicator used to steer operating business, declined slightly by € –76 million or –1.7% to € 4,414 million (2016: € 4,490 million). The resulting EBITDA pre margin thus decreased by around one percentage point to 28.8% (2016: 29.9%). The reconciliation of the operating result (EBIT) to EBITDA pre is presented in the chapter entitled "Internal Management System".

The development of EBITDA pre in the individual quarters in comparison with 2016 as well as the respective growth rates are presented in the following overview:

GROUP

EBITDA pre[1] and change by quarter[2]
€ million/change in %

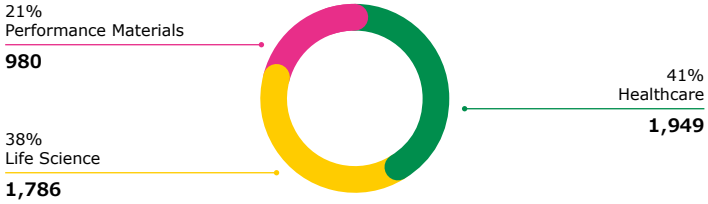


[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

The slight decrease in Group EBITDA pre was attributable to our Healthcare and Performance Materials business sectors. By contrast, the good business performance of Life Science had a positive effect on this earnings indicator. Healthcare, which again was the business sector with the highest EBITDA pre, generated € 1,949 million in 2017 (2016: € 2,128 million), thus contributing 41% (2016: 43%) of Group EBITDA pre (excluding the € –301 million decline due to Corporate and Other). EBITDA pre of our Life Science business sector improved by 8.1% to € 1,786 million (2016: € 1,652 million). Consequently, the business sector's share of Group EBITDA pre rose by 4 percentage points to 38% (2016: 34%). With an EBITDA pre of € 980 million (2016: € 1,106 million), the share of this Group key performance indicator attributable to Performance Materials decreased to 21% (2016: 23%).

GROUP

EBITDA pre[1] by business sector[2] – 2017
€ million/in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Not presented: Decline in Group EBITDA pre by € –301 million due to Corporate and Other.

GROUP

Balance sheet structure

	Dec. 31, 2017		Dec. 31, 2016		Change	
	€ million	**in %**	€ million	in %	€ million	in %
Non-current assets[1]	**28,166**	**79.1%**	**30,589**	**80.0%**	**–2,423**	**–7.9%**
of which:						
Goodwill[1]	13,582		15,015		–1,433	
Other intangible assets[1]	8,317		9,980		–1,663	
Property, plant and equipment[1]	4,512		4,231		281	
Other non-current assets	1,755		1,363		392	
Current assets[1]	**7,455**	**20.9%**	**7,670**	**20.0%**	**–215**	**–2.8%**
of which:						
Inventories[1]	2,632		2,609		23	
Trade accounts receivable	2,923		2,889		34	
Current financial assets	90		145		–55	
Other current assets[1]	1,221		1,087		134	
Cash and cash equivalents	589		939		–350	
Total assets[1]	**35,621**	**100.0%**	**38,258**	**100.0%**	**–2,637**	**–6.9%**
Equity	**14,066**	**39.5%**	**14,050**	**36.7%**	**16**	**0.1%**
Non-current liabilities[1]	**12,919**	**36.3%**	**15,119**	**39.5%**	**–2,200**	**–14.5%**
of which:						
Provisions for pensions and other post-employment benefits	2,257		2,313		–56	
Other non-current provisions	788		834		–46	
Non-current financial liabilities	8,033		8,809		–776	
Other non-current liabilities[1]	1,842		3,163		–1,321	
Current liabilities[1]	**8,635**	**24.2%**	**9,089**	**23.8%**	**–454**	**–5.0%**
of which:						
Current provisions	414		412		2	
Current financial liabilities	2,790		3,788		–997	
Trade accounts payable	2,195		2,048		147	
Other current liabilities[1]	3,234		2,841		393	
Total liabilities and equity[1]	**35,621**	**100.0%**	**38,258**	**100.0%**	**–2,637**	**–6.9%**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments" in the Notes to the Consolidated Financial Statements.

The total assets of the Group declined in comparison with December 31, 2016 by € 2,637 million to € 35,621 million (December 31, 2016: € 38,258 million). A significant reason for this was the development of the euro-U.S. dollar exchange rate. In particular, intangible assets, which for the most part are carried in U.S. dollars, declined sharply owing to the weaker U.S. dollar. The development of other non-current liabilities was mainly due to the decline in deferred tax liabilities included in this item. Owing to new U.S. tax reform legislation, deferred taxes were remeasured using modified tax rates. The resulting decrease in deferred tax liabilities led to corresponding tax income and consequently to an improvement in net income (see Note (14) "Income taxes" in the Notes to the Consolidated Financial Statements).

The slight reduction in working capital to € 3,387 million (2016: € 3,488 million) was due mainly to the increase in trade accounts payable.

GROUP

Working capital[1]

€ million	Dec. 31, 2017	Dec. 31, 2016	Change € million	Change in %
Trade accounts receivable	2,923	2,889	34	1.2%
Receivables from royalties and licenses	28	38	–9	–25.0%
Inventories[2]	2,632	2,609	23	0.9%
Trade accounts payable	–2,195	–2,048	–147	7.2%
Working capital[1,2]	**3,387**	**3,488**	**–100**	**–2.9%**

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments" in the Notes to the Consolidated Financial Statements.

The composition and the development of net financial debt were as follows:

GROUP

Net financial debt[1]

€ million	Dec. 31, 2017	Dec. 31, 2016	Change € million	Change in %
Bonds and commercial paper	8,213	9,650	–1,437	–14.9%
Bank loans	1,653	1,978	–325	–16.4%
Liabilities to related parties	767	758	10	1.3%
Loans from third parties and other financial liabilities	73	80	–7	–8.6%
Liabilities from derivatives (financial transactions)	113	128	–16	–12.2%
Finance lease liabilities	4	4	–0	–1.3%
Financial liabilities	**10,823**	**12,597**	**–1,774**	**–14.1%**
less				
Cash and cash equivalents	589	939	–350	–37.3 %
Current financial assets	90	145	–55	–37.8 %
Net financial debt[1]	**10,144**	**11,513**	**–1,369**	**–11.9 %**

[1] Not defined by International Financial Reporting Standards (IFRS).

GROUP

Reconciliation of net financial debt[1]

€ million	2017	2016
January 1	**11,513**	**12,654**
Currency translation difference	–429	118
Dividend payments to shareholders and to E. Merck KG, Darmstadt, Germany[2]	624	600
Acquisitions[2]	17	156
Payments from the disposal of assets held for sale and from other divestments[2]	–167	–366
Free cash flow[1]	–1,433	–1,693
Other	19	44
December 31	**10,144**	**11,513**

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] According to the consolidated cash flow statement.

The equity of the Group rose slightly in 2017 to € 14,066 million (December 31, 2016: € 14,050 million). The very strong level of profit after tax amounting to € 2,610 million (2016: € 1,633 million) was offset by currency translation differences from the translation of assets held in foreign currencies into euro, dividend payments, and the profit transfer to E. Merck KG, Darmstadt, Germany (see "Consolidated Statement of Comprehensive Income" and "Consolidated Statement of Changes in Net Equity" in the Consolidated Financial Statements). The lower level of total assets and the slight increase in equity led to an improvement in the equity ratio by nearly 3 percentage points to 39.5% (December 31, 2016: 36.7%).

The increase in cash inflows from operating activities served among other things to finance the strong investing activity of the Group. Consequently, free cash flow decreased to € 1,433 million (2016: € 1,693 million). The composition as well as the development of the relevant items are presented in the following table:

GROUP

Free cash flow[1]

			Change	
€ million	**2017**	2016	€ million	in %
Cash flow from operating activities according to the cash flow statement	2,696	2,518	178	7.1%
Payments for investments in intangible assets	–392	–132	–260	>100.0%
Payments from the disposal of intangible assets	4	2	2	>100.0%
Payments for investments in property, plant and equipment	–919	–716	–203	28.4%
Payments from the disposal of property, plant and equipment	44	21	23	>100.0%
Free cash flow[1]	**1,433**	**1,693**	**–260**	**–15.4%**

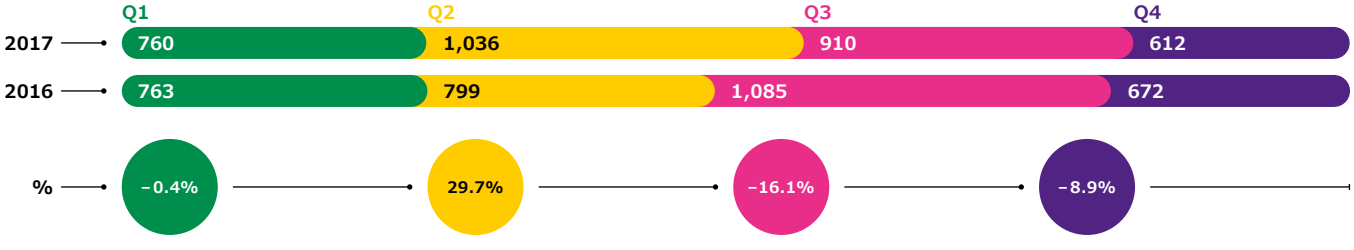
[1] Not defined by International Financial Reporting Standards (IFRS).

Business free cash flow of the Group was € 3,318 million in 2017, which met the previous year's figure. The slight decline in EBITDA pre as well as higher capital spending were primarily offset by the development of receivables. The composition of this financial indicator is presented in the combined management report under "Internal Management System".

The distribution of business free cash flow across the individual quarters and the percentage changes in comparison with 2016 were as follows:

GROUP

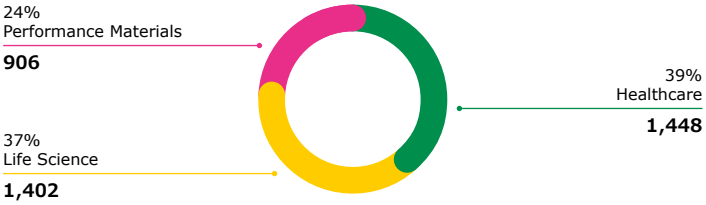
Business free cash flow[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

GROUP

Business free cash flow[1] by business sector[2] – 2017
€ million/in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Not presented: Decline in Group business free cash flow by € –437 million due to Corporate and Other.

The contributions of the operating business sectors to business free cash flow of the Group developed in 2017 as follows: Healthcare generated business free cash flow amounting to € 1,448 million (2016: € 1,648 million). Consequently, with a 39% share (2016: 43%) of Group business free cash flow (excluding the decline of € –437 million due to Corporate and Other) Healthcare was once again the business sector with the highest cash flows as per the definition of this key performance indicator. In 2017, our Life Science business sector achieved a further increase in the previous year's strong level by 22.5% to € 1,402 million (2016: € 1,144 million), thus increasing its share of Group business free cash flow to 37% (2016: 30%). Performance Materials contributed € 906 million (2016: € 1,011 million) to this Group financial indicator, equivalent to 24% (2016: 27%).

The investments in property, plant, equipment and software as well as advance payments for intangible assets included in the calculation of business free cash flow increased in 2017 by 21.9% to a total of € 1,047 million (2016: € 859 million). The investments in property, plant and equipment included therein amounted to € 936 million in 2017 (2016: € 753 million), of which € 438 million (2016: € 332 million) was attributable to strategic investment projects each with a project volume of more than € 2 million; the remainder was attributable to smaller investment projects.

In 2017, strategic investments of € 212 million were made to expand the Darmstadt site. Of this amount, € 76 million was used to upgrade global headquarters; the projects include an Innovation Center and an employee cafeteria, among other things. In addition, a new sampling center for regulated products was constructed for € 10 million. In our Healthcare business sector, investments included € 33 million in a new laboratory building for pharmaceutical research and € 28 million in a new packaging center.

Outside Germany, high levels of strategic investment were also made. Particularly in China, both our Healthcare and Life Science business sectors invested € 25 million and € 26 million, respectively, in new production facilities. Furthermore, our Performance Materials business sector invested € 12 million in the Netherlands to construct a production facility for the manufacture of liquid crystal window modules.

Our credit ratings from the independent rating agencies did not change in 2017. Our company is currently rated by Standard & Poor's, Moody's and Scope. Standard & Poor's has issued a long-term credit rating of A with a stable outlook, Moody's a rating of Baa1 with a stable outlook, and Scope a rating of A–, likewise with a stable outlook. An overview of the development of our rating in recent years is presented in the Report on Risks and Opportunities.

The development of key balance sheet figures is as follows:

GROUP

Key balance sheet figures

in %		Dec. 31, 2017	Dec. 31, 2016[1]	Dec. 31, 2015	Dec. 31, 2014	Dec. 31, 2013
Equity ratio[2]	Equity / Total assets	39.5%	36.7%	33.8%	45.4%	53.2%
Asset ratio[2]	Non-current assets / Total assets	79.1%	80.0%	80.7%	59.7%	64.5%
Asset coverage[2]	Equity / Non-current assets	49.9%	45.9%	41.8%	76.0%	82.4%
Finance structure[2]	Current liabilities / Liabilities (total)	40.1%	37.5%	37.2%	46.5%	40.0%

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments" in the Notes to the Consolidated Financial Statements.
[2] Not defined by International Financial Reporting Standards (IFRS).

OVERALL ASSESSMENT OF BUSINESS PERFORMANCE AND ECONOMIC SITUATION

Fiscal 2017 was a year of challenges and one that opened up numerous new opportunities for the future with the approvals of Bavencio® and Mavenclad®. Key strategic intentions were implemented or introduced. The financial targets that we had set ourselves for 2017 were achieved. Moderate organic growth enabled Group net sales to increase to € 15,327 million (2016: € 15,024 million). In 2017, EBITDA pre amounted to € 4,415 million (2016: € 4,490 million), which meant we almost reached the very good year-earlier figure. With an EBITDA pre margin of 28.8% (2016: 29.9%), our profitability remains at a notable level even though our Healthcare and Performance Materials business sectors contended with challenges. We also made progress with the reduction of net financial debt: Despite our high capital spending, we lowered our debt by € –1,369 million. Consequently, net financial debt amounted to € 10,144 million on December 31, 2017 (December 31, 2016: € 11,513 million).

With the approvals of Bavencio® and Mavenclad®, our Healthcare business sector achieved major milestones. The steady further development of the promising pipeline remains a high priority. This was reflected by an above-average increase in research and development costs. In 2017, the divestment of the Biosimilars business closed and the company announced it is reviewing strategic options for the Consumer Health business.

The business performance of Life Science was very successful and we are excellently positioned for the future. Performance Materials was adversely affected by the market development in the Liquid Crystals business. The business sector is intensively working to consolidate our position at a continued high level.

The good key balance sheet figures, which improved further in 2017, illustrate the solid finance policy being pursued by the Group. For instance, the equity ratio rose to 39.5% (2016: 36.7%) and has thus reached a very good level. We will continue to assign high priority to the rapid reduction of our financial liabilities. In 2017, there were no changes to our credit ratings by the independent rating agencies Standard & Poor's (A with a stable outlook), Moody's (Baa1 with a stable outlook) and Scope (A– with a stable outlook).

Based on our solid net assets and financial position as well as successful business performance, the economic position of the Group can be assessed positively overall. It represents a good foundation for the promising further development of our businesses.

Healthcare

HEALTHCARE

Key figures

€ million	2017	2016	Change € million	Change in %
Net sales	6,999	6,855	144	2.1%
Operating result (EBIT)[1]	1,447	1,593	–146	–9.2%
Margin (% of net sales)[1]	20.7%	23.2%		
EBITDA[1]	2,155	2,425	–269	–11.1%
Margin (% of net sales)[1]	30.8%	35.4%		
EBITDA pre[1]	1,949	2,128	–179	–8.4%
Margin (% of net sales)[1]	27.9%	31.0%		
Business free cash flow[1]	1,448	1,648	–200	–12.1%

[1] Not defined by International Financial Reporting Standards (IFRS).

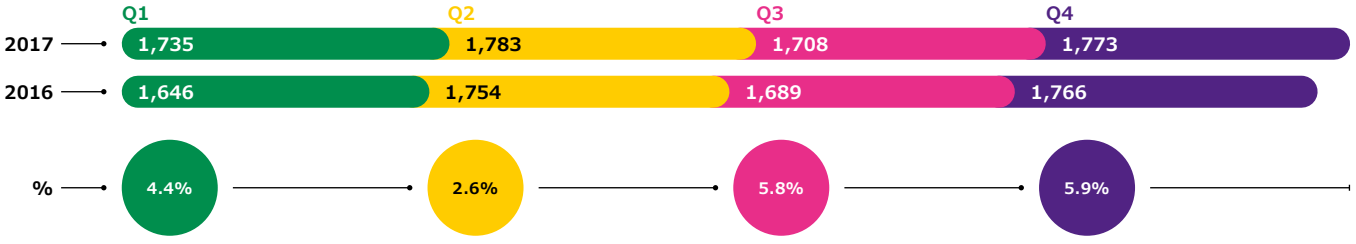
DEVELOPMENT OF NET SALES AND RESULTS OF OPERATIONS

In 2017, our Healthcare business sector generated organic sales growth of 4.7%. Negative foreign exchange effects of –1.6% and a negative portfolio effect of –1.0% resulted in overall sales growth of 2.1%. Consequently, net sales amounted to € 6,999 million (2016: € 6,855 million). In the Biopharma business, organic sales growth was especially attributable to medicines from the General Medicine franchise (including CardioMetabolic Care), first and foremost Glucophage®, Euthyrox® and Concor®. The Consumer Health business also delivered very strong organic growth. By contrast, sales of the two top-selling products, the multiple sclerosis medicine Rebif® and the oncology drug Erbitux®, declined organically. The negative exchange rate effects resulted mainly from the decline in the value of the U.S. dollar, the Chinese renminbi and the British pound. The divestment of the business in Pakistan at the end of 2016, which primarily affected sales in the General Medicine franchise (including CardioMetabolic Care), led to a portfolio effect of –1.0%. Commission income, which is also included in net sales, dropped by –53.4% to € 83 million (2016: € 178 million). This was especially attributable to the takeover of the Glucophage® commercialization rights in China from Bristol-Myers Squibb at the beginning of 2017. In the past, Healthcare recorded exclusively commission income for Glucophage® sales in China. Since the beginning of 2017, the business sector no longer reports commission income for this product, but rather the corresponding sales for Glucophage® in China. In return, license payments are made to Bristol-Myers Squibb.

The development of net sales in the individual quarters as well as the respective organic growth rates in 2017 are presented in the following overview:

HEALTHCARE

Net sales and organic growth[1] by quarter[2]
€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

HEALTHCARE

Net sales by region – 2017
€ million/% of net sales of the business sector

Europe, which accounts for 36% of Healthcare sales (2016: 37%) and is the business sector's largest region in terms of sales, saw an organic sales decline of –1.4% and generated net sales of € 2,502 million (2016: € 2,555 million). This was particularly due to the difficult competitive situation and further price reductions for Rebif®. Sales of Erbitux® and Gonal-f® also declined organically, the latter being due to the unusually strong growth in 2016. The organic sales growth of the Consumer Health business as well as initial sales of Mavenclad®, which was approved in 2017, could only partly compensate for this development. Overall, net sales decreased by –2.1%.

Asia-Pacific, the second-largest region in terms of sales, generated organic growth of 20.5%, contributing 23% to the business sector's net sales (2016: 21%). This was mainly due to the changed business model for Glucophage® marketing in China as of January 1, 2017. The business with fertility medicines, including Gonal-f®, as well as the Consumer Health business generated double-digit organic growth in some cases. A portfolio effect of –4.7% resulted from the divestment of our business activities in Pakistan. Including currency headwinds of –2.8%, net sales in the region amounted to € 1,581 million (2016: € 1,399 million).

In North America, net sales amounted to € 1,494 million (2016: € 1,601 million). The organic decline of –4.5% was mainly driven by the development of Gonal-f®, which had benefited from a favorable competitive situation in the previous year. Moreover, the difficult competitive situation for Rebif® and the organic sales decline of Saizen® contributed to this development. Besides double-digit organic growth of other fertility medicines, initial sales of Bavencio® also had a positive effect. This immuno-oncology medicine was approved in the United States for the treatment of metastatic Merkel cell carcinoma in March 2017 and advanced bladder cancer in May 2017. Including negative exchange rate effects of –2.2%, the region's share of Healthcare sales was 21% (2016: 23%).

In Latin America, where organic sales growth amounted to 11.1%, net sales of € 922 million significantly exceeded the year-earlier level (2016: € 839 million). Organic sales growth in all businesses and therapeutic areas, especially for Erbitux®, Euthyrox® and with core strategic brands in the Consumer Health business, led to this development. Including negative exchange rate effects of –1.0%, the region's share of Healthcare sales increased to 13% (2016: 12%).

The Middle East and Africa region generated net sales of € 500 million (2016: € 461 million). Organic sales growth of 10.4% resulted mainly from the development of fertility medicines, Euthyrox® and Concor®, as well as double-digit organic sales growth of the Consumer Health business.

HEALTHCARE

Net sales components by region – 2017

€ million/change in %	Net sales	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change
Europe	2,502	–1.4%	–0.7%	–0.1%	–2.1%
North America	1,494	–4.5%	–2.2%	–	–6.7%
Asia-Pacific (APAC)	1,581	20.5%	–2.8%	–4.7%	13.0%
Latin America	922	11.1%	–1.0%	–0.1%	10.0%
Middle East and Africa (MEA)	500	10.4%	–1.9%	–	8.5%
Healthcare	**6,999**	**4.7%**	**–1.6%**	**–1.0%**	**2.1%**

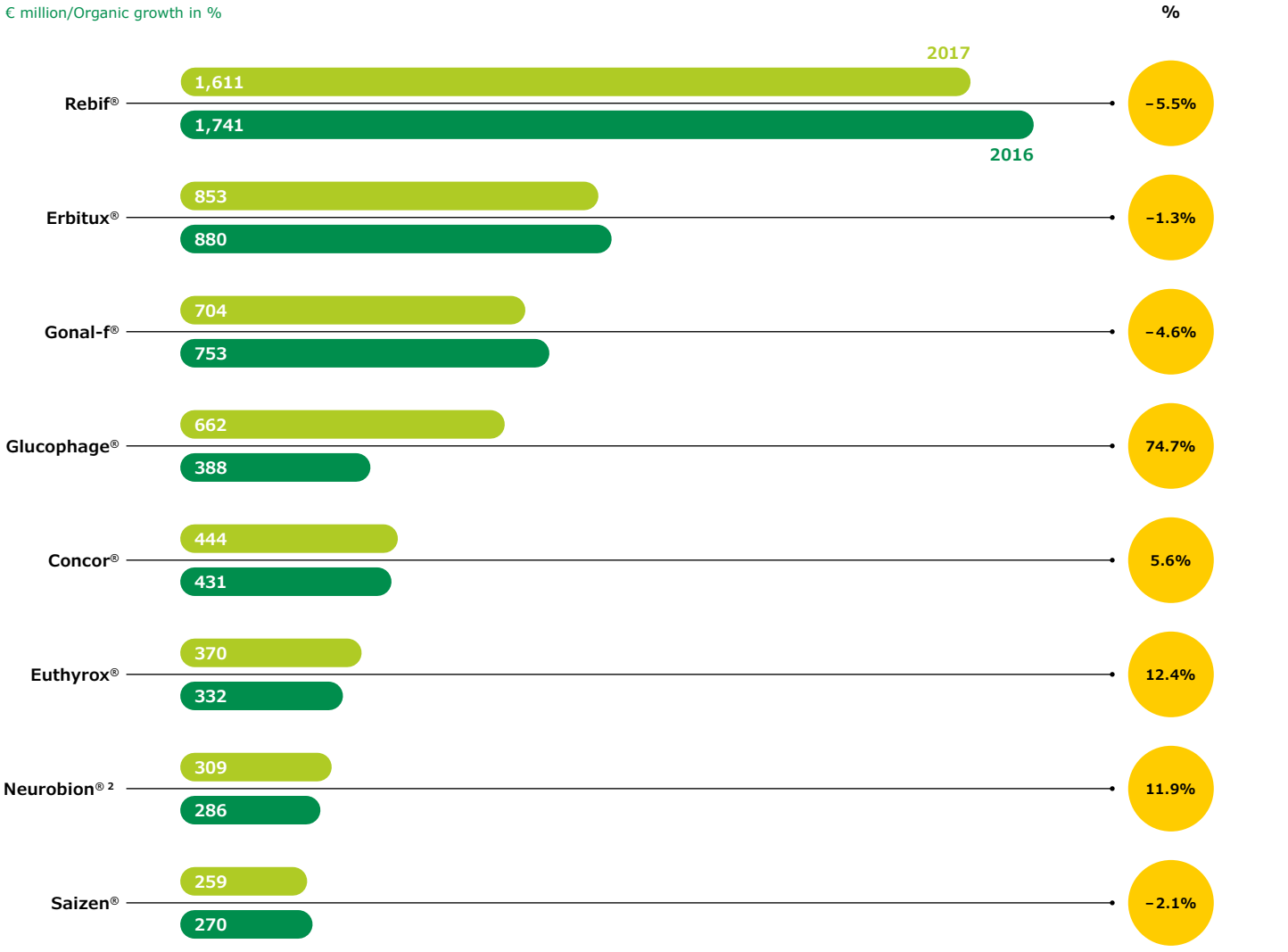
[1] Not defined by International Financial Reporting Standards (IFRS)

Net sales and organic growth rates of the key products developed in 2017 as follows:

HEALTHCARE

Product sales and organic growth[1]

€ million/Organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Including Neurobion®, Dolo-Neurobion®, Dexabion® and Gavindo®.

Sales of the drug Rebif®, which is used to treat relapsing forms of multiple sclerosis, saw an organic sales decline of –5.5% in 2017. Including negative exchange rate effects of –2.0%, sales of € 1,611 million were recorded (2016: € 1,741 million). The organic decline was primarily attributable to performance in the main sales markets, namely North America and Europe. Generating 63% of sales (2016: 61%), North America remained the most important sales market for Rebif® despite an organic decline in sales of –3.2%. Price increases in the United States at the beginning of 2017 and in August could not offset declining sales volumes. Including negative foreign exchange effects of –2.3%, sales in the region amounted to € 1,012 million (2016: € 1,071 million). In Europe, both price reductions and continued competitive pressure led to an organic sales decline of –12.1%. This resulted in sales of € 456 million (2016: € 524 million), reflecting a decline in the region's contribution to total Rebif® sales to 28% (2016: 30%). The other regions, namely Latin America, Middle East and Africa, and Asia-Pacific, generated sales of € 142 million (2016: € 145 million). They once again generated a 9% share of Rebif® sales (2016: 9%).

Including a slight organic sales decline of –1.3% and negative exchange rate effects of –1.7%, sales of the oncology medicine Erbitux® amounted to € 853 million (2016: € 880 million). In Europe, the top-selling region for Erbitux®, sales decreased organically by –4.2%. This development was mainly due to compulsory price reductions in several countries as well as to the difficult competitive situation. Sales in Europe amounted to € 447 million (2016: € 470 million). Consequently, the region's share of total Erbitux® sales declined to 52% (2016: 54%). The Asia-Pacific region saw an organic sales decline of –3.3% and contributed 31% to sales (2016: 32%). Together with negative exchange rate effects of –2.5%, sales amounted to € 263 million (2016: € 280 million). Double-digit organic growth of 23.6% in Latin America led to sales of € 87 million (2016: € 73 million), lessening the impact of the sales decline in the other regions despite negative foreign exchange effects of -5.1%. At € 56 million, sales in the Middle East and Africa region were at the previous year's level (2016: € 56 million). Organic growth of 0.6% was canceled out by exchange rate effects of –1.1%.

HEALTHCARE

Sales and organic growth[1] of Rebif® and Erbitux® by region – 2017

		Total	Europe	North America	Asia-Pacific (APAC)	Latin America	Middle East and Africa (MEA)
Rebif®	€ million	1,611	456	1,012	14	67	61
	Organic growth[1] in %	–5.5%	–12.1%	–3.2%	–1.9%	12.6%	–7.6%
	% of sales	100%	28%	63%	1%	4%	4%
Erbitux®	€ million	853	447	–	263	87	56
	Organic growth[1] in %	–1.3%	–4.2%	–	–3.3%	23.6%	0.6%
	% of sales	100%	52%	–	31%	10%	7%

[1] Not defined by International Financial Reporting Standards (IFRS).

With Gonal-f®, the leading recombinant hormone used in the treatment of infertility, our Healthcare business sector generated sales of € 704 million and was thus significantly below the year-earlier level (2016: € 753 million). The organic sales decline of –4.6% resulted primarily from performance in North America and Europe. The strong year-earlier sales in North America were due to a favorable competitive situation. Positive, and in some cases double-digit, organic growth in the regions Asia-Pacific as well as Middle East and Africa offset this development. By contrast, exchange rates had a negative impact of –1.8%.

In the Endocrinology franchise, net sales of € 383 million were below the year-earlier level (2016: € 404 million) due to a slight organic sales decline of –2.3% and a negative exchange rate effect of –2.1%. Sales of the growth hormone Saizen®, the top-selling product in the franchise, amounted to € 259 million (2016: € 270 million). This was attributable to both an organic sales decline of –2.1% and a negative exchange rate effect of –2.0%.

The General Medicine franchise (including CardioMetabolic Care), which commercializes products to treat cardiovascular diseases, thyroid disorders and diabetes, among other things, generated organic growth of 16.4%. Including currency headwinds of –1.3% and a negative portfolio effect of –3.2%, net sales amounted to € 1,925 million (2016: € 1,720 million). Double-digit organic growth was due in particular to the performance of Glucophage®, which is used in the treatment of diabetes. Sales of Glucophage® grew organically by 74.7% and included the effect of the takeover of the Glucophage® marketing rights in China from Bristol-Myers Squibb. Including an exchange rate impact of –2.0% and a portfolio effect of –1.8%, net sales of this diabetes treatment increased to € 662 million (2016: € 388 million). Euthyrox®, a medicine to treat thyroid disorders, delivered double-digit organic growth of 12.4% in 2017 and generated sales of € 370 million (2016: € 332 million). Organic growth in all regions, above all the markets in Asia-Pacific and Latin America, contributed to this development. Concor®, a beta-blocker, grew organically by 5.6%. Including currency headwinds (–0.9%) and a portfolio effect (–1.5%), sales amounted to € 444 million (2016: € 431 million). The portfolio effect in General Medicine (including CardioMetabolic Care) resulted mainly from the divestment of our business in Pakistan at the end of 2016.

In 2017, the Consumer Health business, which markets over-the-counter pharmaceuticals, generated organic growth in all main sales regions totaling 7.6%. Including currency headwinds of –0.5% and a portfolio effect of –1.0%, net sales of the business amounted to € 911 million (2016: € 860 million). The global core strategic brands contributed significantly to this development, particularly Neurobion® and Nasivin®, as well as the regional brand Vigantol®, which is primarily marketed in Europe.

The results of operations developed as follows:

HEALTHCARE

Results of operations

					Change	
€ million	**2017**	**in %**	2016	in %	€ million	in %
Net sales	**6,999**	**100.0%**	**6,855**	**100.0%**	**144**	**2.1%**
Cost of sales	–1,587	–22.7%	–1,377	–20.1%	–211	15.3%
(of which: amortization of intangible assets)[1]	*(–2)*		*(–1)*		*(–1)*	*(>100.0%)*
Gross profit	**5,412**	**77.3%**	**5,478**	**79.9%**	**–67**	**–1.2%**
Marketing and selling expenses	–2,722	–38.9%	–2,587	–37.7%	–135	5.2%
(of which: amortization of intangible assets)[1]	*(–558)*		*(–565)*		*(7)*	*(–1.3%)*
Administration expenses	–299	–4.3%	–270	–3.9%	–29	10.7%
Research and development costs	–1,632	–23.3%	–1,496	–21.8%	–136	9.1%
(of which: amortization of intangible assets)[1]	*(–1)*		*(–1)*		*(–)*	*(–)*
Other operating expenses and income	688	9.8%	468	6.8%	220	47.0%
Operating result (EBIT)[2]	**1,447**	**20.7%**	**1,593**	**23.2%**	**–146**	**–9.2%**
Depreciation/amortization/impairment losses/ reversals of impairment losses	708	10.1%	831	12.1%	–123	–14.8%
(of which: adjustments)	*(–51)*		*(71)*		*(–122)*	*(>100.0%)*
EBITDA[2]	**2,155**	**30.8%**	**2,425**	**35.4%**	**–269**	**–11.1%**
Restructuring costs	40		12		28	>100.0%
Integration costs/IT costs	28		18		10	54.3%
Gains (–)/losses (+) on the divestment of businesses	–316		–330		13	–4.1%
Acquisition-related adjustments	–		–		–	–
Other adjustments	42		3		39	>100.0%
EBITDA pre[2]	**1,949**	**27.9%**	**2,128**	**31.0%**	**–179**	**–8.4%**

[1] Excluding amortization of internally generated or separately acquired software.
[2] Not defined by International Financial Reporting Standards (IFRS).

Gross profit of our Healthcare business sector decreased slightly in 2017 and amounted to € 5,412 million (2016: € 5,478 million). At 77.3%, the resulting gross margin was below the previous year's figure (2016: 79.9%).

The increase in marketing and selling expenses related mainly to the market launches of Mavenclad® and Bavencio®. This item again included license expenses payable to Bristol-Myers Squibb as of the beginning of 2017 owing to the takeover of the commercialization rights to Glucophage® in China.

Research and development costs amounted to € 1,632 million (2016: € 1.496 million); the resulting research spending ratio increased to 23.3% (2016: 21.8%). This development was mainly due to higher investments in the Biopharma pipeline. Furthermore, 2016 was positively impacted by the release of provisions amounting to € 57 million. These were originally set up in connection with the termination of clinical development projects in previous years.

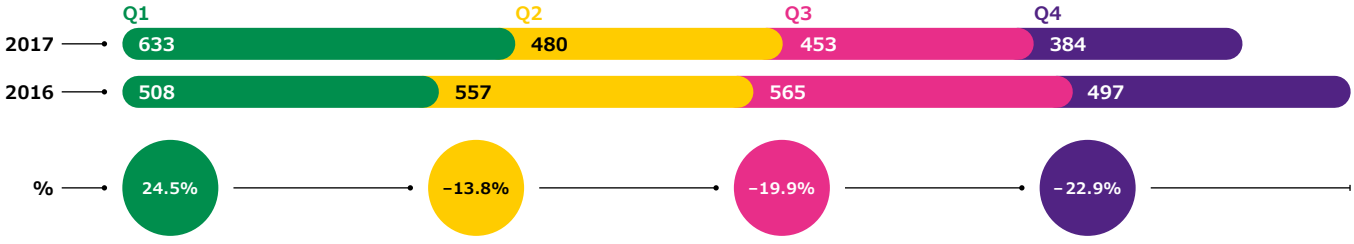
The development of other operating expenses and income was due to multiple effects in both 2017 and 2016. For instance, license income, which is reported under other operating income, included the milestone payments for the approval of Bavencio®. In 2017, the medicine was approved in the indication Merkel cell carcinoma in the United States, the European Union, Switzerland, Iceland, Liechtenstein, Norway, Japan, and Canada, as well as for the treatment of urothelial carcinoma in the United States. This item also still included higher royalty income from Avonex® and Plegridy® (both Biogen Inc.) due to the additional patent granted in the United States in June 2016 as well as income from an agreement on a one-time payment for future license payments at the beginning of 2017. The gain on the divestment of the Biosimilars business in August 2017 amounting to € 319 million also had a significant effect on other operating expenses and income. The previous year was also positively influenced by the gain on returning the rights to Kuvan® to BioMarin Pharmaceutical Inc., USA (€ 330 million). Both effects were eliminated in the calculation of EBITDA pre. The following impairment loss reversals and impairment losses were also included in other operating expenses and income: The reversal of the impairment loss on the intangible asset for cladribine tablets in 2017 owing to the regulatory approval of Mavenclad® amounted to € 17 million. In addition, an impairment loss recorded in 2011 on the biopharmaceutical production facility in Corsier-sur-Vevey, Switzerland, was reversed in the amount of € 69 million. Moreover, 2017 included an impairment loss of € 33 million on the co-commercialization right for Xalkori®. In 2016, this co-commercialization right was already impaired by € 71 million.

After eliminating depreciation, amortization, impairments and reversals of impairment losses as well as adjustments, EBITDA pre decreased to € 1,949 million (2016: € 2,128 million). This led to a margin relative to sales of 27.9% (2016: 31.0%).

The development of EBITDA pre in the individual quarters in comparison with 2016 is presented in the following overview:

HEALTHCARE

EBITDA pre[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

DEVELOPMENT OF BUSINESS FREE CASH FLOW

In 2017, business free cash flow amounted to € 1,448 (2016: € 1,648 million). The lower level in comparison with the previous year was mainly due to the decline in EBITDA pre. In addition, higher capital spending contributed to the decline in this key figure, whereas the development of receivables had a positive impact.

HEALTHCARE

Business free cash flow[1]

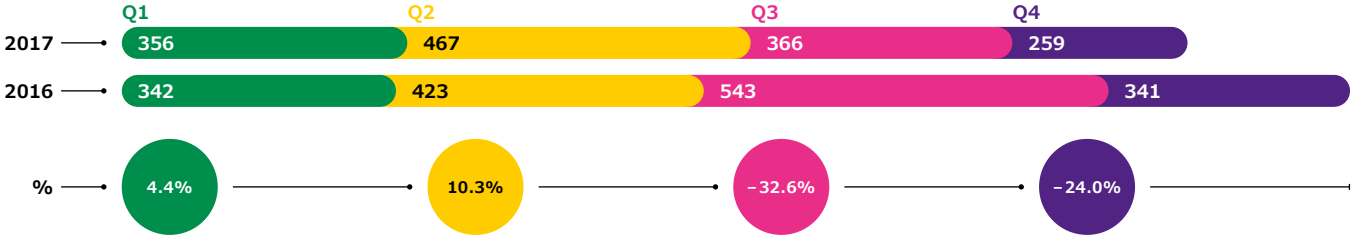
€ million	2017	2016	Change € million	Change in %
EBITDA pre[1]	1,949	2,128	–179	–8.4%
Investments in property, plant and equipment, software as well as advance payments for intangible assets	–411	–348	–63	18.0%
Changes in inventories	–39	–38	–2	5.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses	–51	–94	43	–45.6%
Business free cash flow[1]	**1,448**	**1,648**	**–200**	**–12.1%**

[1] Not defined by International Financial Reporting Standards (IFRS).

The development of business free cash flow in the individual quarters in comparison with 2016 is presented in the following overview:

HEALTHCARE

Business free cash flow[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Life Science

LIFE SCIENCE

Key figures

€ million	2017	2016	Change € million	Change in %
Net sales	5,882	5,658	224	4.0%
Operating result (EBIT)[1]	834	556	277	49.8%
Margin (% of net sales)[1]	14.2%	9.8%		
EBITDA[1]	1,580	1,378	202	14.6%
Margin (% of net sales)[1]	26.9%	24.4%		
EBITDA pre[1]	1,786	1,652	134	8.1%
Margin (% of net sales)[1]	30.4%	29.2%		
Business free cash flow[1]	1,402	1,144	258	22.5%

[1] Not defined by International Financial Reporting Standards (IFRS).

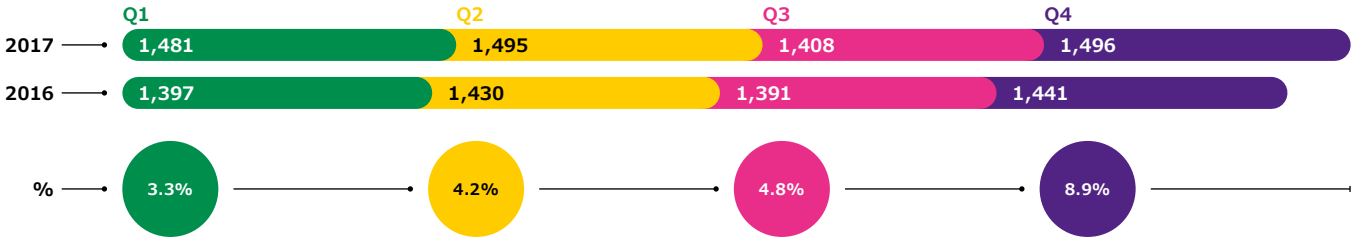
DEVELOPMENT OF NET SALES AND RESULTS OF OPERATIONS

In 2017, Life Science posted organic sales growth of 5.3%, partially offset by negative foreign exchange effects of –1.7%. The acquisition of BioControl Systems in December 2016 contributed 0.4% to net sales. Including these effects, net sales rose overall by 4.0% to € 5,882 million (2016: € 5,658 million). All three business units contributed favorably to the organic sales growth of our Life Science business sector in 2017. Process Solutions generated organic sales growth of 8.0% attributable to high demand across the portfolio and was thus again the main driver of growth in Life Science in 2017. Applied Solutions continued to perform well, posting organic growth of 4.7%. The Research Solutions business unit reported an organic sales increase of 3.0%.

The development of sales in the individual quarters in comparison with 2016 as well as the respective organic growth rates are presented in the following graph:

LIFE SCIENCE

Net sales and organic growth[1] by quarter[2]
€ million/organic growth in %

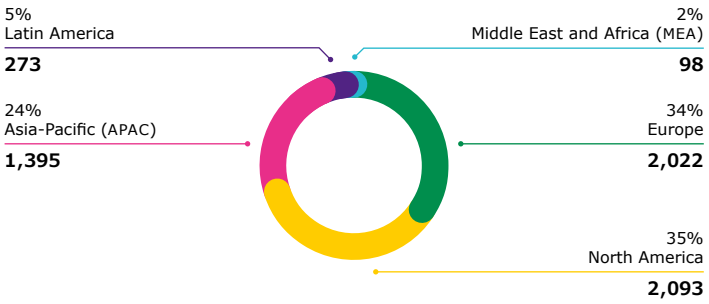


[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

LIFE SCIENCE

Net sales by region – 2017

€ million/% of net sales of the business sector



From a geographic perspective, all regions contributed positively to the organic sales growth of Life Science.

North America remained the largest region for our Life Science business sector, accounting for 35% (2016: 36%) of net sales. It posted organic sales growth of 4.5%, driven by a 6.7% increase in Process Solutions. Research Solutions and Applied Solutions also demonstrated positive growth dynamics with 2.7% and 3.4% growth, respectively. In 2017, Research Solutions benefited from improved customer demand and initial sales synergies from the Sigma-Aldrich acquisition as well as from a weak comparative basis in 2016. Applied Solutions continued its positive development, particularly owing to good demand in Analytics and Biomonitoring. Overall, net sales in North America rose to € 2,093 million (2016: € 2,031 million).

Europe, Life Science's second largest geographic market, generated organic net sales growth of 3.9% in 2017 with positive performance across most of the portfolio. Having already generated strong growth in 2016, Process Solutions and Research Solutions continued to perform well in 2017, generating good organic growth rates of 4.3% and 3.8%, respectively. Overall, sales increased to € 2,022 million (2016: € 1,960 million) equating to a contribution of 34% (2016: 35%) of the business sector's net sales in 2017.

Within Asia-Pacific, sales grew organically by 8.2% with all businesses contributing favorably. The largest contributor was Process Solutions with 17.6% organic sales growth driven by Upstream & Systems as well as Filtration & Chromatography. Net sales in Asia-Pacific rose to € 1,395 million (2016: € 1,324 million) representing an overall contribution of 24% (2016: 23%) to the business sector.

In Latin America, Life Science reported organic growth of 6.3%, primarily driven by the double-digit growth in Applied Solutions, especially Lab Water and Biomonitoring. Net sales in the region increased to € 273 million (2016: € 256 million) accounting for 5% of the business sector's net sales (2016: 4%), a slight increase over 2016.

The Middle East and Africa region posted strong organic sales growth of 8.7%. Net sales in the region grew to € 98 million (2016: € 87 million) representing 2% (2016: 2%) of Life Science net sales in 2017.

LIFE SCIENCE

Net sales components by region – 2017

€ million/change in %	Net sales	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change
Europe	2,022	3.9%	–1.0%	0.3%	3.2%
North America	2,093	4.5%	–2.5%	1.0%	3.0%
Asia-Pacific (APAC)	1,395	8.2%	–2.3%	–0.5%	5.4%
Latin America	273	6.3%	–0.7%	1.2%	6.8%
Middle East and Africa (MEA)	98	8.7%	3.2%	0.4%	12.3%
Life Science	**5,882**	**5.3%**	**–1.7%**	**0.4%**	**4.0%**

[1] Not defined by International Financial Reporting Standards (IFRS).

The Process Solutions business unit, which markets products and services for the entire pharmaceutical production value chain, generated organic sales growth of 8.0% in 2017. Following restrained organic sales growth in the first half of the year, demand from several major accounts increased slightly towards year-end. By contrast, demand from regional accounts developed very well throughout 2017.

Net sales for this business unit increased by a total of 6.0% to € 2,241 million (2016[1]: € 2,115 million). The share of sales generated by Process Solutions represented 38% (2016: 37%) of Life Science net sales. All Process Solutions businesses contributed to this strong performance.

[1] Previous year's figures have been adjusted due to an internal realignment.

The Research Solutions business unit, which provides products and services to support life science research for pharmaceutical, biotechnology and academic research laboratories, posted organic sales growth of 3.0% in 2017. In addition to initial sales synergies from the acquisition of Sigma-Aldrich, Lab & Specialty Chemicals was the key driver of net sales growth for Research Solutions, which increased to € 2,066 million (2016[1]: € 2,045 million), representing 35% (2016: 36%) of the business sector's net sales.

[1] Previous year's figures have been adjusted due to an internal realignment.

The Applied Solutions business unit generated organic sales growth of 4.7% with its broad range of products for researchers as well as scientific and industrial laboratories. Including exchange rate and portfolio effects, net sales rose to € 1,575 million (2016[1]: € 1,498 million) representing 27% (2016: 27%) of the business sector's net sales. The sales performance of Applied Solutions was driven by all business fields except Biosystems & Regulated Materials.

LIFE SCIENCE

Net sales components by business unit – 2017

€ million/change in %	Net sales	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change
Process Solutions	2,241	8.0%	–2.0%	–0.1%	6.0%
Research Solutions	2,066	3.0%	–1.6%	–0.3%	1.0%
Applied Solutions	1,575	4.7%	–1.6%	1.9%	5.1%

[1] Not defined by International Financial Reporting Standards (IFRS).

The results of operations developed as follows:

LIFE SCIENCE

Results of operations

					Change	
€ million	2017	in %	2016	in %	€ million	in %
Net sales	**5,882**	**100.0%**	**5,658**	**100.0%**	**224**	**4.0%**
Cost of sales	–2,588	–44.0%	–2,679	–47.4%	92	–3.4%
(of which: amortization of intangible assets)[1]	*(–60)*		*(–63)*		*(3)*	*(–4.4%)*
Gross profit	**3,294**	**56.0%**	**2,978**	**52.6%**	**315**	**10.6%**
Marketing and selling expenses	–1,734	–29.5%	–1,706	–30.1%	–28	1.6%
(of which: amortization of intangible assets)[1]	*(–445)*		*(–453)*		*(8)*	*(–1.9%)*
Administration expenses	–261	–4.4%	–248	–4.4%	–13	5.4%
Research and development costs	–241	–4.1%	–260	–4.6%	18	–7.0%
(of which: amortization of intangible assets)[1]	*(–1)*		*(–1)*		*(–)*	*(–)*
Other operating expenses and income	–224	–3.8%	–209	–3.7%	–15	7.3%
Operating result (EBIT)[2]	**834**	**14.2%**	**556**	**9.8%**	**277**	**49.8%**
Depreciation/amortization/impairment losses/ reversals of impairment losses	746	12.7%	822	14.5%	–75	–9.2%
(of which: adjustments)	*(3)*		*(27)*		*(–24)*	*(–87.4%)*
EBITDA[2]	**1,580**	**26.9%**	**1,378**	**24.4%**	**202**	**14.6%**
Restructuring costs	5		1		4	>100.0%
Integration costs/IT costs	114		122		–8	–6.6%
Gains (–)/losses (+) on the divestment of businesses	1		–		–	–
Acquisition-related adjustments	63		150		–88	–58.3%
Other adjustments	22		–		22	–
EBITDA pre[2]	**1,786**	**30.4%**	**1,652**	**29.2%**	**134**	**8.1%**

[1] Excluding amortization of internally generated or separately acquired software.
[2] Not defined by International Financial Reporting Standards (IFRS).

In 2017, gross profit increased by 10.6% to € 3,294 million (2016: € 2,978 million). In 2016, cost of sales contained higher expenses from the step-up of inventories as a result of the first-time consolidation of Sigma-Aldrich. In addition, the strong increase in gross profit was attributable to organic sales growth as well as the positive effect from the acquisition of BioControl Systems, which more than offset considerable negative foreign exchange effects. Marketing and selling expenses increased by 1.6% to € 1,734 million (2016: € 1,706 million) while R&D expenses decreased by –7.0% to € 241 million (2016: € 260 million). Other operating expenses and income (net) increased by 7.3% to € –224 million (2016: € –209 million), among other things owing to a provision set up for litigation risks in connection with the antitrust review proceedings for the acquisition of Sigma-Aldrich (see Note (27) "Other provisions" in the Notes to the Consolidated Financial Statements). Within the scope of the calculation of EBITDA pre, these expenses were eliminated accordingly. In comparison with 2016, the operating result (EBIT) of Life Science rose by € 277 million to € 834 million (2016: € 556 million). After depreciation and amortization and adjustments, EBITDA pre rose by 8.1% to € 1,786 million (2016: € 1,652 million). This reflects the strong organic sales performance of the combined Life Science business, which continues to focus on actively managing costs and realizing the planned synergies from the acquisition of Sigma-Aldrich.

The development of EBITDA pre in the individual quarters in comparison with 2016 is presented in the following overview:

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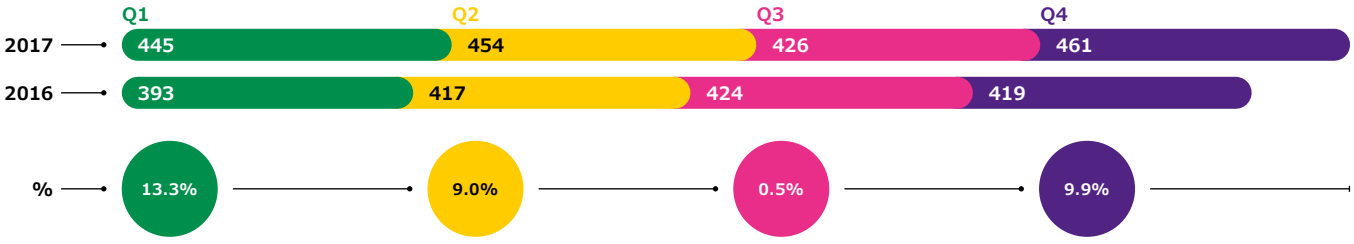
EBITDA pre[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

DEVELOPMENT OF BUSINESS FREE CASH FLOW

In 2017, the business free cash flow of our Life Science business sector rose by 22.5% or € 258 million to € 1,402 million (2016: € 1,144 million). The increase was primarily driven by the positive development of EBITDA pre, inventories, and receivables. This was partly offset by higher capital spending.

LIFE SCIENCE

Business free cash flow[1]

€ million	2017	2016	Change € million	Change in %
EBITDA pre[1]	1,786	1,652	134	8.1%
Investments in property, plant and equipment, software as well as advance payments for intangible assets	–371	–313	–59	18.7%
Changes in inventories[2]	28	3	25	>100.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses	–41	–64	23	–36.4%
Elimination first-time consolidation of Sigma-Aldrich	–	–146	146	–100.0%
Elimination first-time consolidation of BioControl Systems[2]	–	12	–12	–100.0%
Business free cash flow[1]	**1,402**	**1,144**	**258**	**22.5%**

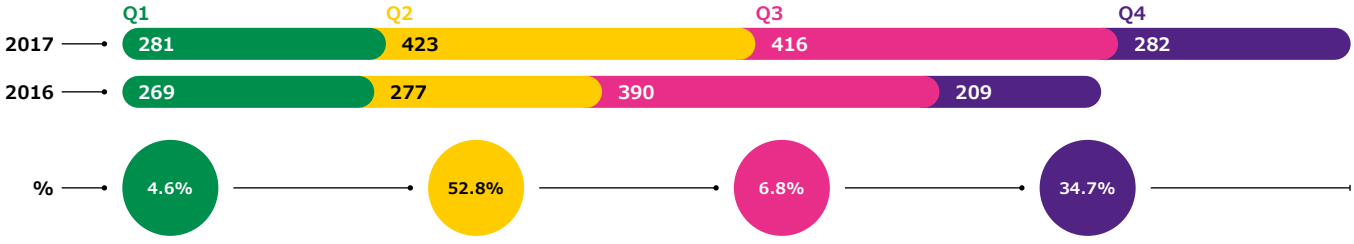
[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments" in the Notes to the Consolidated Financial Statements.

The development of business free cash flow items in the individual quarters in comparison with 2016 is presented in the following overview:

LIFE SCIENCE

Business free cash flow[1] and change by quarter[2]

€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Performance Materials

PERFORMANCE MATERIALS

Key figures

			Change	
€ million	**2017**	2016	€ million	in %
Net sales	2,446	2,511	–65	–2.6%
Operating result (EBIT)[1]	689	823	–134	–16.3%
Margin (% of net sales)[1]	28.2%	32.8%		
EBITDA[1]	947	1,077	–130	–12.1%
Margin (% of net sales)[1]	38.7%	42.9%		
EBITDA pre[1]	980	1,106	–127	–11.4%
Margin (% of net sales)[1]	40.1%	44.1%		
Business free cash flow[1]	906	1,011	–105	–10.4%

[1] Not defined by International Financial Reporting Standards (IFRS).

DEVELOPMENT OF NET SALES AND RESULTS OF OPERATIONS

In 2017, net sales of our Performance Materials business sector decreased by –2.6% to € 2,446 million (2016: € 2,511 million). This was mainly due to organic declines in sales (–1.7%) as the Display Materials business did not reach the previous year's level. The stronger euro compared with 2016 also impacted the development of net sales (–0.9%).

The Display Materials business unit, consisting of the Liquid Crystals business and complementary materials, represented more than 50% of the net sales of Performance Materials. This business unit saw an organic decrease in sales, but continued to defend its market leadership position. The decline in sales stemmed from the performance of established liquid crystal technologies, caused by a normalization of the unusually high market shares as well as the price declines customary in this industry. An exception here was the energy-saving UB-FFS technology, which achieved high double-digit growth.

The Integrated Circuit Materials (IC-Materials) business unit recorded very strong organic sales growth, to which all major businesses contributed. Particularly high growth rates were achieved in the businesses with dielectric materials and deposition materials for chip production.

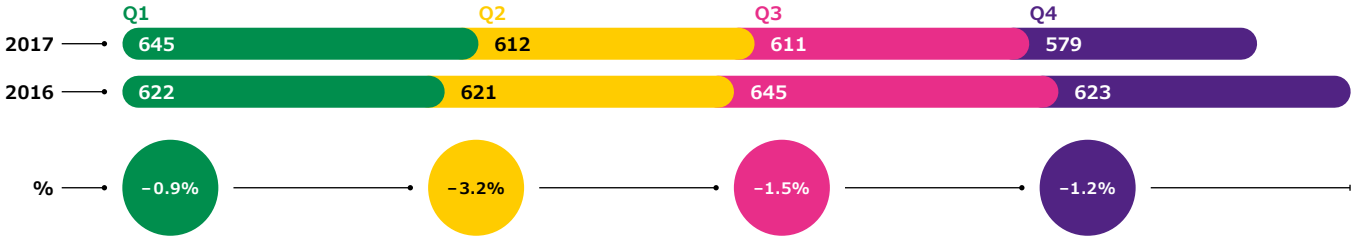
The Pigments & Functional Materials business unit generated a moderate increase in sales. The main driver was demand for materials for decorative applications, such as Xirallic® pigments, which are used particularly in automotive coatings.

In the Advanced Technologies business unit, higher demand for OLED materials led to significant sales growth.

The development of net sales in the individual quarters as well as the respective organic growth rates in 2017 are presented in the following overview:

PERFORMANCE MATERIALS

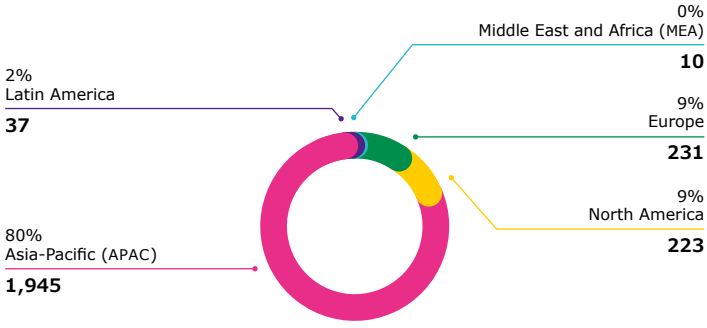
Net sales and organic growth[1] by quarter[2]
€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

PERFORMANCE MATERIALS

Net sales by region – 2017
€ million/% of net sales of the business sector



Accounting for 80% (2016: 80%), the Asia-Pacific region again generated the vast majority of the business sector's net sales. This is due to the concentration of customers for display and integrated circuit materials in Asia-Pacific. In this region, sales declined to € 1,945 million (2016: € 2,013 million). Organically, sales decreased by –2.4% owing to the performance of the Display Materials business unit. The good development of the IC Materials and Pigments businesses could not offset this.

In Europe, Performance Materials generated sales of € 231 million (2016: € 220 million). The Pigments & Functional Materials business unit was the main driver of the organic sales increase of 5.6%.

In North America, net sales declined slightly to € 223 million (2016: € 226 million) owing to foreign exchange effects. Organically, sales reached the previous year's level.

Since they account for a low proportion of sales, the two regions Latin America and Middle East and Africa played a subordinate role. They recorded an organic decline in sales since the high level of sales generated with insect repellents in 2016 normalized.

PERFORMANCE MATERIALS

Net sales components by region – 2017

€ million/change in %	Net sales	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change
Europe	231	5.6%	–0.2%	–	5.3%
North America	223	0.4%	–1.5%	–	–1.1%
Asia-Pacific (APAC)	1,945	–2.4%	–0.9%	–	–3.4%
Latin America	37	–12.1%	–1.0%	–	–13.0%
Middle East and Africa (MEA)	10	–8.5%	0.6%	–	–7.9%
Performance Materials	**2,446**	**–1.7%**	**–0.9%**	**–**	**–2.6%**

[1] Not defined by International Financial Reporting Standards (IFRS).

The results of operations developed as follows:

PERFORMANCE MATERIALS

Results of operations

					Change	
€ million	2017	in %	2016	in %	€ million	in %
Net sales	**2,446**	**100.0%**	**2,511**	**100.0%**	**–65**	**–2.6%**
Cost of sales	–1,145	–46.8%	–1,145	–45.6%	–	–
(of which: amortization of intangible assets)[1]	*(–118)*		*(–118)*		*(–)*	*(–)*
Gross profit	**1,301**	**53.2%**	**1,366**	**54.4%**	**–65**	**–4.7%**
Marketing and selling expenses	–242	–9.9%	–233	–9.3%	–9	4.1%
(of which: amortization of intangible assets)[1]	*(–14)*		*(–13)*		*(–1)*	*(5.8%)*
Administration expenses	–72	–2.9%	–61	–2.4%	–12	19.0%
Research and development costs	–225	–9.2%	–213	–8.5%	–12	5.7%
(of which: amortization of intangible assets)[1]	*(–3)*		*(–2)*		*(–1)*	*(19.9%)*
Other operating expenses and income	–73	–3.0%	–37	–1.5%	–36	97.5%
Operating result (EBIT)[2]	**689**	**28.2%**	**823**	**32.8%**	**–134**	**–16.3%**
Depreciation/amortization/impairment losses/ reversals of impairment losses	258	10.5%	254	10.1%	4	1.5%
(of which: adjustments)	*(26)*		*(16)*		*(9)*	*(56.8%)*
EBITDA[2]	**947**	**38.7%**	**1,077**	**42.9%**	**–130**	**–12.1%**
Restructuring costs	5		1		5	>100.0%
Integration costs/IT costs	20		26		–5	–21.2%
Gains (–)/losses (+) on the divestment of businesses	1		–		1	–
Acquisition-related adjustments	–		3		–3	–100.0%
Other adjustments	7		–		7	–
EBITDA pre[2]	**980**	**40.1%**	**1,106**	**44.1%**	**–127**	**–11.4%**

[1] Excluding amortization of internally generated or separately acquired software.
[2] Not defined by International Financial Reporting Standards (IFRS).

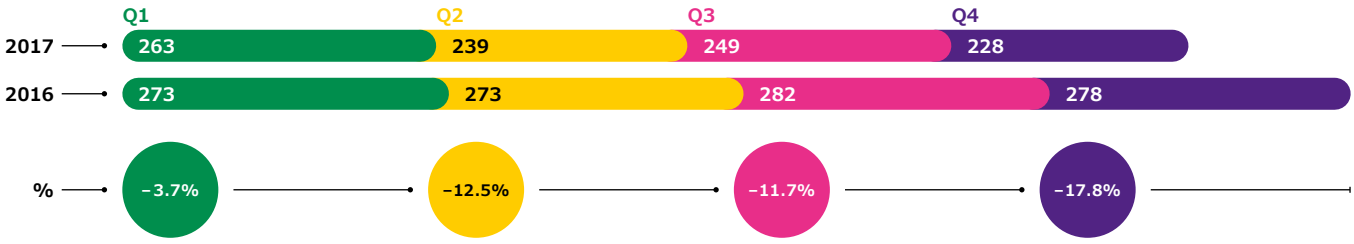
In 2017, gross profit was € 65 million below the previous year's level, resulting in a gross margin of 53.2% (2016: 54.4%). The operating result (EBIT) decreased by € 134 million to € 689 million in 2017 (2016: € 823 million). Apart from the sales-related decline in gross profit, the main reasons were higher marketing and selling expenses as well as additional research costs in order to press ahead further in growth markets, for example the development of liquid crystal window modules and OLED materials.

EBITDA pre amounted to € 980 million, which was € 127 million lower than in the previous year (2016: € 1,106 million). The EBITDA pre margin declined to 40.1% (2016: 44.1%).

The development of EBITDA pre in the individual quarters in comparison with 2016 is presented in the following overview:

PERFORMANCE MATERIALS

EBITDA pre[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

DEVELOPMENT OF BUSINESS FREE CASH FLOW

At € 906 million, the business free cash flow of our Performance Materials business sector fell short of the high year-earlier figure (2016: € 1,011 million). This resulted from the lower EBITDA pre, which could not be offset by the release of capital from the decrease in receivables.

PERFORMANCE MATERIALS

Business free cash flow[1]

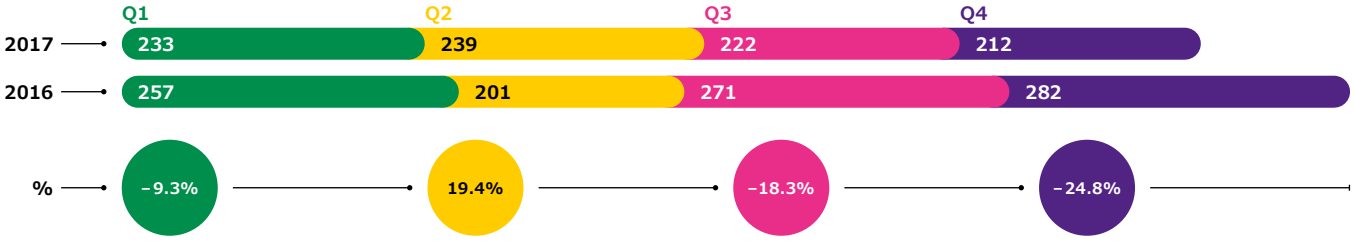
			Change	
€ million	**2017**	2016	€ million	in %
EBITDA pre[1]	980	1,106	–127	–11.4%
Investments in property, plant and equipment, software as well as advance payments from intangible assets	–125	–109	–16	14.5%
Changes in inventories	–14	35	–49	>100.0%
Changes in trade accounts receivable and receivables from royalties and licenses	65	–19	84	>100.0%
Elimination first-time consolidation of Sigma-Aldrich	–	–3	3	–100.0%
Business free cash flow[1]	**906**	**1,011**	**–105**	**–10.4%**

[1] Not defined by International Financial Reporting Standards (IFRS).

The development of business free cash flow in the individual quarters in comparison with 2016 is presented in the following overview:

PERFORMANCE MATERIALS

Business free cash flow[1] change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Corporate and Other

Corporate and Other comprises Group administration expenses for Group functions that cannot be directly allocated to the business sectors, such as Finance, Procurement, Legal, Communications, and Human Resources. Corporate costs additionally encompass expenses for central, non-allocated IT functions, including expenses related to the expansion and harmonization of IT systems within the Group, as well as research and development costs not allocable to a single business sector.

CORPORATE AND OTHER

Key figures

			Change	
€ million	**2017**	2016	€ million	in %
Operating result (EBIT)[1]	–445	–492	47	–9.5%
EBITDA[1]	–400	–465	65	–14.0%
EBITDA pre[1]	–301	–396	96	–24.2%
Business free cash flow[1]	–437	–485	47	–9.8%

[1] Not defined by International Financial Reporting Standards (IFRS).

In 2017, administration expenses reported under Corporate and Other increased to € 298 million (2016: € 276 million). Research and development costs allocated to Corporate and Other amounted to € 42 million (2016: € 7 million) and included expenses for the Innovation Center (management of ideation), costs of the New Business Builder, unit (entering innovation fields and conducting innovation projects) as well as costs of the Global Health Institute, which is responsible for developing health solutions in developing countries. These projects are initiatives with benefits for us as a whole. Other operating expenses (net) improved to € –101 million (2016: € –207 million). Among other things, this was attributable to lower currency losses. The operating result (EBIT) attributable to Corporate and Other amounted to € –445 million (2016: € –492 million) and EBITDA totaled € –400 million (2016: € –465 million). After eliminating adjustments, EBITDA pre amounted to € –301 million (2016: € –396 million).

The development of business free cash flow was positively impacted by the improvement in EBITDA pre. However, higher capital spending led to cash outflows, which negatively affected this key performance indicator. Overall, negative business free cash flow improved to € –437 million (2016: € –485 million).

Report on Risks and Opportunities

Risks and opportunities are inherent to entrepreneurial activity. We have put systems and processes in place to identify risks at an early stage and to counteract them by taking appropriate action. Within the company, opportunity management is an integral component of internal decision-making processes such as short- and medium-term planning and intra-year business plans.

Risk and opportunity management

Merck KGaA, Darmstadt, Germany, is part of a complex, global business world and is therefore exposed to a multitude of external and internal influences. Every business decision is therefore based on the associated risks and opportunities.

In our internal risk reporting, risks are defined as potential future events or developments that could lead to a negative deviation from our (financial) targets. In parallel, opportunities are defined as potential events or developments that imply a positive deviation from our planned (financial) targets. Identified future events and expected developments are taken into account in internal planning provided that it can be assumed that their occurrence is likely in the planning period. The risks and opportunities presented in the following risk and opportunities report are those potential future events that could respectively lead to a negative or positive deviation from the topics covered by planning.

RISK MANAGEMENT PROCESS

The objective of our risk management activities is to recognize, assess and manage risks early on and to implement appropriate measures to minimize them. The responsibilities, objectives and processes of risk management are described in our internal risk management guidelines. The business heads, managing directors of our subsidiaries, and the heads of Group functions are specified as employees with responsibility for risks. The group of consolidated companies for risk reporting purposes is the same as the group of consolidated companies for the consolidated financial statements. Every six months, the risk owners assess their risk status and report their risk portfolio to Risk Management. We use special risk management software in the context of these activities.

Likewise, risk-mitigating measures are reported and assessed. The effectiveness of these measures and the planned implementation time frame are monitored by Group Risk Management.

The residual risk after the implementation of these measures is presented in the internal risk report as net risk.

Group Controlling & Risk Management forms the organizational framework for risk management and reports directly to the Group Chief Financial Officer. Group Risk Management uses the information reported to determine the current risk portfolio for the Group, presenting this in a report to the Executive Board, the Supervisory Board and the Finance Committee with detailed explanations twice per year. This also encompasses a probability-weighted aggregation of risks at Group level using a Monte Carlo simulation. Furthermore, significant changes in the assessment of the risks already known and new significant risks can be reported at any time and are communicated to the corporate bodies on an ad hoc basis.

For reporting risks with a potential negative impact on our EBIT, a threshold is set at a value of € 5 million in the standard process and at a value of € 25 million in the ad hoc process. Risks below these thresholds are steered independently within the business sectors. The relevant timeframe for internal risk reporting is five years. The effects of risks described in this report on risks and opportunities are presented as annual values. The assessment of the risks presented relates to December 31, 2017. There were no relevant changes after the balance sheet date that would have necessitated an amended presentation of the risk situation of the Group.

Within the scope of audits, Group Internal Auditing regularly reviews the performance of risk management processes within the units and, at the same time, the communication of relevant risks from the operating businesses to Group Risk Management.

OPPORTUNITY MANAGEMENT PROCESS

The risk management system described concentrates on business risks, and not on opportunities at the same time. The opportunity management process is integrated into our internal controlling processes and carried out in the operating units on the basis of the Group strategy. The businesses analyze and assess potential market opportunities as part of strategy and planning processes. In this context, investment opportunities are examined and prioritized primarily in terms of their potential value proposition in order to ensure an effective allocation of resources. We selectively invest in growth markets to leverage the opportunities of dynamic development and customer proximity at a local level.

If the occurrence of the identified opportunities is rated as likely, they are incorporated into the business plans and the short-term forecasts. Trends going beyond this or events that could lead to a positive development in the net assets, financial position and results of operations are presented in the following report as opportunities. These could have a positive effect on our medium-term prospects.

Risk and opportunity assessment

RISKS

The significance of risks is calculated on the basis of their potential negative impact on the forecast financial targets in conjunction with the probability of occurrence of the respective risk. In line with these two factors, risks are classified as "high", "medium" or "low".

The underlying scales for measuring these factors are shown below:

PROBABILITY OF OCCURRENCE

Probability of occurrence	Explanation
< 20%	Unlikely
20 – 50%	Possible
51 – 80%	Likely
> 80%	Very likely

DEGREE OF IMPACT

Degree of impact	Explanation
> € 50 million	Substantial negative impact on the net assets, financial position and results of operations
€ 20 – 50 million	Moderate negative impact on the net assets, financial position and results of operations
€ 5 – 20 million	Immaterial negative impact on the net assets, financial position and results of operations
< € 5 million	Critical negative impact on the net assets, financial position and results of operations

The combination of the two factors results in the risk matrix below, which shows the individual risks and their significance to the Group.

RISK MATRIX

> € 50 million	Medium	Medium	High	High
€ 20 – 50 million	Medium	Medium	Medium	High
€ 5 – 20 million	Low	Medium	Medium	Medium
< € 5 million	Low	Low	Low	Low
Impact / Probability of occurrence	< 20%	20 – 50%	51 – 80%	> 80%

OPPORTUNITIES

Opportunities are assessed in their respective specific business environment. General measures of the business functions are quantified during operational planning in relation to sales, EBITDA pre and business free cash flow. Net present value, internal rate of return, the return on capital employed (ROCE), and the amortization period of the investment are primarily used to assess and prioritize investment opportunities. Similarly, scenarios are frequently set up to simulate the influence of possible fluctuations and changes in the respective factors on results. There is no overarching, systematic classification of the probability of occurrence and impact of opportunities.

Internal control system for the Group accounting process

The objective of the internal control system for the accounting process is to implement controls that provide assurance that the financial statements are prepared in compliance with the relevant accounting laws and standards. This system covers measures designed to ensure the complete, correct and timely conveyance and presentation of information that is relevant for the preparation of the consolidated financial statements and the combined management report.

KEY TOOLS

The internal control system aims to ensure the accuracy of the consolidated accounting process through functioning internal controls with reasonable assurance. The Group Accounting function centrally steers the preparation of the consolidated financial statements of Merck KGaA, Darmstadt, Germany, as the parent company of the Group. This Group function defines the reporting requirements that all our subsidiaries must meet. At the same time, this function steers and monitors the scheduling and process-related requirements of the consolidated financial statements. Group Accounting centrally manages all changes to the equity holding structure and correspondingly adapts the Group's scope of consolidation. The proper elimination of intragroup transactions within the scope of the consolidation process is ensured. Group-wide accounting guidelines form the basis for the preparation of the statutory financial statements of the parent company and of the subsidiaries, which are reported to Group Accounting; the guidelines are adapted in a timely manner to reflect changes in the financial regulatory environment and are updated in accordance with internal reporting requirements. For special issues, such as the accounting treatment of intangible assets within the scope of company acquisitions or pension obligations, external experts are additionally involved where necessary.

The individual companies have a local internal control system. Where financial processes are handled by a Shared Service Center, the internal control system of the Shared Service Center is additionally applied. Both ensure that accounting complies with IFRS (International Financial Reporting Standards) and with the Group accounting guidelines.

Group Accounting provides support to the local contacts and ensures a consistently high quality of reporting throughout the entire reporting process.

For Group financial reporting purposes, most of our subsidiaries use standard SAP software. Consolidation software from SAP is also used for the elimination of intragroup transactions. A detailed authorization concept ensures the separation of duties with respect to both single-entity reporting and the consolidated financial statements. In principle, the accounting process is designed to ensure that all units involved adhere to the principle of dual control.

The effectiveness of our internal control system with regard to accounting and the compliance of financial reporting by the individual companies is confirmed by both the local managing director and the local chief financial officer when they sign the single-entity reporting. For the accounting treatment of balance sheet items, Group Accounting closely cooperates with Group Risk Management in order to correctly present potential balance sheet risks. All the structures and processes described are subject to regular review by Group Internal Auditing based on an annual audit plan set out by the Executive Board. The results of these audits are dealt with by the Executive Board, the Supervisory Board and the Finance Committee. The internal control system at our company makes it possible to lower the risk of material misstatements in accounting to a minimum. However, no internal control system – regardless of its design – can entirely rule out a residual risk.

Business-related risks and opportunities

POLITICAL AND REGULATORY RISKS AND OPPORTUNITIES

As a global company, we face political and regulatory changes in a large number of countries and markets.

Risk of more restrictive regulatory requirements regarding drug pricing, reimbursement and approval

In our Healthcare business sector, the known trend towards increasingly restrictive requirements in terms of drug pricing, reimbursement and approval is continuing. These requirements can negatively influence the profitability of our products, also through market referencing between countries, and jeopardize the success of market launches and new approvals. Foreseeable effects are taken into account as far as possible in the business sector's plans. Close communication with health and regulatory authorities serves as a preventive measure to avert risks. Remaining risks beyond the current plans resulting from restrictive regulatory requirements are classified as a medium risk owing to the possible critical negative impact.

Risk of stricter regulations for the manufacturing, testing and marketing of products

Likewise, in our Life Science and Performance Materials business sectors, we must adhere to a multitude of regulatory specifications regarding the manufacturing, testing and marketing of many of our products. Specifically in the European Union, we are subject to the European chemicals regulation REACH. It demands comprehensive tests for chemical products. Moreover, the use of chemicals in production could be restricted, which would make it impossible to continue manufacturing certain products. We are constantly pursuing research and development in substance characterization and the possible substitution of critical substances so as to reduce the occurrence of this risk, and therefore view it as unlikely. Nevertheless, it is classified as a medium risk given its critical negative impact on the net assets, financial position and results of operations.

Risk of negative political and macroeconomic developments

The destabilization of political systems (as for example in Turkey or the Middle East), the possible establishment of trade barriers as well as foreign exchange policy changes can lead to declines in sales in certain countries and regions. These risks are taken into account as far as possible in the business plans of the affected countries and regions and mitigated through product, industry and regional diversification.

Potential negative macroeconomic developments, for example in Argentina and Brazil, can also impact our business. To minimize these impacts, corresponding measures pertaining to the sales strategy have been initiated in these countries.

The United Kingdom's imminent exit from the European Union ("Brexit") gives rise to risks for our existing business in that country (2017: sales of € 429 million, 1,514 employees and five production sites) such as the decline in the value of the British pound, a weakening of economic activity in the United Kingdom, regulatory changes, and the creation of trade barriers such as import duties, which could have an impact on our profitability. To analyze these risks and to counteract them in a timely and targeted manner, internal working groups have been set up.

The net risk of negative political and macroeconomic developments is seen as possible and has critical negative effects on the net assets, financial position and results of operations. We thus rate this as a medium risk.

MARKET RISKS AND OPPORTUNITIES

We compete with numerous companies in the pharmaceutical, chemical and life science sectors. Rising competitive pressure can have a significant impact on the quantities sold and prices attainable for our products.

Opportunities due to new technologies in the manufacturing of displays

We see opportunities in the medium-to long-term possibilities of significant market growth of OLED applications in high-quality display applications. We are building on more than ten years of experience in manufacturing organic light-emitting diode (OLED) materials as well as a strong portfolio of worldwide patents in order to develop ultrapure and extremely stable materials that are precisely tailored to customer requirements. The development in the OLED market is being driven by the diversification of applications for OLED displays. OLED technology is an established alternative to LCDs in small-area displays, for instance smartphones. However, owing to technological advances, OLED technology is being used in more and more large-area displays, such as televisions. High-quality lighting applications, for example for automobiles, offer further growth potential for OLEDs. In order to make the mass production of large-area OLED displays more efficient, we have been cooperating since the end of 2012 with Seiko Epson Corporation to enable printing processes for OLED displays. At the beginning of the second quarter of 2017, the HyperOLED project started within the scope of the Horizon 2020 initiative, an EU-based program. As part of this project, together with four other partners, we will be developing high-performance, hyperfluorescence OLEDs for display and lighting applications over the next three years.

To expand our expertise in the field of high-quality display applications, we entered into a development agreement with CLEARink Displays. Together, we plan to launch an innovative, patented and reflecting display technology for mobile devices. Our objective is to commercialize the first video-enabled reflecting color displays in 2018.

Opportunities due to new application possibilities for liquid crystals

We are pursuing a strategy of leveraging our expertise as the global market leader in liquid crystals in order to develop new fields of application for innovative liquid crystal technologies. For instance, we are pressing ahead to capture the future markets for liquid crystal windows (LCWs) and mobile antennas. Thanks to licrivision™ technology, LCWs create new architectural possibilities.

Through continuously variable brightness control, they can for example increase a building's energy efficiency. To drive forward the market penetration of liquid crystal windows, we are investing around € 19 million in the construction of a production facility for window modules. Initial sales, albeit at a low level, are expected in 2018 with greater medium-term potential. Antennas that can receive signals transmitted in the high frequency range can also be realized with the aid of corresponding liquid crystal mixtures. As a result, mobile data exchange could improve significantly in a wide variety of fields of application. Since novel liquid crystal materials for antennas are currently being developed, the market launch of liquid crystal antennas could still take a few years. New application opportunities for liquid crystals could have medium- to long-term positive effects on the financial indicators of our Performance Materials business sector.

Opportunities offered by the increased importance of the automotive platform

In the future, topics such as data transmission, individual design, smart lighting and autonomous driving will play an important role in the automotive industry, thus expanding our opportunities in smart technologies.

In 2017, we presented our automotive innovations at our own exhibition stand at the International Motor Show (IAA) in Frankfurt am Main, Germany, for the first time. With our products and displays in the New Mobility World, we offered visitors the opportunity to familiarize themselves with the broad range of future applications and with our company.

Opportunities from leveraging the e-commerce and distribution platform

With the acquisition of Sigma-Aldrich in 2015 we have gained access to the leading life science e-commerce platform. Our customers are already benefiting from an offering of more than 300,000 products including highly respected brands distributed via this e-commerce platform. We are further expanding this platform in order to continuously increase the number of products available on it. Making ordering processes faster and more convenient for our customers and offering support through individualized product recommendations could lead to higher sales volumes and enable us to win new customers. Consequently, this distribution channel could lead to an above-average development of sales in the medium term.

This is being expanded through the collaboration with Elsevier. Our products are now listed in Reaxys, a chemicals database. Users can now conveniently find and purchase the products we develop and supply.

The acquisition of Grzybowski Scientific Inventions complements our e-commerce platform. The retro-synthesis software from this acquisition offers the possibility to identify and select synthesis methods.

Risk due to increased competition and customer technology changes

In our Healthcare business sector, both our biopharmaceutical products and classic pharmaceutical business are exposed to increased competition from rival products (in the form of biosimilars and generics). In the Life Science and Performance Materials business sectors, risks are posed by not only cyclical business fluctuations but also changes in the technologies used or customer sourcing strategies, particularly with respect to liquid crystals. We use close customer relationships and in-house further developments as well as market proximity, including precise market analyses as mitigating measures. Overall, owing to its possible occurrence with a critical negative impact, the market risk is classified as a medium risk.

Opportunities offered by digitalization and activities to boost innovative strength

Digital technologies are becoming increasingly important for our markets and our world of work. Therefore, in 2015, we launched strategic digital initiatives geared to improving the efficiency of our internal processes and to evaluating the opportunities of digitalization with regard to our products and customers. In addition to collaborations with external partners to expand e-health solutions for patients, e.g. our MSdialog platform, the Accelerator program, which is being driven by our Innovation Center, is one component of our innovation strategy. We achieved a record number of applicants, with the number of applications increasing by 82% over the previous round. The program comprises support for and access to start-up companies that offer innovative digital solutions in the fields of healthcare, life science and performance materials. With corporate venture capital fund, we are also strengthening our collaboration with and access to highly innovative start-ups. The expansion of these activities could lead to new market opportunities for us. In the medium term, these could have a positive impact on the development of our sales.

Furthermore, we are expanding our expertise through a PMatX incubator for next-generation electronics in Israel. With a focus on start-up companies for state-of-the-art electronics, the topics being addressed are closely related to Performance Materials.

RISKS AND OPPORTUNITIES OF RESEARCH AND DEVELOPMENT

For us, innovation is a major element of the Group strategy. Research and development projects can experience delays, expected budgets can be exceeded, or targets can remain unmet. Research and development activities are of special importance to our Healthcare business sector. In the course of portfolio management, we regularly evaluate and, if necessary, refocus research areas and all R&D pipeline projects.

Special mention should be made of the strategic alliance formed in 2014 between our company and Pfizer Inc. as a research and development opportunity in our Healthcare business sector. In 2017, the European Commission approved Bavencio®, an anti- PD-L1 antibody we are co-developing with Pfizer, in 28 countries of the European Union, Iceland, Liechtenstein and Norway as well as in Canada and Japan. This builds on the previous approvals in the United States and Switzerland. Bavencio® is thus the first immunotherapy for patients with metastatic Merkel cell carcinoma.

Additionally, Bavencio® was approved by the FDA for the treatment of patients with locally advanced or metastatic urothelial cancer.

In addition, Mavenclad® was approved in 2017 in the European Union by the European Commission. Approvals were also granted in Canada and Australia. It is the first short-course oral treatment approved in Europe for the treatment of relapsing multiple sclerosis in patients with high disease activity. The first market launch will take place in Germany, followed by the United Kingdom and the remaining EU member states.

We plan to submit Mavenclad® for regulatory review in the United States and both drugs in Asia.

Apart from these regulatory submissions, we are pushing ahead with research projects in further important indications and are actively pursuing new opportunities through in- and outlicensing.

The expenses currently being incurred, especially in our Healthcare research and development, are already reflected in the current plans. The same applies to net sales generated by the products Bavencio® and Mavenclad®. If approved in further countries, the estimated sales potential could increase.

Moreover, we in-licensed four oncology research and development programs from Vertex. With this strategic portfolio acquisition, we are strengthening our oncology pipeline in two attractive areas where we already possess substantial expertise: DNA damage response as well as immuno-oncology. These areas offer highly promising therapeutic synergies.

Risks of discontinuing development projects and regulatory approval of developed medicines

Sometimes development projects are discontinued after high levels of investment at a late phase of clinical development. Decisions – such as those relating to the transition to the next clinical phase – are taken with a view to minimizing risk. Furthermore, there is the risk that regulatory authorities either do not grant or delay approval, which can have an impact on earnings, for example by lower sales or missed milestone payments from collaboration agreements. Additionally, there is the danger that undesirable side effects of a pharmaceutical product could remain undetected until after approval or registration, which could result in a restriction of approval or withdrawal from the market. We are currently not aware of any risks beyond general development risks that could significantly affect the net assets, financial position and results of operations.

PRODUCT-RELATED RISKS AND OPPORTUNITIES

Risk of a temporary ban on products/production facilities or of non-registration of products due to non-compliance with quality standards

We are required to comply with the highest standards of quality in the manufacturing of pharmaceutical products (Good Manufacturing Practice). In this regard we are subject to the supervision of the regulatory authorities. Conditions imposed by national regulatory authorities could result in a temporary ban on products/production facilities, and possibly affect new registrations with the respective authority. We take the utmost effort to ensure compliance with regulations, regularly perform our own internal inspections and also carry out external audits. Thanks to these quality assurance processes, the occurrence of a risk is unlikely, however cannot be entirely ruled out. Depending on the product concerned and the severity of the objection, such a risk can have a critical negative impact on the net assets, financial position and results of operations. Therefore, we rate this as a medium risk.

Operational failure risks

Further risks include operational failures due to fire or force majeure, for example natural disasters such as floods or earthquakes, which could lead to a substantial interruption or restriction of business activities. Insofar as it is possible and economically viable, the Group limits its damage risks with insurance coverage, the nature and extent of which is constantly adapted to current requirements. Likewise, we are exposed to risks of production outages and the related supply bottlenecks that can be triggered by technical problems in production facilities with very high capacity utilization. We are working to continuously mitigate the risks by making regular investments, setting up alternative sourcing options and maintaining inventory levels.

Although the occurrence of these risks is considered unlikely, an individual event could have a critical negative effect on the net assets, financial position and results of operations and are therefore classified as a medium risk.

Risks of dependency on suppliers

Quality controls along the entire value chain reduce the risks related to product quality and availability. This starts with the qualification of our suppliers. Quality controls also include comprehensive quality requirements for raw materials, purchased semi-finished products and plants. We are dependent on individual suppliers for a number of precursor products, packaging materials and finished goods. In the event that one of these suppliers curtails or discontinues production, or supply is disrupted, this could potentially have a critical impact on the business concerned. With long-term strategic alliances for precursor products critical to supply and price as well as alternative sourcing strategies, we reduce the probability of occurrence of these risks and rate them as unlikely. Overall, these are classified as medium risks.

Product liability risks
Companies in the chemical and pharmaceutical industries are exposed to product liability risks in particular. Product liability risks can lead to considerable claims for damages, loss of reputation and costs to avert damages. We have taken out the liability insurance that is standard in the industry for such risks. However, it could be that the insurance coverage available is insufficient for individual cases. Although the occurrence of product liability claims in excess of the existing insurance coverage is considered unlikely, individual cases could still have a critical negative effect on the net assets, financial position and results of operations. We therefore rate a potential product liability risk as a medium risk.

Risks due to product-related crime and espionage
Owing to our portfolio, we are exposed to a number of sector-specific crime risks. This relates primarily to products, including among other things, counterfeiting, illegal channeling, misuse as well as all types of property crime, including attempts at these crimes. Crime phenomena such as cybercrime and espionage could equally affect our innovations or innovation abilities as such.

To combat product-related crime, an internal coordination network covering all functions and businesses ("Anti-Counterfeiting Operational Network") was set up several years ago. In addition, security measures are in use to protect products against counterfeiting. Innovative technical security solutions and defined preventive approaches are used to ward off dangers relating to cybercrime and espionage. Measures to prevent risks and to prosecute identified offenses are conducted in all the relevant crime areas in close and trustworthy cooperation with the responsible authorities. The impact of these risks on business operations depends on the respective individual case, product-specific factors, the value chain, as well as on regional aspects in particular. Our Corporate Security department is responsible for the overall coordination of all measures in this area. Overall, the threat resulting from crime in general is seen as being possible and is classified as a medium risk.

Opportunities due to an expanding local presence in high-growth markets
For numerous markets in Asia, the Middle East, Latin America and Africa, we expect that in the coming years all business sectors will continue to make above-average contributions to growth. In order to further expand this potential for our businesses, we have moved forward with several investment projects in recent years. For instance, in 2017 we invested around € 25 million in China to further expand the capacity of a pharmaceutical manufacturing facility as well as a further € 26 million in a manufacturing plant for our Life Science business sector. Moreover, we are continuing our engagement in Africa. The greater local presence and customer proximity could give us a key competitive edge and, in the medium to long term, offers the opportunity for significant growth in sales and EBITDA pre.

RISKS AND OPPORTUNITIES FROM THE USE OF SOCIAL MEDIA

Our company and its employees are active on numerous social media channels. The consistent and legally compliant use of the channels and their content is important in terms of increasing awareness of our brand, among other things. We take precautions and implement processes to ensure awareness of the proper handling of social media, controlling publication and actively managing communication.

Nevertheless, reputational risks could result, for instance through public dialogues in social media. Overall, we rate this as a low risk.

Financial risks and opportunities

As a corporate group that operates internationally and due to our presence in the capital market, we are exposed to various financial risks and opportunities. Above all, these are liquidity and counterparty risks, financial market risks and opportunities, risks of fluctuations in the market values of operational tangible and intangible assets, as well as risks and opportunities from pension obligations.

RISK AND OPPORTUNITY MANAGEMENT IN RELATION TO THE USE OF FINANCIAL INSTRUMENTS

In the area of financial risks and opportunities, we use an active management strategy to reduce the effects of fluctuations in exchange and interest rates. The management of financial risks and opportunities by using derivatives in particular is regulated by extensive guidelines. Speculation is prohibited. Derivative transactions are subject to constant risk controls. A strict separation of functions between trading, settlement and control functions is ensured.

LIQUIDITY RISKS

In order to ensure its continued existence, a company must be able to fulfill its commitments from operating and financial activities at all times. To reduce potential liquidity risks, we have a central Group-wide liquidity management system in place and a balanced maturity profile. The maturities of our financial liabilities are aligned with our planned free cash flow. Furthermore, we have a multicurrency revolving credit facility of € 2 billion with a term until 2020, which ensures continuing solvency if any liquidity bottlenecks occur. As our loan agreements do not contain any financial covenants, these agreed lines of credit can be accessed even if our credit rating should deteriorate. Additionally, we have a commercial paper program with a maximum volume of € 2 billion.

Overall, the liquidity risk is unlikely and rated as low.

COUNTERPARTY RISKS

Counterparty risks arise from the potential default by a partner in connection with financial investments, loans and financing commitments on the one hand and receivables in operating business on the other.

As for counterparty risks from financial transactions, we review all positions relating to trading partners and their credit ratings on a daily basis. We manage financial risks of default by diversifying our financial positions and through the related active management of our trading partners. Significant financial transactions involving credit risk are entered into with banks and industrial companies that have a good credit rating. Moreover, our large banking syndicate – the multi-currency revolving credit facility of € 2 billion was syndicated by 19 banks – reduces possible losses in the event of default.

The solvency and operational development of trading partners is regularly reviewed as part of the management of operational counterparty risks. Sovereign risks are also analyzed. The volume of receivables of each customer is capped in line with their credit ratings. Risk-mitigating measures, such as credit insurance, are utilized as appropriate. Nevertheless, defaults by isolated trading partners, even those with outstanding credit ratings, cannot be entirely ruled out, although rated as unlikely (further information can be found in "Credit risks" in Note (38) "Management of financial risks" in the Consolidated Financial Statements).

Counterparty risk is classified as a medium risk overall owing to the unlikely probability of occurrence with a potential critical negative effect.

FINANCIAL MARKET OPPORTUNITIES AND RISKS

As a result of our international business activities and global corporate structure, we are exposed to risks and opportunities from fluctuations in exchange rates. These result from financial transactions, operating receivables and liabilities, as well as forecast future cash flows from sales and costs in foreign currency. We use derivatives to manage and reduce the aforementioned risks and opportunities (further information can be found in "Derivative financial instruments" in the Notes to the Consolidated Financial Statements). Due to their possible occurrence with a potentially critical negative effect on the net assets, financial position and results of operations, foreign exchange rate risks are rated as medium risk.

Variable interest and current financial liabilities are exposed to the risks and opportunities of interest rate fluctuations. These are also managed and reduced using derivatives. Interest rate risks have a potentially moderate negative impact, are considered unlikely and pose low risks overall.

RISKS OF IMPAIRMENT OF BALANCE SHEET ITEMS

The carrying amounts of individual balance sheet items are subject to the risk of changing market and business conditions and thus to changes in fair values as well. Necessary impairments could have a significant negative non-cash impact on earnings and affect the accounting ratios.

This applies in particular to the high level of intangible assets including goodwill, which mainly derive from the purchase price allocations made in connection with past acquisitions (further information can be found under "Goodwill" and "Other intangible assets" in the Notes to the Consolidated Financial Statements). All relevant risks were assessed during the preparation of the consolidated financial statements and taken into account accordingly. We rate risks beyond this as unlikely with a critical negative impact. Therefore, this is seen as a medium risk.

RISKS AND OPPORTUNITIES FROM PENSION OBLIGATIONS

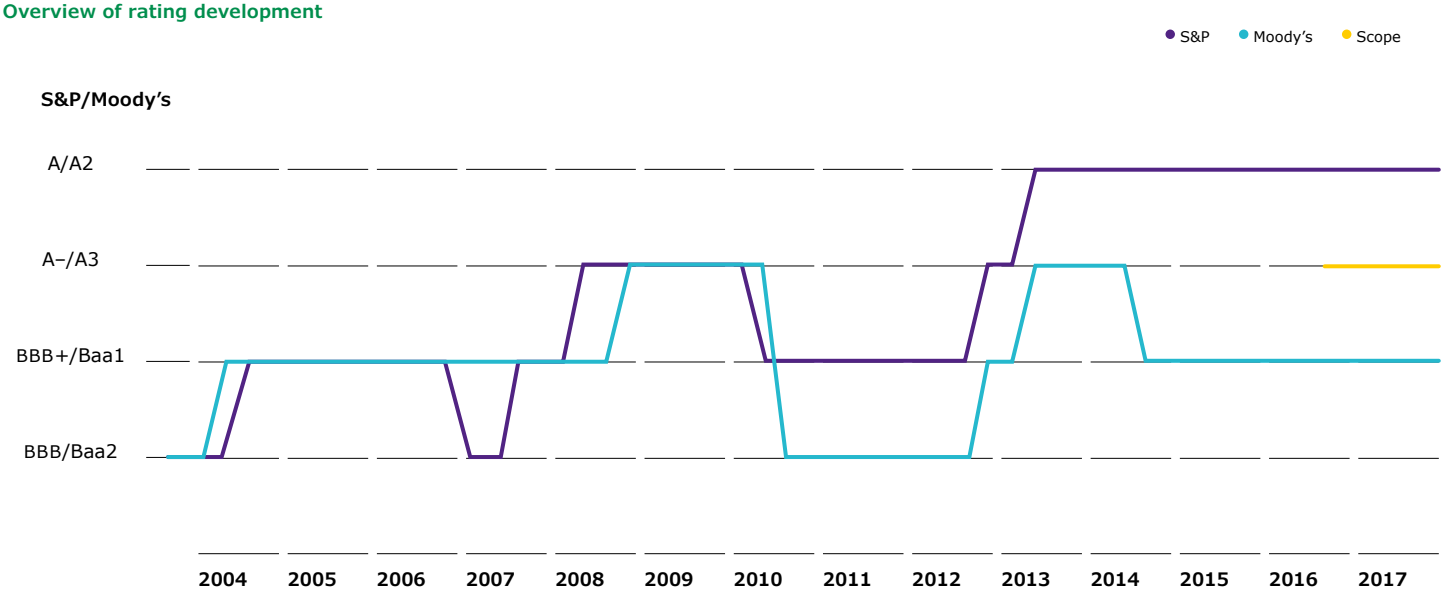
We have commitments in connection with pension obligations. The present value of defined benefit obligations can be significantly increased or reduced by changes in the relevant valuation parameters, for example the interest rate or future salary increases. Pension obligations are regularly assessed as part of annual actuarial reports. The obligations are covered by the pension provisions reported in the balance sheet based on the assumptions as of the balance sheet date. Some of these obligations are funded by plan assets (further information can be found under "Provisions for pensions and other post-employment benefits" in the Notes to the Consolidated Financial Statements). To the extent that pension obligations are covered by plan assets consisting of interest-bearing securities, shares, real estate, and other financial assets, decreasing or negative returns on these assets can adversely affect the fair value of plan assets and thus result in further additions to pension provisions. By contrast, rising returns increase the value of plan assets, thereby resulting in excess cover of plan liabilities. We increase the opportunities of fluctuations in the market value of plan assets on the one hand and reduce the risks on the other by using a diversified investment strategy. The unlikely risk due to pension obligations could have moderate negative effects on the net assets, financial position and results of operations, and is to be classified as low.

ASSESSMENTS BY INDEPENDENT RATING AGENCIES

The capital market uses the assessments published by rating agencies to help lenders assess the risks of a financial instrument used by our company. We are currently rated by Standard & Poor's, Moody's and Scope. Standard & Poor's has issued a long-term credit rating of A with a stable outlook, Moody's a rating of Baa1 with a stable outlook, and Scope a rating of A-, likewise with a stable outlook. In line with market procedures, our financing conditions are closely tied to our rating. The better a rating, the more favorably we can generally raise funds on the capital market or from banks.

REPORT ON RISKS AND OPPORTUNITIES

Overview of rating development



Legal risks

Generally, we strive to minimize and control our legal risks. To this end, we have taken the necessary precautions to identify threats and defend our rights where necessary.

Nevertheless, we are still exposed to litigation risks or legal proceedings. In particular, these include risks in the areas of product liability, competition and antitrust law, pharmaceutical law, patent law, trademark law, tax law, and environmental protection. As a research-based company, we have a valuable portfolio of industrial property rights, patents and brands that could become the target of attacks and infringements. The outcome of future proceedings or those currently pending is difficult to foresee.

For instance, we are currently involved in litigation with Merck & Co. Inc., Kenilworth, NJ, USA (outside the United States and Canada: Merck Sharp & Dohme Corp. (MSD)), against whom we have filed lawsuits in various countries. This company has also sued us in the United States for trademark infringement, among other things.

Due to long statutes of limitations or in some cases the absence thereof, it is not possible to rule out that we will face third-party claims arising from the same issue despite the conclusion of legal proceedings. Court or official rulings or settlements can lead to expenses with a significant impact on our business and earnings.

Despite extensive precautionary measures, non-compliance with laws and regulations leading to related consequences can never be completely excluded.

Tax risks are reviewed regularly and systematically by Group Tax. Corresponding standards and guidelines are used in order to identify tax risks at an early stage as well as to review, evaluate and correspondingly minimize them. Risk reduction measures are coordinated by Group Tax together with the subsidiaries abroad.

In our opinion, the lawsuits described below constitute the most significant legal risks. This should not be seen as an exhaustive list of all legal disputes currently ongoing.

RISKS FROM PRODUCT-RELATED AND PATENT LAW DISPUTES

We are involved in a patent dispute in the United States with Biogen Inc. (Massachusetts, USA) ("Biogen"). Biogen claims that the sale of Rebif® in the United States infringes on a Biogen patent. The disputed patent was granted to Biogen in 2009 in the United States. Subsequently, Biogen sued our company and other pharmaceutical companies for infringement of this patent. Our company defended itself against all allegations and brought a countersuit claiming that the patent is invalid and not infringed on by our actions. A Markman hearing took place in January 2012, leading to a decision in the first quarter of 2016. A first-instance ruling is now expected for 2018. A court-ordered mediation proceeding did not lead to an agreement between the parties. We have taken appropriate accounting measures.

Nevertheless, potentially critical negative impacts of the litigation on the financial position cannot be ruled out.

In our Performance Materials business sector, we are involved in a legal dispute with JNC Corporation, Japan, (JNC). JNC claims that by manufacturing and marketing certain liquid crystals mixtures, our company has infringed JNC patents. We maintain that JNC's patent infringement assertion is invalid owing to relevant prior art and has filed the corresponding nullity actions, which in three cases were already successful in first-instance proceedings. JNC has filed complaints in each case. In a correction trial, a decision in favor of JNC was issued in the second instance. Both our company and the Korean Patent Office have filed complaints with the Korean Supreme Court. In parallel, JNC filed two patent infringement suits. In 2017, a first-instance decision was issued in favor of our company, which JNC then appealed. Our company has taken appropriate accounting measures. Nevertheless, a potentially critical negative impact of the litigation on the financial position cannot be ruled out.

In July, Bristol-Myers Squibb Co., USA, E.R. Squibb & Sons L.L.C., USA, Ono Pharmaceutical Co., Ltd., Japan, and a private individual filed suit in the United States District Court of Delaware against our company and Pfizer Inc., USA, (Pfizer) based on the allegation that Bavencio® infringes a U.S. patent. The plaintiffs accuse multiple companies of infringing a U.S. patent relating to methods of treating tumors with anti-PD-L1 antibodies. Both our company and Pfizer have initiated legal steps to defend themselves. A potentially critical negative impact of the litigation on the financial position cannot be ruled out.

RISKS DUE TO ANTITRUST AND OTHER GOVERNMENT PROCEEDINGS

Raptiva®: In December 2011, the federal state of São Paulo, Brazil, sued us for damages because of alleged collusion between various pharmaceutical companies and an association of patients suffering from psoriasis and vitiligo. This collusion is alleged to have been intended to increase sales of the medicines from the companies involved to the detriment of patients and state coffers. Moreover, patients are also suing for damages in connection with the product Raptiva®.

We have taken appropriate accounting measures for these issues. Risks in excess of this with a substantial negative effect on the net assets, financial position and results of operations cannot be ruled out, but are considered unlikely. This is rated as a medium risk.

On July 6, 2017, we received notice from the European Commission (EU Commission), in which the EU Commission informed our company of its preliminary conclusion that our company and Sigma-Aldrich allegedly transmitted incorrect and/or misleading information within the scope of the acquisition of Sigma-Aldrich. The EU Commission received registration of the merger on April 21, 2015 and granted clearance on June 15, 2015 subject to the condition that our company and Sigma-Aldrich divest parts of the European solvents and inorganic chemicals businesses of Sigma-Aldrich in order to resolve antitrust concerns. According to the preliminary viewpoint of the EU Commission communicated in the letter dated July 6, 2017, our company and Sigma-Aldrich withheld in this connection important information about an innovation project allegedly relevant for certain laboratory chemicals of significance to the analysis by the EU Commission. According to the EU Commission, the innovation project should have been included in the remedies package. A meeting of the cooperation procedure between the EU Commission and our company took place on February 5, 2018. The ongoing investigations are limited to the examination of violations of EU merger control procedures and do not affect the validity of the EU Commission's decision to approve the merger. The risk is considered likely with a critical negative impact on the net assets, financial position and results of operations and is thus classified as high. Appropriate accounting measures have been taken.

RISKS OWING TO A SETTLEMENT AGREEMENT OF THE DIVESTED GENERICS GROUP

Paroxetine: In connection with the divested generics business, we are subject to antitrust investigations by the British Competition and Market Authority (CMA) in the United Kingdom. In March 2013, the authorities informed us of the assumption that a settlement agreement entered into in 2002 between Generics (UK) Ltd. and several subsidiaries of GlaxoSmithKline plc, (UK) in connection with the antidepressant drug paroxetine violates British and European competition law. Our company, the then owner of Generics (UK) Ltd., was allegedly involved in the negotiations for the settlement agreement and is therefore liable. The investigations into Generics (UK) Ltd. started in 2011, without this being known to us. On February 11, 2016, the CMA imposed a fine in this matter. We have taken legal action against this fine. Appropriate accounting measures have been taken. This is currently classified as a medium risk with a moderate negative impact on the financial position.

Human resources risks

Our future growth is highly dependent on our innovative strength. Therefore, the expertise and engagement of employees in all sectors in which we operate are crucial to the success of the company. The markets relevant to the company are characterized by intensive competition for qualified specialists and by the challenge of being perceived by the public as an attractive employer. Fluctuation risks specific to countries and industries have to be identified ahead of time and specifically addressed in order to keep the skills and expertise critical to success and business within the company.

Recruiting and retaining specialists and talent is therefore one of the key priorities for the company and is managed through the targeted use of, for instance, employer branding initiatives, global talent and succession management processes as well as competitive compensation packages. Nevertheless, employee-related risks that affect business activities are possible, even though their impact is difficult to assess. We rate this as a medium risk.

Information technology risks

We use a variety of IT systems and processes in order to optimally support our globalization. Trends in information technology offer various opportunities but also harbor risks.

Risks due to cybercrime and the failure of business-critical IT applications

Increasing international networking and the related possibility of IT system abuse are resulting in cybercrime risks for our company, such as the failure of central IT systems, the disclosure or loss of the data integrity of confidential data from research and business activities, the manipulation of IT systems in chemical process control, or an increased burden or adverse impact on IT systems as a result of virus attacks.

The Group operates an information protection management system based on ISO 27001 comprising security guidelines as well as organizational and technical measures to prevent and address IT security incidents. Globally used IT applications form the basis for the contractual delivery of products and solutions. The failure of business-critical IT applications could therefore have a direct influence on our ability to deliver and the quality of our products. This also applies to the failure of a data center. To achieve the required service quality, we use a quality management system certified to ISO 9001 that also applies to the provision of IT.

In addition, to reduce the risk of failure, we operate several redundantly designed data centers. Likewise, complications with the changeover of IT systems could negatively impact the earnings situation. Close monitoring of critical IT projects serves to mitigate this risk.

Despite the mitigating measures taken and functional continuity plans, the effects of cybercrime or the failure of business-critical IT applications and their influence on the net assets, financial position and results of operations are considered high risks owing to likely and potentially critical negative impacts.

Environmental and safety risks

As a company with global production operations, we are exposed to risks of possible damage to people, goods and our reputation. Audits, consulting and training on environmental protection and occupational health and safety minimize these risks to people and the environment. In order to ensure the continuity of plant and equipment, we monitor these risks both at our own sites as well as at suppliers and contract manufacturers. By adhering to high technical standards, our rules of conduct and all legal requirements in environmental protection and occupational health and safety, we ensure the preservation of goods and assets. We have taken sufficient appropriate accounting measures for the environmental risks known to us. Nevertheless, we classify these as a high risk since a critical negative impact on the financial position cannot be ruled out.

Risks of the divestment, acquisition and integration of companies and businesses

Irrespective of the fact that acquisitions made in the past have been successfully completed, the risk of conducting the acquisition and integration exists for future transactions. This includes, among other things, the inability to meet sales volume targets and higher integration costs than expected, as well as the failure to meet synergy goals. The divestment of companies and businesses can lead to liability vis-à-vis the buyer, for instance through indemnity clauses and guarantee commitments. Through strong due diligence processes and closely managed integration processes, we seek to reduce the probability of occurrence of this risk. Therefore, we classify this as a low risk with an unlikely probability of occurrence and potentially moderate negative effects on the net assets, financial position and results of operations.

Overall view of the risk and opportunity situation and management assessment

Although the number of risks reported is higher than the specific opportunities identified, we consider the distribution of risks and opportunities to be balanced. A balanced overall view is also supported by the fact that net sales and business success are built on a diverse range of pharmaceutical and chemical products for a variety of industries. As the markets differ in their structure and economic cycles, this diversification helps to lower risk.

The most significant individual risks in the businesses have been named in the report above, with business-related risks being the most significant alongside legal risks.

With respect to high and medium risks, certain changes have resulted as the assessment of the individual risks has of course altered over the fiscal year due to changing external and internal conditions, while the overall risk profile remained stable. Thanks to the risk reduction measures taken – such as the consistent implementation of management action (organizational responsibility and process improvements), existing insurance coverage and accounting precautions – we take counteraction, in particular against significant risks.

The overall risk of the Group, which is derived from the probability-weighted aggregation of the identified risks, leads to the assessment that we are not exposed to risk scenarios of a nature to threaten the existence of the Group as a going concern or for which coverage and financing of the losses is questionable. We are confident that we will continue to successfully master the challenges arising from the above risks in the future as well.

In our view, business-related opportunities offer the greatest potential. An important element here is the continuous expansion of our businesses in Asia, Latin America, Africa, and the Middle East. With the successful focusing and continued intensification of our research and development activities, we want to be able to continue to offer our customers innovative products and help shape markets. Moreover, we also consolidate our expertise in numerous alliances with industrial partners as well as various universities and international organizations. We are making targeted investments in future-oriented companies and start-ups via our corporate venture capital Fund and our Accelerator programs. The topic of innovation is at the forefront of all our activities. Externally, this is becoming particularly apparent through our new Innovation Center at Group headquarters in Darmstadt, which is to develop into a nucleus of creativity at our company. The activities listed hold significant opportunities for us in the medium to long term, beyond the underlying forecast period.

We pursue the opportunities that arise and specify their expected effects in the forecast development of our key performance indicators – net sales, EBITDA pre and business free cash flow. Furthermore, we will actively seek new opportunities, examine their implementation and drive them forward where appropriate. If opportunities arise in addition to the forecast developments, or these occur more quickly than anticipated, this could have correspondingly positive effects on our net assets, financial position and results of operations.

Report on Expected Developments

The following report provides a forecast for fiscal 2018 of the development of Merck KGaA, Darmstadt, Germany, and its three business sectors: Healthcare, Life Science and Performance Materials. The forecast again covers our key performance indicators as in the previous year, namely net sales, EBITDA pre and business free cash flow. On September 5, 2017, we announced that strategic options for the Consumer Health business are being examined. This analysis of strategic options had not yet been completed when this report was prepared, and on December 31, 2017 the Executive Board came to the conclusion that a divestment of the Consumer Health business within 12 months is not to be considered as very likely. Therefore, our forecast is based on an unchanged portfolio compared with fiscal 2017.

FORECAST FOR THE GROUP

€ million	Actual results 2017	Forecast for 2018	Key assumptions
Net sales	15,326.6	– Moderate organic growth – Moderately negative foreign exchange effect	– Moderate organic growth in Healthcare due to strong dynamics in growth markets as well as increasing sales of Mavenclad® and Bavencio® – Solid organic growth in Life Science, slightly above expected market growth – Slight to moderate organic decrease in Performance Materials owing to the ongoing adjustment processes in the Liquid Crystals business – Negative foreign exchange effect, driven primarily by the exchange rate of the U.S. dollar and currencies of various growth markets
EBITDA pre	4,414.5	– Slight organic decline – Negative foreign exchange effect of –4% to –6%	– In Healthcare continued high investments in research and development as well as in marketing and sales; absence of positive one-time effects from the previous year – Organic sales growth and continued realization of planned synergies from the integration of Sigma-Aldrich in Life Science – Ongoing adjustment processes in the Liquid Crystals business that will not be offset despite the enhanced diversification of Performance Materials and active cost management – Negative foreign exchange effect, particularly owing to the development of the U.S. dollar and currencies of various growth markets
Business free cash flow	3,318.0	– Low double-digit percentage decline	– Lower EBITDA pre and investments in property, plant and equipment as well as digitalization initiatives, higher inventory levels due to a changed product mix and volume increases

NET SALES

For the Group, in 2018 we expect moderate organic sales growth in comparison with the previous year. With regard to foreign exchange rates, we continue to expect a volatile environment due to political and macroeconomic developments. For the full year, we forecast a moderately negative exchange rate effect on our net sales compared with the previous year, with a greater impact in the first half than in the second half of the year. The estimation for 2018 is based on a €/US$ exchange rate in the range of 1.18–1.22 and further declines in the value of the currencies of various growth markets.

For our Healthcare business sector, we forecast a moderate organic increase in net sales in 2018. Again in 2018, this is expected to be driven mainly by strong dynamics in our growth markets, which should offset the still challenging market environment for Rebif® and continued price pressure in numerous markets. Furthermore, we expect sales of Mavenclad® in the high double-digit million range and of Bavencio® in the mid double-digit million range.

In our Life Science business sector, for 2018 we again predict solid organic growth of net sales, which should be slightly above expected market growth. We see medium-term growth at around 4% per year. We assume that Process Solutions will be the largest growth driver. The expected topline synergies from the Sigma-Aldrich acquisition will contribute to sales growth as planned.

We forecast a slight to moderate organic decline in net sales for our Performance Materials business sector in 2018 compared with 2017. The adjustment processes in our Liquid Crystals business will, as expected, also continue in 2018, leading to significant sales declines. We assume that the expected good sales growth of the other business units will not be able to compensate for this development.

EBITDA PRE

EBITDA pre is our key financial indicator to steer operating business. On a currency-adjusted basis, we forecast a slight percentage decline in EBITDA pre for the Group in 2018 compared with 2017. In addition, based on the above-described currency scenario, however, foreign exchange rates are expected to impact our EBITDA pre by approximately –4% to –6% compared with 2017, which will affect all three business sectors.

For our Healthcare business sector, we forecast a slight percentage decline in organic EBITDA pre; the foreign exchange environment is expected to have a moderately negative impact on EBITDA pre. Owing to the continuous further development of our research pipeline, we are budgeting higher research and development costs compared with 2017. However, this is subject to the development of clinical data and prioritization decisions. Furthermore, the absence of positive one-time effects from the previous year amounting to approximately € 200 million (milestone payments for Bavencio®; one-time payment for future license payments) will have a negative impact.

For our Life Science business sector, in fiscal 2018 we expect a similar dynamic for currency-adjusted growth of EBITDA pre as in the previous year (2017: +8%). Both the expected sales development and the further planned realization of synergies from the Sigma-Aldrich acquisition will contribute to this. However, organic EBITDA pre growth of our Life Science business sector is likely to be lowered by a moderately negative foreign exchange effect.

We assume that in our Performance Materials business sector, the expected good development of the other business units as well as disciplined cost management will once again in 2018 not be able to offset the expected sales and earnings decline in the highly profitable Liquid Crystals business. Consequently, we expect that organic EBITDA pre will decline in the mid-teens percentage range in comparison with 2017. The difficult foreign exchange environment, which hits the Performance Materials business especially hard due to its regional positioning, will have an additional negative impact on the earnings situation.

In our estimation, negative EBITDA pre of Corporate and Other will increase in the low double-digit percentage range in 2018. This development relates to investments in innovation and digitalization initiatives. Previously, these costs were incurred in the business sectors and are now recorded centrally under Corporate and Other. By contrast, expected currency hedging gains should have a compensating effect in 2018.

BUSINESS FREE CASH FLOW

For the business free cash flow of the Group in 2018, we forecast a decline in the low double-digit percentage range, driven by lower EBITDA pre, continued high investments in property, plant and equipment, and higher inventories owing to a changed product mix and higher volumes.

FORECAST FOR OUR HEALTHCARE BUSINESS SECTOR

€ million	Actual results 2017	Forecast for 2018	Key assumptions
Net sales	6,999.0	– Moderate organic growth – Moderately negative foreign exchange effect	– Organic sales growth in growth markets will compensate for the organic decline in Rebif® sales, which is expected to be in the high single-digit percentage range – Continued price pressure in Europe and also in the Asia-Pacific as well as Middle East and Africa regions – Bavencio® and Mavenclad® will contribute visibly to sales growth – Solid organic growth of our Consumer Health business – Negative foreign exchange effect, driven primarily by the exchange rate of the U.S. dollar and currencies of various growth markets
EBITDA pre	1,949.3	– Slight organic decline – Moderately negative foreign exchange effect	– Continued rise in research and development spending due to expected further pipeline development, particularly in immuno-oncology – Increasing marketing and selling expenses – Negative product mix effect due to a decline in sales of Rebif® – Absence of positive one-time effects from 2017 amounting to approximately € 200 million (milestone payments for Bavencio®; one-time payment received for future license payments) – Cost savings owing to the divestment of our Biosimilars business – Increasing earnings contributions from Bavencio® and Mavenclad® – Negative foreign exchange effect, driven primarily by the exchange rate of the U.S. dollar and currencies of various growth markets
Business free cash flow	1,447.9	– Single-digit percentage decline	– Decline in EBITDA pre – Increase in working capital due to product mix effects

NET SALES

For our Healthcare business sector, we expect moderate organic sales growth in 2018. The development of our growth markets in the Latin America, Middle East and Africa, as well as Asia-Pacific regions is expected to contribute to this growth to a large extent. We also assume that the products newly approved in 2017, namely Bavencio® and Mavenclad®, will contribute significantly to growth with sales in the mid double-digit million range and high double-digit million range, respectively. These positive effects should be able to more than offset the expected decline in sales of Rebif® as well as continued price pressure in key markets in Europe, Asia-Pacific, as well as Middle East and Africa. Furthermore, we assume that our Consumer Health business will also contribute to the positive organic sales development. In particular, the U.S. dollar exchange rate and foreign exchange developments in various growth markets should lead to a moderately negative exchange rate effect.

EBITDA PRE

For 2018, we forecast currency-adjusted EBITDA pre of our Healthcare business sector to see a slight percentage decline compared with the previous year. However, the expected negative foreign exchange environment will additionally adversely affect EBITDA pre. Positive one-time effects amounting to approximately € 200 million, which we realized in 2017, will not be incurred in 2018. This includes Bavencio® milestone payments from Pfizer and a one-time payment for future license payments. Continuously rising research and development costs for further pipeline development, particularly in immuno-oncology, will be an additional key driver of the forecast organic development of EBITDA pre. However, this budgeted cost increase will be further updated in the course of the year depending on clinical data and prioritization decisions. We also expect our marketing and selling costs to increase further. In addition, we assume that our product mix will develop unfavorably owing to the expected decline in sales of Rebif®. The divestment of our Biosimilars business in 2017 and the resulting absence of research and development costs as well as increasing contributions from our newly approved products Bavencio® and Mavenclad® will partly offset the expected decline in organic EBITDA pre.

BUSINESS FREE CASH FLOW

In 2018, we expect business free cash flow of our Healthcare business sector to show a single-digit percentage decline. This will be primarily driven by the expected decline in EBITDA pre and the increase in working capital due to product mix effects.

FORECAST FOR OUR LIFE SCIENCE BUSINESS SECTOR

€ million	Actual results 2017	Forecast for 2018	Key assumptions
Net sales	5,881.5	– Solid organic growth, slightly above expected market growth – Moderately negative foreign exchange effect	– Process Solutions is likely to remain the strongest growth driver, followed by Applied Solutions – Research Solutions will also contribute positively to organic sales development, albeit to a smaller extent – No significant portfolio effect from the acquisition of Natrix Separations – Negative foreign exchange effect, particularly owing to the development of the U.S. dollar
EBITDA pre	1,785.8	– Organic earnings growth with a similar dynamic as in 2017 – Moderately negative foreign exchange effect	– Positive development resulting from expected sales growth – Continuation of the planned realization of synergies from the Sigma-Aldrich acquisition – Negative foreign exchange effect, particularly owing to the development of the U.S. dollar
Business free cash flow	1,401.7	– Slightly below the prior-year level	– Improved EBITDA pre – Higher inventories reflect the expected sales growth and changed product mix

NET SALES

For our Life Science business sector, compared with 2017 we forecast further solid organic net sales growth in 2018, which should be slightly above expected market growth. In the medium term, we see annual market growth at approximately 4%. We assume that all business units will contribute positively to organic growth. In 2018, the Process Solutions business unit is again likely to remain the strongest driver of organic growth, followed by Applied Solutions. The Research Solutions business unit should also contribute to the positive sales development, yet to a lesser extent. Additionally, the topline synergies from the Sigma-Aldrich acquisition will contribute to growth as planned. At the end of 2017, we acquired Natrix Separations. The consolidation will not lead to a significant portfolio effect. We assume a moderately negative foreign exchange effect primarily owing to the development of the U.S. dollar.

EBITDA PRE

EBITDA pre of our Life Science business sector in 2018 is likely to see dynamic growth similar to 2017 on a currency-adjusted basis (2017: +8%). This development is in line with the expected development of sales. Furthermore, in 2018 we will assign high priority to continuing the planned realization of cost and sales synergies from the Sigma-Aldrich acquisition. After already having realized synergies of around € 185 million up until 2017, for 2018 we expect further synergies as planned that are likely to have an additional effect of around € 95 million on earnings. We assume that in 2018 we will achieve our planned synergy target of € 280 million for the Sigma-Aldrich acquisition. However, in 2018 organic growth of EBITDA pre of our Life Science business sector is expected to be lowered by moderately negative foreign exchange effects.

BUSINESS FREE CASH FLOW

We expect our Life Science business free cash flow to be slightly below the previous year's level. The higher EBITDA pre will be more than offset by higher inventory levels. These result primarily from expected dynamic sales growth and a changed product mix.

FORECAST FOR OUR PERFORMANCE MATERIALS BUSINESS SECTOR

€ million	Actual results 2017	Forecast for 2018	Key assumptions
Net sales	2,446.0	– Organically slightly to moderately below the year-earlier level – Moderately negative foreign exchange effect	– Volume increase in all businesses; strong dynamics particularly in Advanced Technologies and IC Materials – Market share adjustment and price decline in the Liquid Crystals business – Negative exchange rate effect, especially due to the forecast development of the U.S. dollar and currencies in key Asian markets
EBITDA pre	979.8	– Organic percentage decline in the mid teens range – Moderately negative foreign exchange effect	– The decline in market shares and prices in the Liquid Crystals business cannot be offset by growth of the other businesses and active cost management – Negative foreign exchange effect, particularly owing to the development of the U.S. dollar and currencies in key Asian markets
Business free cash flow	905.8	– Double-digit percentage decline	– Decline in EBITDA pre, sustained high investments in property, plant and equipment and higher inventory levels due to volume increases

NET SALES

We forecast a slight to moderate organic sales decline in our Performance Materials business sector in 2018 compared with 2017. In our estimation, the adjustment processes in our Liquid Crystals business will continue unabated in 2018. This is attributable to the normalization of our market shares, especially in China, which had been unusually high in recent years. This has been recognizable since 2017. Therefore, it is to be expected that the pricing pressure customary in this industry will once again not be offset by the corresponding volume growth in 2018. Despite the meanwhile high degree of diversification of our Performance Materials business sector, in our estimation this development will not be offset by good organic growth in our other business fields. OLED technology (Advanced Technologies) and the semiconductor materials business are expected to show a dynamic development. Due to unfavorable foreign exchange developments, in Performance Materials in 2018 we expect to see a moderately negative foreign exchange effect stemming mainly from the U.S. dollar exchange rate, as well as declines in the value of key Asian currencies.

EBITDA PRE

In 2018, our Performance Materials business sector will probably again be unable to compensate for the expected sales decline in the highly profitable Liquid Crystals business despite the expected good performance of the other business fields as well as high cost discipline. Consequently, we expect that organic EBITDA pre will decline in the mid-teens percentage range in comparison with 2017. The difficult foreign exchange environment, which hits the Performance Materials business especially hard due to its regional positioning, will additionally have a moderately negative impact on the earnings situation.

BUSINESS FREE CASH FLOW

For our Performance Materials business sector, we forecast a decline in business free cash flow in the mid double-digit percentage range. Besides the negative development of EBITDA pre, we expect higher investments in property, plant and equipment as well as high inventory levels due to volume increases.

Summary

For 2018, we expect moderate organic growth of net sales for the Group, which is likely to be driven by the Healthcare and Life Science business sectors. In addition, we assume a moderately negative foreign exchange effect due to the current weakness of the U.S. dollar as well as the development forecast for various currencies in our growth markets. EBITDA pre of the Group is expected to decrease slightly on a currency-adjusted basis in comparison with the previous year. In our Healthcare business sector, we expect a slight organic percentage decline in EBITDA pre. For our Life Science business sector, on a currency-adjusted basis we expect similar growth dynamics of EBITDA pre as in the previous year. For our Performance Materials business sector, we forecast EBITDA pre to decline in the mid-teens percentage range on a currency-adjusted basis. We assume that the currently difficult foreign exchange environment in all three business sectors will lead to a decline in EBITDA pre of between –4% and –6%.

Business free cash flow of the Group is expected to decline in the low double-digit percentage range, above all due to lower EBITDA pre, continuing investments in property, plant and equipment and in digitalization initiatives, as well as higher inventories.

Report in accordance with section 315 (4) of the German Commercial Code (HGB)

The following information is provided in accordance with section 315 (4) of the German Commercial Code and the explanatory report pursuant to section 176 (1) sentence 1 of the German Stock Corporation Act (AktG).

As of the balance sheet date, the company's subscribed capital is divided into 129,242,251 no-par value bearer shares plus one registered share. Each share therefore corresponds to € 1.30 of the share capital. The holder of the registered share is E. Merck Beteiligungen KG, Darmstadt, Germany, a related party of Merck KGaA, Darmstadt, Germany. It is entitled and obliged to appoint one-third of the members of the Supervisory Board representing the limited liability shareholders. If the holder of the registered share is a general partner, he or she has no such right of appointment. The transfer of the registered share requires the company's approval. The approval is granted at the sole discretion of the personally liable general partner with an equity interest, namely E. Merck KG, Darmstadt, Germany.

Pursuant to the information on voting rights submitted to us in accordance with the German Securities Trading Act (WpHG), on December 31, 2017 no shareholders owned direct or indirect investments exceeding more than 10% of the voting rights.

According to the Articles of Association of Merck KGaA, Darmstadt, Germany, the general partners not holding an equity interest who form the Executive Board are admitted by E. Merck KG, Darmstadt, Germany, with the consent of a simple majority of the other general partners. A person may only be a general partner not holding an equity interest if he or she is also a general partner of E. Merck KG, Darmstadt, Germany. In addition, at the proposal of E. Merck KG, Darmstadt, Germany, and with the approval of all general partners not holding an equity interest, further persons who are not general partners not holding an equity interest may be appointed to the Executive Board.

The Articles of Association can be amended by a resolution by the Annual Meeting that requires the approval of the general partners. The resolutions of the General Meeting are, notwithstanding any statutory provisions to the contrary, adopted by a simple majority of the votes cast. Where the law requires a capital majority in addition to the voting majority, resolutions are adopted by a simple majority of the share capital represented in the vote. The Articles of Association of the company encompass authorized and contingent capital.
The Executive Board is authorized to increase the company's share capital with the approval of the Supervisory Board and of E. Merck KG, Darmstadt, Germany, once or repeatedly up to and including April 27, 2022 by up to a total of € 56,521,124.19 by issuing new no-par value bearer shares against cash and/or non-cash contributions ("Authorized Capital 2017"). Limited liability shareholders shall be generally granted the statutory right to subscribe to the new shares.

However, the Executive Board is authorized, with the approval of the Supervisory Board, to exclude the limited liability shareholders' subscription right in full or in part in case of a capital increase against cash contributions pursuant to or by analogous application of section 186 (3) sentence 4 AktG, if the issue price of the new shares is not substantially lower than the stock exchange price of the company's shares already listed and if the new shares which are issued under exclusion of the subscription right do not exceed a proportional amount of 10% of the share capital either at the time of the Authorized Capital 2017 taking effect or at the time of the Authorized Capital 2017 being utilized. This restriction to 10% of the share capital shall include the proportional amount of the share capital that is attributable to shares which are issued under exclusion of the subscription right or sold during the term of the Authorized Capital 2017 based on an authorization to issue new shares or sell own shares by direct or analogous application of section 186 (3) sentence 4 AktG. Further, this restriction shall also include the proportional amount of the share capital that is attributable to shares which may or must be issued in order to service bonds carrying a conversion or option right or a conversion or option obligation, if the bonds are issued during the term of the Authorized Capital 2017 under exclusion of the limited liability shareholders' subscription right by analogous application of section 186 (3) sentence 4 AktG.

It is likewise possible to exclude the subscription right of the limited liability shareholders with the approval of the Supervisory Board in the case of capital increases through non-cash contributions, particularly for the purpose of acquiring enterprises, parts of enterprises or interests in enterprises.

In addition, with the approval of the Supervisory Board, the limited liability shareholders' subscription rights can be excluded in order to enable E. Merck KG, Darmstadt, Germany, to exercise its right pursuant to Article 32 (3) of the Articles of Association of the company to participate in a capital increase by issuing shares or freely transferable share subscription rights.
It is likewise possible to exclude, with the approval of the Supervisory Board, the subscription right of the limited liability shareholders in order to enable E. Merck KG, Darmstadt, Germany, to exercise its right pursuant to Article 33 of the Articles of Association to convert, in full or in part, its equity interest into share capital.

Moreover, with the approval of the Supervisory Board, the subscription right of the limited liability shareholders can be excluded if and to the extent this is necessary to grant the holders or creditors of conversion or option rights and/or the holders or creditors of financing instruments carrying conversion or option obligations, which were or are issued by the company or by a domestic or foreign company in which the company directly or indirectly holds the majority of the votes and capital, a subscription right to the extent to which they would be entitled after the exercise of the conversion or option rights or after the performance of a conversion or option obligation.

Lastly, with the approval of the Supervisory Board, the subscription right of the limited liability shareholders can be excluded in order to exclude fractional amounts from the subscription right.

The sum of shares issued on the basis of the Authorized Capital 2017 under exclusion of the limited liability shareholders' subscription right must not exceed a proportional amount of 20% of the share capital, by taking into account other shares of the company which, during the term of the Authorized Capital 2017, are sold or issued under exclusion of the subscription right or are to be issued under bonds issued after April 28, 2017 under exclusion of the subscription right; this limitation shall apply both at the time of this authorization taking effect and at the time of this authorization being exercised.

To the extent that the subscription right is not excluded under the above provisions, it may also be granted to the limited liability shareholders by way of an indirect subscription right pursuant to section 186 (5) AktG or, in part, by way of a direct subscription right, and otherwise by way of an indirect subscription right pursuant to section 186 (5) AktG.

Furthermore, the Executive Board is authorized, with the approval of the Supervisory Board, to determine the additional details of the capital increase and its implementation, including the content of rights attached to the shares as well as the terms and conditions of the share issue.

The Articles of Association also encompass contingent capital. The share capital is contingently increased by up to € 66,406,298.40 divided into 51,081,768 shares (Contingent Capital I). The contingent capital increase serves to grant exchange rights to E. Merck KG, Darmstadt, Germany, in accordance with Article 33 of the Articles of Association to enable the conversion of its equity interest. The shares carry dividend rights from the beginning of the fiscal year following the year in which the conversion option is exercised.

Moreover, the share capital is contingently increased by up to € 16,801,491.20 composed of up to 12,924,224 no par value bearer shares (Contingent Capital II). This increase in contingent capital is only to be implemented insofar as the bearers or creditors of option or conversion rights or the conversion obligations on warrant bonds, option participation certificates, option participation bonds, convertible bonds, convertible participation certificates or convertible participation bonds issued against contributions that are issued or guaranteed by the company or a subordinate Group company on the basis of the authorization resolution of the Annual General Meeting of May 9, 2014 to May 8, 2019, utilize their option or conversion rights or, to fulfill their conversion obligation insofar as they are obliged to fulfill their conversion obligation, or insofar as the company exercises an option, wholly or in part, of granting shares in the company instead of paying the sum of money due and to the extent that in each case a cash settlement is not granted, or own shares or other forms of fulfillment are used. Each issue of new shares shall take place at the determined option or conversion price, pursuant to the aforementioned authorization resolution. The new shares participate in the profit from the beginning of the fiscal year in which they are created; insofar as this is legally permissible, the Executive Board may, with the approval of the Supervisory Board, and in deviation from section 60 (2) AktG, stipulate that the new shares also participate in the profit for a past fiscal year. The Executive Board is authorized, with the approval of the Supervisory Board and of E. Merck KG, Darmstadt, Germany, to stipulate the further details of the implementation of the increase in contingent capital.

The company is not authorized to acquire its own shares.

The company has not entered into any material agreements subject to a change of control pursuant to a takeover offer nor has it entered into any compensation agreements with the members of the Executive Board or employees in the event of a takeover offer.

Additional information in accordance with the German Commercial Code (HGB)

The management report of Merck KGaA, Darmstadt, Germany, has been combined with the Group management report. The annual financial statements and the combined management reports of the Group and Merck KGaA, Darmstadt, Germany, for 2017 are being filed with the electronic German Federal Gazette (elektronischer Bundesanzeiger) and are available on the website of the German company register.

Statement on Corporate Governance

The Statement on Corporate Governance according to section 289a HGB is contained in the Corporate Governance section of this report.

Effects of company agreements on the net assets, financial position and results of operations

OPERATING ACTIVITIES OF THE BUSINESS SECTORS

As part of the strategic further development of Merck KGaA, Darmstadt, Germany, it is planned to spin off the existing operating activities of the Healthcare, Performance Materials and Life Science business sectors into three separate companies with the legal form of a GmbH or German limited liability corporation (hereinafter: "OpCo" or plural "OpCos"). The spin-off of the business sectors to these OpCo target companies domiciled in Darmstadt must be approved by the General Meeting of Merck KGaA, Darmstadt, Germany, in April 2018. Following approval by the General Meeting, the three business sectors are to be spun off with retroactive effect from January 1, 2018.

Combined control and profit and loss transfer agreements already exist between the respective OpCos. Going forward, these agreements are to remain in effect. Consequently, in the future there will still be one company for corporation tax, trade tax and turnover tax purposes. In the future, each OpCo will be owned by a business-sector-relevant intermediate holding company, each of which is a wholly owned subsidiary of Merck KGaA, Darmstadt, Germany.

Since the technical system requirements to report the business sectors spun off as regards the OpCos are not yet in place, the business sectors spun off are to be temporarily leased back to the Group until the ERP systems of the respective OpCos are introduced. For this purpose, Merck KGaA, Darmstadt, Germany, is entering into a business leasing contract with the respective OpCo with retrospective effect from January 1, 2018. Until the technical system requirements have been implemented, owing to the business lease Merck KGaA, Darmstadt, Germany, will record business transactions in its own name and on its own behalf. Once the ERP systems have been introduced for each OpCo, the business lease will be terminated and the business will be taken over in full.

BUSINESS SPLIT AND TRANSFER TO MERCK REAL ESTATE GMBH, DARMSTADT, GERMANY, A SUBSIDIARY OF MERCK KGAA, DARMSTADT, GERMANY

The real estate and properties of Merck KGaA, Darmstadt, Germany, are rented based on a general rental agreement with effect on December 15, 2017 from Merck KGaA, Darmstadt, Germany to Merck Real Estate GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. A combined control and profit and loss transfer agreement exists between Merck KGaA, Darmstadt, Germany, and Merck Real Estate GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. Therefore, Merck Real Estate GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, is one of the companies in fiscal unity with Merck KGaA, Darmstadt, Germany.

Within the scope of this reorganization, 111 employees of Merck KGaA, Darmstadt, Germany, were taken on by Merck Real Estate GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. The transferred assets and liabilities are presented in the overview at the end of this section. The impact on the income statement of Merck KGaA, Darmstadt, Germany, was only immaterial in 2017.

SEPARATION OF THE CONSUMER HEALTH BUSINESS

By way of the transfer agreement dated August 31, 2017, Merck KGaA, Darmstadt, Germany, transferred to Merck Consumer Health GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, with retroactive effect from January 1, 2017 and via Merck Consumer Health Holding Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, its Consumer Health business along with all the allocable business assets, rights and duties in the course of a so-called chain transfer. The separation serves to prepare the strategic repositioning of the Consumer Health business within the Group.

The operations of Merck Consumer Health GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, were immediately leased back to Merck KGaA, Darmstadt, Germany, after the transfer to Merck KGaA, Darmstadt, Germany. The lease fee amounted to € 1.3 million in 2017. Additionally, the effects on the income statement of the company are not material. Employees were not transferred to Merck Consumer Health GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany.

The following overview presents the assets and liabilities transferred from Merck KGaA, Darmstadt, Germany, to Merck Consumer Health GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, with retroactive effect from January 1, 2017.

€ million	Merck Consumer Health GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany	Merck Real Estate GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany
Transferred assets		
A. Tangible assets		
Software	–	0.0
Buildings	1.4	–
Plant and machinery, other facilities	4.6	0.4
Construction in progress	1.5	–
	7.5	**0.4**
B. Current assets		
Inventories	4.4	–
Trade accounts receivable	0.5	–
Other receivables and other assets	1.4	–
	6.3	**–**
Total assets	**13.8**	**0.4**
Transferred liabilities		
A. Provisions		
Provisions for pensions and other post-employment benefits	–	0.6
Other provisions	1.5	1.4
	1.5	**2.0**
B. Liabilities		
Trade accounts payable	1.0	–
Other liabilities	–	–
	1.0	**–**
Total liabilities	**2.5**	**2.0**
Total transferred assets less liabilities	**11.3**	**–1.6**

Business development

In 2017, Merck KGaA, Darmstadt, Germany, sales increased by € 342 million. The increase resulted from the Healthcare and Life Science business sectors as well as other sales. By contrast, sales of the Performance Materials business sector declined slightly:

			Change	
€ million	**2017**	2016	€ million	in %
Healthcare	2,404	2,232	172	7.7%
Life Science	777	710	67	9.4%
Performance Materials	1,399	1,407	–8	–0.6%
Other sales	228	116	112	96.5%
Total sales	**4,807**	**4,465**	**342**	**7.7%**

Other sales mainly included intragroup cross-charging for IT services and other administration services. The increase was due to higher ongoing costs for IT projects.

The share of sales with other Group companies (Group sales) amounted to 93.6% in 2017 (2016: 91.0%).

			Change	
€ million	**2017**	2016	€ million	in %
Group sales	4,500	4,063	437	10.8%
Sales to third parties	307	402	–95	–23.6%
Total	**4,807**	**4,465**	**342**	**7.7%**

At 90.3% (2016: 89.4%), the share of exports in 2017 was slightly above the previous year's level.

			Change	
€ million	**2017**	2016	€ million	in %
Outside Germany	4,341	3,990	351	8.8%
Germany	467	475	–8	–1.7%
Total	**4,807**	**4,465**	**342**	**7.7%**

In the Healthcare business sector, the increase in sales was primarily due to an agreement on a one-time payment for future license payments. Sales of products, on the other hand, remained almost unchanged. The increase in sales of cardiovascular therapies (+14.8%) was approximately offset by a decline in sales of the oncology drug Erbitux (–7.5%). Thyroid therapies generated a slight rise in sales (+2.5%). Overall, the business sector recorded sales declines in the region of Europe, offset by a sales increase in the Asia-Pacific region.

In Performance Materials, sales by the Display Materials business unit did not reach the previous year's level. The sales increases in the other two business units Pigments & Functional Materials (+10.6%) and Advanced Technologies (+8.3%) did not compensate for this. Sales declines were recorded particularly in the Asia-Pacific region. This was offset by a slight increase in the regions of Europe and North and Latin America.

In 2017, sales by the Life Science business sector increased by 9.4%. Growth was generated by all three business units, whereby Process Solutions accounted for the largest share of growth (+14%). The largest sales increases were recorded in the regions of Europe, North and Latin America, as well as Asia-Pacific.

RESULTS OF OPERATIONS

			Change	
€ million	**2017**	2016	€ million	in %
Sales	4,807	4,465	343	7.7%
Other income	212	185	27	14.3%
Cost of materials	–1,505	–1,488	–17	1.1%
Personnel expenses	–1,258	–1,055	–203	19.2%
Depreciation, amortization, write-downs and impairment losses	–183	–176	–7	4.2%
Other operating expenses	–1,801	–1,726	–75	4.3%
Investment income/Write-downs of financial assets	847	659	188	28.6%
Financial result	–201	–243	41	–17.1%
Profit before profit transfers and taxes	**917**	**621**	**296**	**47.7%**
Profit transfers	–533	–400	–153	38.2%
Taxes	–193	–65	–128	196.9%
Profit after profit transfers and taxes/Net income	**171**	**156**	**15**	**9.8%**

The increase in **other income** was mainly attributable to higher income from increased inventories of work in progress and finished goods.

The **cost of materials** increased slightly. The cost of materials in relation to sales amounted to 31.3% (2016: 33.3%).

The increase in **personnel expenses** was due to higher pension expenses, on the one hand. The increase in pension expenses resulted from an adjustment in 2016 of the actuarial interest rate used for the measurement of pension provisions. Due to the law on implementation of the directive on credit agreements relating to residential immovable property and on the amendment of provisions of commercial law, in 2016 the specified period for measurement of the average market interest rate was extended from seven to ten years. This resulted in lower pension expenses in 2016. On the other hand, wages and salaries increased as a result of the collectively agreed pay increase and the higher number of employees.

Depreciation, amortization, write-downs and impairment losses increased slightly by 4.2% as a result of higher fixed assets.

The rise in **other operating expenses** was due to increased sales and marketing activities as well as higher expenses in connection with provisions for litigation risks.

Investment income improved mainly as a result of a higher dividend payment from Merck Holding GmbH, Gernsheim, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany.

The **financial result** improved overall owing to higher interest income from plan assets, which are offset against the interest component of the addition to pension provisions.

NET ASSETS AND FINANCIAL POSITION

ASSETS

€ million	Dec. 31, 2017	Dec. 31, 2016	Change € million	Change in %
Fixed assets	**18,148**	**17,563**	**585**	**3.3%**
Intangible assets	490	250	240	95.9%
Tangible assets	1,173	1,003	170	16.9%
Financial assets	16,486	16,310	176	1.1%
Current assets	**1,763**	**1,504**	**259**	**17.2%**
Inventories	688	635	53	8.4%
Trade accounts receivable	181	291	–110	–37.7%
Receivables and other assets	892	576	316	54.8%
Cash and cash equivalents	1	2	–1	–50.0%
Prepaid expenses	**28**	**28**	**0**	**0.0%**
	19,940	**19,095**	**845**	**4.4%**

LIABILITIES

€ million	Dec. 31, 2017	Dec. 31, 2016	Change € million	Change in %
Net equity	**5,328**	**5,290**	**38**	**0.7%**
Provisions	**1,312**	**1,034**	**278**	**26.9%**
Provisions for pensions and other post-employment benefits	200	80	120	150.5%
Other provisions	1,112	954	158	16.6%
Liabilities	**13,281**	**12,769**	**512**	**4.0%**
Financial obligations	1,500	1,500	–	0.0%
Trade accounts payable	292	260	32	12.3%
Other liabilities	11,489	11,009	480	4.4%
Deferred income	**18**	**2**	**16**	**800.0%**
	19,940	**19,095**	**845**	**4.4%**

The net assets and financial position of Merck KGaA, Darmstadt, Germany, changed only slightly in comparison with the previous year. With a 4.4% increase in total assets, the equity ratio amounted to 26.7% (2016: 27.7%).

At the Darmstadt site, the construction project to expand global headquarters made further progress. This significantly contributed to the increase in tangible assets.

The increase in financial assets was due to a payment made to the capital reserve of Merck 12. Allgemeine Beteiligungs-GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, in 2017.

The increase in current assets (+€ 259 million) was mainly attributable to higher receivables from affiliates for short-term loans. By contrast, tax receivables declined.

The increase in other provisions (+€ 158 million) was mainly due to higher provisions for income taxes and for legal risks.

The rise in other liabilities resulted primarily from the clearing account with Merck Financial Services GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany.

Research and development

In 2017, research and development spending on projects of Merck KGaA, Darmstadt, Germany, and other Group companies totaled € 685 million (2016: € 751 million). A large portion was also incurred by companies outside the Group. In Darmstadt, Healthcare mainly focuses on oncology as well as autoimmune and inflammatory diseases. The decline of € 75 million in R&D spending by the Healthcare business sector was reflected in the decline of € 66 million in overall R&D spending (–8.8%). At the same time, the Healthcare business sector accounted for 59.6% (2016: 64.3%) and thus the largest proportion of research and development spending. The Performance Materials business sector focuses its research activities on developing new and improved basic materials and mixtures for LC displays, as well as for innovative OLED applications. To strengthen the Pigments business, new effect pigments for the automotive, cosmetics and printing ink sectors have been developed. In the Life Science business sector, research activities focused in particular on technologies for laboratory and life science applications, and new developments were driven forward. These included improved test kits, chromatography methods, substrates for separating active substances, and innovations in the fields of microbiology and hygiene monitoring.

			Change	
€ million	**2017**	2016	€ million	in %
Healthcare	408	483	–75	–15.5%
Life Science	35	39	–4	–10.3%
Performance Materials	220	223	–3	–1.3%
Other R&D spending that cannot be allocated to the individual business sectors	22	6	16	266.7%
Total	**685**	**751**	**–66**	**–8.8%**

The ratio of research and development spending to sales was 14.3% (2016: 16.8%). Overall, the average number of employees working in research and development was 2,515. Merck KGaA, Darmstadt, Germany, is one of the main research sites of the Group, accounting for a share of 32.0% (2016: 38.0%) of total Group research and development spending. The decrease in this share was due on the one hand to lower research and development costs of Merck KGaA, Darmstadt, Germany, and on the other hand to higher research and development costs of the Group.

Dividend

For 2017, we are proposing to the General Meeting the payment of a dividend of € 1.25 per share.

Personnel

As of December 31, 2017, Merck KGaA, Darmstadt, Germany, had 10,677 employees, which was an increase over the previous year (2016: 9,988).

Average number of employees by functional area:

PERSONNEL

Average number of employees during the year	**2017**	2016
Production	3,536	3,270
Administration	3,072	2,881
Research	2,515	2,320
Logistics	648	624
Sales and marketing	574	531
Other	128	118
Total	**10,473**	**9,744**

Risks and opportunities

Merck KGaA, Darmstadt, Germany, is largely subject to the same opportunities and risks as the Group. More information can be found in the Report on Risks and Opportunities.

Forecast for Merck KGaA, Darmstadt, Germany

DEVIATIONS OF ACTUAL BUSINESS DEVELOPMENTS IN 2017 FROM THE PREVIOUSLY REPORTED GUIDANCE:

In 2016, sales were forecast to increase slightly in all three business sectors in fiscal 2017.

The sales increase in the Healthcare business sector (+7.7%) was mainly the result of higher license income. Sales of products increased slightly over the previous year's level as additional sales of cardiovascular therapies (+14.8%) offset the decline in sales of the oncology drug Erbitux (−7.5%).

Sales by the Life Science business sector increased significantly (+9.4%). All business units, Research Solutions (+6.6%), Applied Solutions (+6.7%) and Process Solutions (+14.0%), contributed to sales growth.

Continued high competitive pressure in the Liquid Crystals business led to a slight decline in Performance Materials sales (−0.6%). The decline in the Display Materials business unit (−4.8%) was not fully offset by sales increases in the Pigments & Functional Materials (+10.6%) and Advanced Technologies (+8.3%) business units.

A further rise in net income was mainly due to higher sales and improved investment income. The increase in investment income was mainly attributable to a higher dividend payment from Merck Holding GmbH, Gernsheim, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. On the expenses side, this was offset by higher expenses in connection with legal risks, resulting in an overall increase in net income of 9.8%.

The financial resources for the company continue to be provided by Merck Financial Services GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany.

Forecast 2018

For fiscal 2018, slight sales increases are expected for the Life Science and Healthcare business sectors. Sales by the Performance Materials business sector, however, are expected to decline slightly.

As in 2016, the financing costs of the Sigma-Aldrich acquisition continue to adversely affect net income. Nevertheless, positive investment income and dividend payments from subsidiaries will lead again to a slight increase in net income. Merck Financial Services GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany will provide the company with sufficient financial resources and thus ensure liquidity.

Currently no risks can be identified that could jeopardize the continued existence of the company.

CORPORATE GOVERNANCE

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CORPORATE GOVERNANCE

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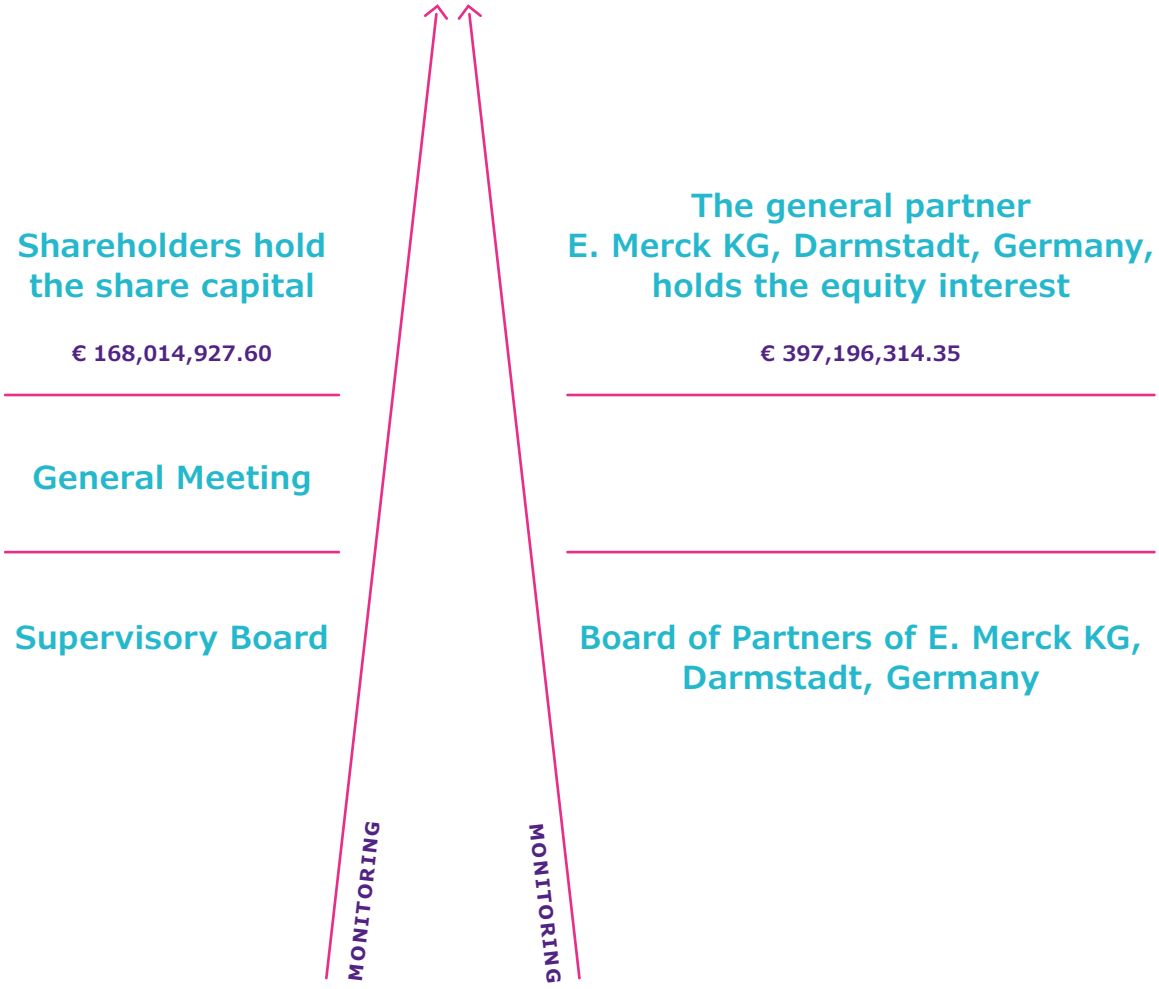
Capital structure and corporate bodies of Merck KGaA, Darmstadt, Germany

Total capital of Merck KGaA, Darmstadt, Germany

€ 565,211,241.95

Executive Board of Merck KGaA, Darmstadt, Germany

General partners with no equity interest



Further information can be found under “Merck KGaA, Darmstadt, Germany” on page 170.

Statement on Corporate Governance

The Statement on Corporate Governance contains the Declaration of Conformity, relevant information on practices within the company, a description of the procedures of the corporate bodies, as well as targets for the percentage of positions held by women as well as the diversity policy.

Joint report of the Executive Board and the Supervisory Board according to section 3.10 of the German Corporate Governance Code including the Declaration of Conformity

The German Corporate Governance Code is geared toward the conditions found in a German stock corporation ("Aktiengesellschaft" or "AG") and does not take into consideration the special characteristics of a corporation with general partners ("Kommanditgesellschaft auf Aktien" or "KGaA") such as Merck KGaA, Darmstadt, Germany. Given the structural differences between an AG and a KGaA, several recommendations of the German Corporate Governance Code are to be applied to a KGaA only in a modified form. Major differences between the two legal forms exist in terms of liability and management. While, in the case of an AG, only the AG is liable as a legal entity, the general partners of a KGaA also have unlimited personal liability for the company's obligations (section 278 (1) of the German Stock Corporation Act – "AktG"). At Merck KGaA, Darmstadt, Germany, this pertains to both E. Merck KG, Darmstadt, Germany, – which pursuant to Article 8 (5) of the Articles of Association is excluded from management and representation – as well as to the managing general partners, who together make up the Executive Board of Merck KGaA, Darmstadt, Germany. The members of the Executive Board of Merck KGaA, Darmstadt, Germany, are therefore subject to unlimited personal liability. Unlike an AG, their executive authority is not conferred by the Supervisory Board, but rather by their status as general partners.

Consequently, in addition to other responsibilities typical of the supervisory board of an AG (see description of the procedures of the Supervisory Board on page 192 et seq.), the supervisory board of a KGaA does not have the authority to appoint the management board, draw up management board contracts or specify compensation of the management board. This legal form also involves special features with regard to the General Meeting. For example, in a KGaA, many of the resolutions made require the consent of the general partners (section 285 (2) AktG), including in particular the adoption of the annual financial statements (section 286 (1) AktG).

Merck KGaA, Darmstadt, Germany, applies the German Corporate Governance Code analogously where these regulations are compatible with the legal form of a KGaA. In order to enable shareholders to compare the situation at other companies more easily, to a broad extent we base corporate governance on the conduct recommendations made by the Government Commission of the German Corporate Governance Code and forego having our own, equally permissible, code. The recommendations of the Code in the past two versions dated May 5, 2015 and February 7, 2017, the intent and meaning of which are applied, were complied with in the period between the last Declaration of Conformity issued on February 24, 2017 with three exceptions. In the future, the recommendations of the Code will again be adhered to with one exception. Further details can be found on page 171.

For a clearer understanding, the following gives a general explanation of the application of German company law at Merck KGaA, Darmstadt, Germany, with additional references to the General Meeting and shareholder rights.

MERCK KGAA, DARMSTADT, GERMANY

The general partner E. Merck KG, Darmstadt, Germany, holds around 70% of the total capital of Merck KGaA, Darmstadt, Germany (equity interest); the shareholders hold the remainder, which is divided into shares (share capital). E. Merck KG, Darmstadt, Germany, is excluded from the management of business activities. The general partners with no equity interest (Executive Board) manage the business activities. Nevertheless, due to its substantial capital investment and unlimited personal liability, E. Merck KG, Darmstadt, Germany, has a strong interest in the businesses of Merck KGaA, Darmstadt, Germany, operating efficiently in compliance with procedures, and exercises its influence accordingly. The participation of Merck KGaA, Darmstadt, Germany, in the profit/loss of E. Merck KG, Darmstadt, Germany, in accordance with Articles 26 et seq. of the Articles of Association further harmonizes the interests of the shareholders and of E. Merck KG, Darmstadt, Germany. E. Merck KG, Darmstadt, Germany, appoints and dismisses the Executive Board. In addition, E. Merck KG, Darmstadt, Germany, has created bodies – complementing the expertise and activities of the Supervisory Board – to monitor and advise the Executive Board. This task applies primarily to the Board of Partners of E. Merck KG, Darmstadt, Germany.

Based on the provisions of the German Stock Corporation Act, the Articles of Association of Merck KGaA, Darmstadt, Germany, and the rules of procedure of the various committees, Merck KGaA, Darmstadt, Germany, has a set of rules for the Executive Board and its supervision that meet the requirements of the German Corporate Governance Code. The investors, who bear the entrepreneurial risk, are protected as provided for by the German Corporate Governance Code.

THE GENERAL MEETING OF MERCK KGAA, DARMSTADT, GERMANY

The twenty-second General Meeting of Merck KGaA, Darmstadt, Germany, was held on April 28, 2017 in Frankfurt am Main, Germany. At 64.03%, the proportion of share capital represented at the meeting was slightly higher than in the previous year. In 2016, the proportion of share capital represented was 61.92%.

In particular, the Annual General Meeting passes resolutions concerning the approval of the annual financial statements, the appropriation of net retained profit, the approval of the actions of the Executive Board members and the Supervisory Board members, as well as the election of the auditor. Changes to the Articles of Association likewise require the adoption of a resolution by the General Meeting. The shareholders of Merck KGaA, Darmstadt, Germany, exercise their rights at the General Meeting. They may exercise their voting rights personally, through an authorized representative or through a proxy appointed by the company. The proxy is in attendance throughout the duration of the General Meeting. All the documents and information concerning upcoming General Meetings (including a summary explanation of shareholder rights) are also posted on our website. Moreover, the General Meeting is webcast live on the Internet from its commencement until the end of the speech by the Chairman of the Executive Board. The introductory speeches by the Chairman of the Executive Board and the Chairman of the Supervisory Board are recorded in order to make them available to interested members of the public at any time after the meeting. In this way, we are satisfying the high transparency requirements of the Group.

DECLARATION OF CONFORMITY

In accordance with section 161 AktG, applying the provisions of the German Corporate Governance Code correspondingly, the Executive Board and the Supervisory Board issued the following Declaration of Conformity with the recommendations of the Government Commission of the German Corporate Governance Code:

"Declaration of the Executive Board and the Supervisory Board of Merck KGaA, Darmstadt, Germany, on the recommendations of the Government Commission of the German Corporate Governance Code pursuant to section 161 AktG.

Since the last Declaration of Conformity on February 24, 2017, we have complied with the recommendations of the Government Commission of the German Corporate Governance Code during the period of validity of the versions dated May 5, 2015 and February 7, 2017 published in the official section of the German Federal Gazette with the following exceptions:

Contrary to section 4.2.5 para 3 sentence 2 of the German Corporate Governance Code, the model tables only show the current service costs; any past service costs are shown in the footnotes. The chosen reporting serves better comparability with other companies and thus the transparency and understandability of the Compensation Report aimed for by the code (see section 4.2.5 para 1 sentence 3 of the German Corporate Governance Code).

Contrary to section 5.3.2 of the German Corporate Governance Code, the Supervisory Board has not established an audit committee. However, an audit committee does exist in the form of the Finance Committee of the Board of Partners of E. Merck KG, Darmstadt, Germany, which to a large extent exercises the duties described in section 5.3.2 of the Code. Due to the relatively limited authority of the supervisory board of a KGaA in comparison with that of an AG, this therefore satisfies the requirements of the German Corporate Governance Code.

Contrary to section 5.4.1 para 2 sentence 1 of the German Corporate Governance Code, previously neither an age limit nor a regular limit on the length of Supervisory Board membership was taken into account when proposing candidates for election to the Supervisory Board. The age and length of membership of Supervisory Board members are not criteria for their qualifications and competence. Therefore, as in the past, we do not wish to forego the many years of experience of Supervisory Board members. Rather, a good balance among Supervisory Board members in terms of age and length of membership is crucial to the successful work of the Supervisory Board. Taking these principles into account, both a limit on age and length of membership shall nevertheless apply.

Contrary to section 7.1.2 sentence 4 of the German Corporate Governance Code, owing to scheduling difficulties, the interim report for the first quarter was only made publicly accessible slightly after the allotted 45-day time limit from the end of the reporting period. In the future, the recommendation shall be complied with in full.

In view of future compliance with the current recommendations of the Government Commission of the German Corporate Governance Code, the Executive Board and the Supervisory Board declare the following: With the exception of the aforementioned deviations from section 5.3.2 (audit committee), the company will comply with the recommendations of the Code in the version dated February 24, 2017."

Darmstadt, February 28, 2018

For the Executive Board	For the Supervisory Board
s. Stefan Oschmann	**s. Wolfgang Büchele**

Compensation report

(The compensation report is part of the audited consolidated financial statements.)

COMPENSATION PHILOSOPHY

As the world's oldest pharmaceutical and chemical company, we attach great importance to responsible governance and entrepreneurship. This is also reflected by the compensation of the members of the Executive Board of Merck KGaA, Darmstadt, Germany. Unlike management board members of stock corporations, they are not merely employed members of a corporate board. Rather, they are personally liable general partners of both Merck KGaA, Darmstadt, Germany, and the general partner E. Merck KG, Darmstadt, Germany, and in this capacity they receive profit sharing from E. Merck KG, Darmstadt, Germany. Owing to the legal form as a KGaA (corporation with general partners), the stipulations of the German Corporate Governance Code concerning the compensation of management board members of publicly listed German stock corporations as well as the individual disclosure thereof do not apply to the Executive Board members of Merck KGaA, Darmstadt, Germany. Nevertheless, we have decided to comply with the requirements of the German Corporate Governance Code.

The compensation paid to the members of the Executive Board takes into account the responsibilities and duties of the individual Executive Board members, their status as personally liable partners, their individual performance, the economic situation, as well as the performance and future prospects of the company.

Furthermore, Executive Board compensation orients towards the external peer environment of Merck KGaA, Darmstadt, Germany, meaning in a comparison with other German blue-chip companies as well as international competitors. The relationship between Executive Board compensation and the compensation of top management and the workforce as a whole continues to be taken into account, also in a multi-year assessment. The Personnel Committee regularly commissions an independent compensation consultant to review the appropriateness of the compensation.

With respect to the specific components of compensation, the setting of individual compensation, the selection of the key performance indicators as well as the definition of payment and allocation rules, the following principles are either followed or taken into consideration:

REGULATORY REQUIREMENTS AND PRINCIPLES OF GOOD CORPORATE GOVERNANCE

The design of the compensation system and the determination of individual compensation orient towards the German Stock Corporation Act and the German Corporate Governance Code. Within the regulatory framework conditions, the objective is to offer the Executive Board members a competitive compensation package in line with market practice.

LONG-TERM GROUP STRATEGY

The execution of the long-term Group strategy is promoted through the selection of appropriate, ambitious key performance indicators for performance-related compensation. Against this background, our performance-related compensation components (profit sharing and the Long-Term Incentive Plan) orient towards the key performance indicators of the Group.

LONG-TERM INTERESTS OF OUR SHAREHOLDERS

The long-term interests of our shareholders are taken into account through a significantly high amount of variable, percentage-related compensation as a proportion of total compensation as well as the compensation system's strong focus on the share price. The performance of the Executive Board members should be properly recognized, with the failure to meet targets leading to a noticeable reduction in performance-related compensation.

In our company, unlike publicly listed German stock corporations, it is not the Supervisory Board, but the Board of Partners of E. Merck KG, Darmstadt, Germany, that decides on the amount and composition of compensation received by our Executive Board members. The Board of Partners has assigned this task to its Personnel Committee. The Personnel Committee is thus primarily responsible for the followings topics as they relate to our Executive Board and the compensation thereof:

- The design and review of performance-independent and performance-related compensation components
- Contents of Executive Board member contracts
- Assumption of honorary offices, board positions and other sideline activities
- Distribution of responsibilities within the Executive Board
- Granting of loans and salary advances

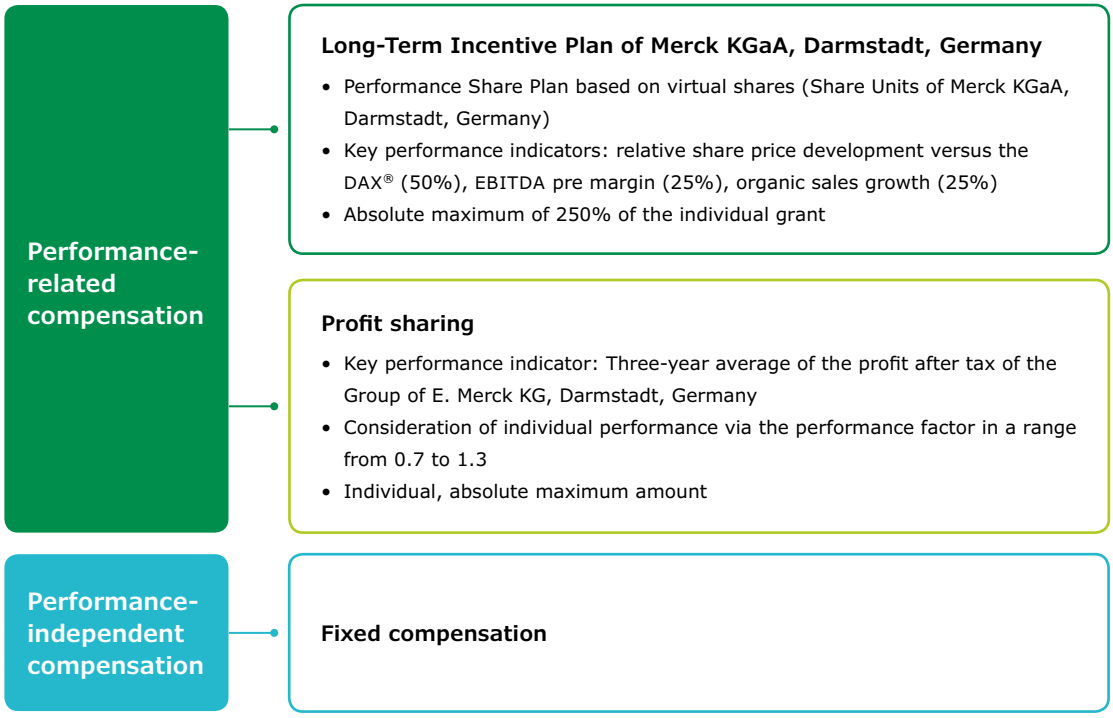
In this context, the Personnel Committee of E. Merck KG, Darmstadt, Germany, has identified the need for change in order to conform even more thoroughly with the new organizational positioning and the principles of sustainable, performance-oriented corporate governance. As of January 1, 2017, the new Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany and the Share Ownership Guideline were introduced. Moreover, the company pensions for Belén Garijo, Kai Beckmann and Marcus Kuhnert were changed from defined-benefit to defined-contribution pension obligations. Furthermore, for profit sharing, the Personnel Committee resolved to individually assess as of 2017 the performance of each Executive Board member using a performance factor ranging from 0.7 to 1.3.

The compensation system for fiscal 2017 was presented to the General Meeting in April 2017 for approval. However, majority approval was not granted. To account for the suggestions made by our shareholders, with support from an independent compensation consultant the compensation system has been further revised with effect from 2018, taking into consideration the regulatory requirements and the internal company strategy. The descriptions of the planned changes to the respective compensation elements can be found in the section entitled "Outlook".

OVERVIEW OF THE STRUCTURE AND THE COMPONENTS OF THE COMPENSATION SYSTEM

The compensation system for the Executive Board basically comprises the three main components fixed compensation, profit sharing and the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany. It is complemented by contributions to the company pension plan as well as additional benefits and possible one-time payments. The components of the compensation system are as follows:

COMPENSATION ELEMENTS AND COMPENSATION STRUCTURE[1]



[1] Excluding additional benefits, company pension and one-time payments.

PERFORMANCE-INDEPENDENT COMPENSATION AND ADDITIONAL BENEFITS

Fixed compensation

The fixed compensation received by the members of the Executive Board comprises firmly agreed and performance-independent amounts that are paid in the form of 12 equivalent monthly installments.

Additional benefits

Moreover, the members of the Executive Board receive performance-independent additional benefits. These consist mainly of contributions to insurance policies, personal security expenses as well as a company car, which they may use privately.

PERFORMANCE-RELATED COMPENSATION

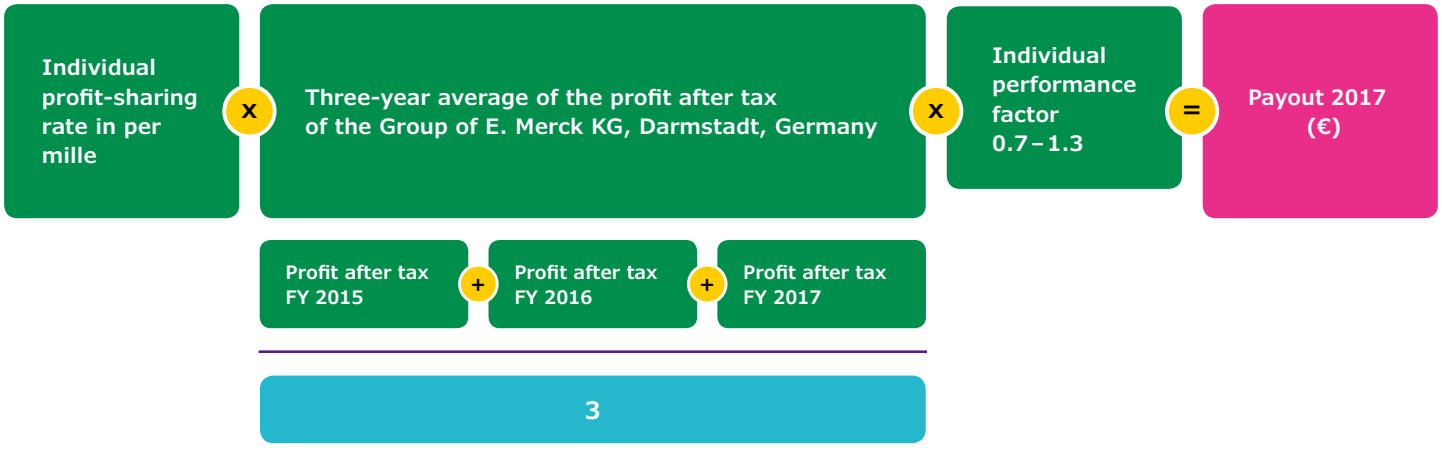
Performance-related compensation comprises **profit sharing** as well as the **Long-Term Incentive Plan**. Both performance-related compensation components are based on multi-year steering parameters. The regulatory requirements of the German Stock Corporation Act and the German Corporate Governance Code are taken into account, and particular recognition is given for sustainable corporate development.

Profit sharing

PROFIT SHARING

Key performance indicator	Three-year average of the profit after tax of the Group of E. Merck KG, Darmstadt, Germany
Period	Three years
Limit	Individual, absolute maximum amount

Within the scope of profit sharing, at the end of a fiscal year the members of the Executive Board receive individually fixed per mille rates based on the three-year average of the profit after tax of the Group of E. Merck KG, Darmstadt, Germany. The current and the two preceding years are included in the calculation. The Personnel Committee of E. Merck KG, Darmstadt, Germany, decides at its equitable discretion whether to consider exceptional factors of particular importance. The use of profit after tax as the key performance indicator, which also serves as the basis for dividend payments, ensures very close alignment with the shareholder interests. The amount of the individually fixed per mille profit-sharing rates is staggered by intervals. Through staggering, the achievement of an average profit after tax of more than € 1 billion is more strongly incentivized than amounts below € 1 billion. However, insofar as the average profit after tax is more than € 1.5 billion, the amount greater than € 1.5 billion is not taken into account when determining profit sharing. To appropriately take into account the individual performance of the Executive Board members, since fiscal 2017 the Personnel Committee has been able to adjust the payment by applying a factor ranging from 0.7 to 1.3. The performance factor makes it possible to recognize superb performance of a member of the Executive Board by multiplying profit sharing by a value greater than 1.0 up to 1.3. Similarly, multiplying by a value less than 1 down to 0.7 can lower profit sharing if the case calls for it. The maximum profit-sharing payment is set individually.



One-time payments until the end of fiscal 2017

Until the end of 2017 E. Merck KG, Darmstadt, Germany, had the possibility in exceptional cases to grant at its own or equitable discretion set amounts for one-time payments to the Personnel Committee responsible for the compensation of Executive Board members. One-time payments made it possible to recognize outstanding performance or successes of an Executive Board member that had a significantly positive economic impact on the Group.

Outlook for fiscal 2018:
For fiscal 2018, the Personnel Committee decided to eliminate the contractually stipulated possibility of one-time payments to members of the Executive Board within the scope of performance-related compensation. This adjustment measure serves primarily to take our international shareholder structure into account.

Moreover, the Personnel Committee resolved to define criteria applicable to the adjustment of profit sharing by applying the factor in a range of between 0.7 and 1.3. Insofar as the adjustment increases or decreases the profit sharing of a member of the Executive Board, this is to be published in the Compensation Report.

Adjustment criteria for increasing profit sharing could include the following:
- Extraordinary success in connection with M&A activities of the Group;
- Extraordinary success in the sustainable strategic, technical, product-related or structural further development or reorganization of the Group;
- Extraordinary performance in the execution of especially important projects or the achievement of other exceptionally important objectives in the area of responsibility;
- Extraordinary performance leading to a clear overachievement of targets for relevant key performance indicators in the area of responsibility;
- Extraordinary contributions to meeting the expectations and objectives of our stakeholders (for example employee satisfaction, customer satisfaction, Corporate Social Responsibility, implementation of diversity requirements).

Adjustment criteria for lowering profit sharing could include the following:
- Violations of internal rules and regulations (for instance our Code of Conduct), laws or other binding external requirements in the area of responsibility; or
- Significant breaches of duty of care within the meaning of section 93 of the German Stock Corporation Act or other grossly non-compliant or unethical behavior; or
- Behaviors or actions that are contradictory to our company values; or
- Failure to execute especially important projects or failing to achieve other exceptionally important objectives in the area of responsibility; or
- Clear failure to achieve targets for relevant key performance indicators in the area of responsibility.

Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany

LONG-TERM INCENTIVE PLAN OF MERCK KGAA, DARMSTADT, GERMANY (LTIP)

Key performance indicators	• Relative share price development vs. the DAX® (5% weighting) • EBITDA pre margin (25% weighting) • Organic sales growth (25% weighting)
Cycle	Three years
Limit	Absolute maximum amounting to 250% of the individual grant
Reference price (share price for conversion into numbers or for payment)	Average closing price of shares of Merck KGaA, Darmstadt, Germany, in Xetra® trading during the last 60 trading days prior to the beginning or the end of the performance cycle

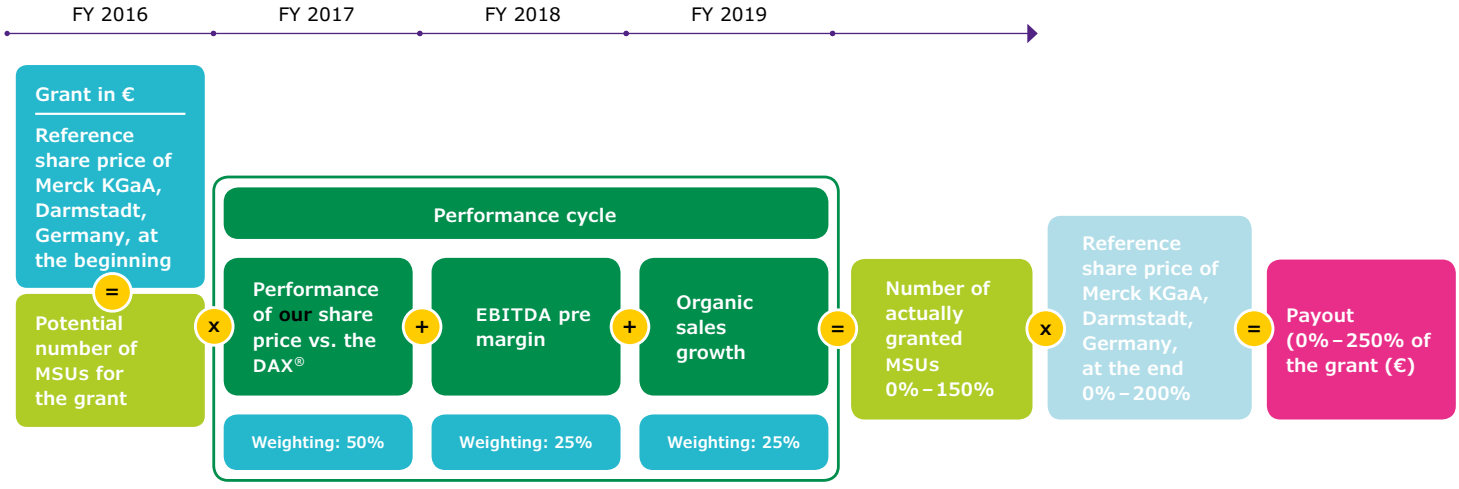
The LTIP is based on a three-year performance, future-oriented performance cycle. Consequently, this meets the new recommendation added to the German Corporate Governance Code dated February 7, 2017 according to which the multi-year assessment basis of variable compensation components is to essentially have forward-looking aspects.

As part of the LTIP, the members of the Executive Board are eligible to receive a certain number of virtual shares – Share Units of Merck KGaA, Darmstadt, Germany (MSUs). The number of MSUs is calculated as follows:

At the beginning of the performance cycle, for each Executive Board member the Personnel Committee sets an individual grant in euros. This grant is then divided by the definitive reference share price at the beginning of the performance cycle, resulting in the number of MSUs they could be eligible to receive.

The final number of MSUs that are actually allocated to the Executive Board members after the performance cycle has expired depends on the development of three weighted key performance indicators over the three-year performance cycle:

a) the performance of the share price of Merck KGaA, Darmstadt, Germany, compared with the performance of the DAX® with a weighting of 50%,
b) EBITDA pre margin, as a proportion of a defined target value with a weighting of 25%, and
c) The organic sales growth of the Group as a proportion of a defined target value with a weighting of 25%.



The Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, thus links two key performance indicators derived from the strategy with an external, relative key performance indicator. On the one hand, this creates an incentive to achieve strategic objectives. On the other hand, the stronger share price orientation takes into account the company's long-term development prospects and the expectations of our shareholders. To prevent distortions as a result of exceptional factors as well as to directly reflect the performance of the Executive Board members, the EBITDA pre margin is used.

Depending on the development of the KPIs, after the end of the three-year performance cycle the members of the Executive Board are definitively allocated between 0% and 150% of the MSUs they could be eligible to receive. The value of these MSUs is paid out to the Executive Board in the year after the three-year performance cycle has ended. For this, the final allocated number of MSUs it multiplied by the definitive reference share price at the end of the performance cycle. The maximum increase in the share price is limited to 200% of the reference price at the beginning of the performance cycle, thus limiting participation in external effects that contribute to share price increases. Apart from setting a limit on the final number of allocated MSUs and on the applicable share price increase, the overall LTIP payment is limited to 250% of the individual grant. If targets are clearly missed, it is also possible that absolutely no payment is made from the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany (0%).

Outlook: Introduction of the clawback rule
Through their status as personally liable general partners of Merck KGaA, Darmstadt, Germany, and of the general partner E. Merck KG, Darmstadt, Germany, the Executive Board members bear a very unique entrepreneurial responsibility. This is also reflected by the penalty criteria set forth in profit sharing and by the German statutory regulations on liability for damages stipulated in section 93 of the German Stock Corporation Act.

To incentivize the extent of entrepreneurial responsibility and personal liability above and beyond this, effective January 1, 2018 a clawback clause has been added to the LTIP rules. This makes it possible to withhold already allocated grants from the LTIP. Use can be made of this possibility in cases such as violations of internal rules and regulations (for instance our Code of Conduct), laws or other binding external requirements in the area of responsibility; significant breaches of duty of care within the meaning of section 93 of the German Stock Corporation Act; grossly non-compliant or unethical behavior; or behaviors or actions that are contradictory to our company values.

Outlook: Subsequent disclosure of the performance corridor
To further increase the transparency of the Executive Board compensation system, in the future the performance corridor for the key performance indicators used in the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, will be subsequently disclosed. However, the company will continue to refrain from publishing this performance corridor in advance as this could permit market- and competitively relevant conclusions to be drawn about strategic objectives.

Share Ownership Guideline
A Share Ownership Guideline was introduced in 2017. This obligates the Executive Board members, for the duration of their employment relationship, to permanently hold shares of Merck KGaA, Darmstadt, Germany, in an amount equal to 100% of their annual gross fixed compensation. Owing to his position as Chairman of the Executive Board, Stefan Oschmann is obligated to hold a higher amount, or 200% of his annual gross fixed compensation, in shares of Merck KGaA, Darmstadt, Germany. The duty to provide evidence of the complete number of shares must be met no later than on expiration of four years after having joined the Executive Board or after the introduction of the rule. The Share Ownership Guideline promotes even stronger alignment between the interests of the Executive Board members and those of our shareholders and it additionally raises the entrepreneurial responsibility of the Executive Board members. Moreover, the introduction of the Share Ownership Guideline takes into account the widespread practice of share ownership among management and executive board members in international peer comparisons.

OVERALL COMPENSATION LIMIT

Compensation amounts are limited not only in terms of the performance-related components of one-time payments, profit sharing and the Long Term Incentive Plan of Merck KGaA, Darmstadt, Germany, but also overall. The maximum limits are presented in the following table:

Executive Board member	Fixed compensation (€ thousand)	Maximum one-time payment (€ thousand)	Maximum profit sharing limit (€ thousand)	Maximum limit Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany (€ thousand)	Maximum limit Overall compensation (€ thousand)
Stefan Oschmann	1,300	2,000	3,700	5,638	**9,800**
Udit Batra	1,000	1,500	2,800	4,263	**8,000**
Kai Beckmann	1,000	1,500	2,400	3,575	**8,000**
Walter Galinat	800	1,500	2,200	3,300	**8,000**
Belén Garijo	1,100	1,500	3,000	4,675	**8,000**
Marcus Kuhnert	800	1,500	2,200	3,300	**8,000**

PENSION OBLIGATIONS

Effective January 1, 2017, for the Executive Board members Kai Beckmann, Belén Garijo, and Marcus Kuhnert the individual contractual pension agreements were changed from defined-benefit to defined-contribution pension obligations, maintaining the direct commitment modality[1]. A defined-contribution pension agreement is also in place with Udit Batra. Within the scope of these defined-contribution pension obligations, every year an amount of € 400,000 is paid into a benefit account and interest is paid on this at standard market interest rates. Once the respective Executive Board members reach the contractually agreed age limit and are no longer employed by E. Merck KG, Darmstadt, Germany, the amount in the benefit account is paid out either in ten annual installments or as a one-time payment. The balance in the benefit account is disbursed as a one-time payment, possibly topped up by additional contributions (maximally ten contributions, up to the age of 60) in the event of permanent disability, or in the event or death to surviving dependents. The vested amount from the former defined-benefit pension agreement was credited to the benefit account when the changeover took place.

A defined-benefit pension obligation remains in place for Stefan Oschmann and Walter Galinat. The old-age pension is determined in accordance with a certain percentage of pensionable compensation. The percentages can be found in the table below. The individual contractual pension obligations grant Stefan Oschmann and Walter Galinat entitlement to a lifelong old-age pension or surviving dependents' pension in the event of reaching the individual contractually agreed age limit, permanent disability, or death. As an alternative to an old-age pension, the possibility also exists for the pension obligation to be paid out as a lump sum calculated in accordance with actuarial principles on reaching the individual contractually agreed age limit.

Moreover, surviving dependents of the two Executive Board members receive a surviving dependents' pension. For spouses, this amounts to 60% of the pension entitlement. Dependent children are entitled to either a half-orphan's or an orphan's pension maximally until the age of 25.

[1] For accounting purposes, this corresponds to a defined-benefit obligation within the meaning of IAS 19.8.

The contribution amounts or pensionable compensation and the percentage obligation as well as the pension provisions and service costs are listed in the following tables:

Defined-contribution obligations

		IFRS			
	Contribution level	Service cost of pension obligations earned in the current year		Present value of the defined-contribution pension obligation as of Dec. 31	
€ thousand		2016	**2017**	2016	**2017**
Executive Board members as of Dec. 31, 2017					
Udit Batra	400	254	379	254	633
Kai Beckmann[1]	400	205	396	5,948	3,977
Belén Garijo[2]	400	688	398	1,501	4,162
Marcus Kuhnert[3]	400	315	426	868	2,512
Total	**1,600**	**1,462**	**1,599**	**8,571**	**11,284**

[1] For 2017, in addition to current service costs of € 396 thousand, there were past service benefits of € 2,424 thousand (total service benefits: € 2,028 thousand).
[2] For 2017, in addition to current service costs of € 398 thousand, there were past service costs of € 2,184 thousand (total service cost: € 2,582 thousand).
[3] For 2017, in addition to current service costs of € 426 thousand, there were past service costs of € 1,178 thousand (total service cost: € 1,604 thousand).

Defined-benefit obligations

			IFRS			
	Pensionable compensation	Percentage entitlement	Service cost of pension obligations earned in the current year		Present value of the defined-benefit pension obligation as of Dec. 31	
€ thousand			2016	**2017**	2016	**2017**
Executive Board members as of Dec. 31, 2017						
Stefan Oschmann[1]	750	62	852	1,401	8,584	9,802
Walter Galinat	490	65	157	168	6,857	6,958
Total	**1,240**		**1,009**	**1,569**	**15,441**	**16,760**

[1] For 2016, in addition to current service costs of € 852 thousand, there were past service costs of € 3,506 thousand (total service cost: € 4,358 thousand) due to the increase in the pensionable compensation and percentage entitlement in connection with the appointment as Chairman of the Executive Board. The percentage entitlement for Stefan Oschmann increases as of 2017 until retirement by two percentage points per year of service up to 70%.

BENEFITS IN THE EVENT OF TERMINATION OF DUTIES AS AN EXECUTIVE BOARD MEMBER

In the event of the early termination of the employment relationship, without notice for good cause, the employment contracts of the Executive Board members stipulate a cap on severance pay in accordance with the recommendation of the German Corporate Governance Code. Pursuant to this, payments in connection with the termination of an Executive Board member's duties shall not exceed twice the annual total compensation or constitute compensation for more than the remaining term of the employment contract (severance cap).

If an Executive Board member's duties prematurely end due to the termination of the employment contract either by the company or the Executive Board member before the performance cycle of an open tranche in the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, expires, the obligations resulting from the plan are no longer applicable.

The employment contracts of Stefan Oschmann, Kai Beckmann and Udit Batra each contain a post-contractual non-competition clause. As compensation for each year of the two-year non-competition period, an amount equal to 50% of the average contractual benefits paid to the respective Executive Board member within the past 12 months prior to leaving the company shall be provided. During the period of the non-competition clause, other employment income and pension payments will be credited to this compensation. Within certain time limits, E. Merck KG, Darmstadt, Germany, has the possibility to dispense with adherence to the non-competition clause with the consequence that the obligation to make the compensation payments shall no longer exist. Owing to the non-competition clause, Karl-Ludwig Kley received compensation of € 936 thousand for 2016 and € 234 thousand for 2017.

The contracts of the Executive Board members further provide for the continued payment of fixed compensation to surviving dependents for a limited period of time in the event of death. Above and beyond existing pension obligations, no further obligations exist in the event of the termination of the contractual relationships of the Executive Board members.

LOANS AND ADVANCES

In 2017, the members of the Executive Board received no advances or loans.

PAYMENTS TO FORMER EXECUTIVE BOARD MEMBERS AND THEIR SURVIVING DEPENDENTS

Payments to former members of the Executive Board or their surviving dependents are made for a limited period of time and represent continued payment of fixed compensation in the event of death as well as pension payments. In fiscal 2017, these amounted to € 12,786 thousand (2016: € 11,850 thousand). Pension provisions for 2017 amounted to € 152,973 thousand (2016: € 143,073 thousand).

MISCELLANEOUS

The total compensation of the Executive Board of Merck KGaA, Darmstadt, Germany, includes both the compensation received from E. Merck KG, Darmstadt, Germany, as well as possibly also from subsidiaries consolidated in the Group financial statements. Should members of the Executive Board be held liable for financial losses while executing their duties, under certain circumstances this liability risk is covered by a D&O insurance policy from Merck KGaA, Darmstadt, Germany. The D&O insurance policy has a deductible in accordance with the legal requirements and the recommendations of the German Corporate Governance Code.

PERFORMANCE-RELATED COMPENSATION IN 2017

The compensation system for our Executive Board is geared to suitably rewarding the performance of Executive Board members in terms of sustainable corporate development and the creation of shareholder value whereas the failure to meet targets leads to a noticeable decrease in performance-related compensation. In response to the suggestions from our shareholders and to further increase the transparency of the Executive Board compensation system, the following tables present the average individual profit-sharing rates and the performance corridors for the key performance indicators used in the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany.

Profit sharing

Within the scope of profit sharing, at the end of a fiscal year the members of the Executive Board receive individually fixed per mille rates based on the three-year average of the profit after tax of the Group of E. Merck KG, Darmstadt, Germany. The current and the two preceding years are relevant here.

Key performance indicator (€ million)	2014	2015	2016	**2017**
Profit after tax of the Group of E. Merck KG, Darmstadt, Germany	1,104	1,066	1,559	2,549
Three-year average of the profit after tax of the Group of E. Merck KG, Darmstadt, Germany (2014 – 2016)		1,243		–
Three-year average of the profit after tax of the Group of E. Merck KG, Darmstadt, Germany (2015 – 2017)	–		1,724	

The amount of the individually fixed per mille profit-sharing rates is staggered by intervals. This staggering incentivizes the achievement of an average profit after tax of more than € 1 billion more strongly than amounts below € 1 billion. However, insofar as the average profit after tax is more than € 1.5 billion, the amount greater than € 1.5 billion is not taken into account when determining the profit-sharing payment. The average profit-sharing rates in per mille for the members of the Executive Board in 2016 and 2017 were as follows:

Member of the Executive Board	**Average profit-sharing rate in per mille 2017**	**Performance factor for individual performance 2017**
Stefan Oschmann	2.15	1
Udit Batra	1.63	1
Kai Beckmann	1.39	1
Walter Galinat	1.28	1
Belén Garijo	1.74	1
Marcus Kuhnert	1.28	1

In fiscal 2017, the individual performance factor was not used to adjust profit sharing.

Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany
Until the beginning of fiscal 2017, payment from the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, was based on the achievement of specific targets with respect to the development of the share price of Merck KGaA, Darmstadt, Germany, compared with the DAX® as well as the development of the EBITDA pre margin during the three-year performance cycle. The following table presents the target values that lead to 100% target achievement relative to the respective key performance indicator. Below the lower target corridor limit, target achievement for the respective KPI is 0%. Above the upper target corridor limit, target achievement no longer increases.

Key performance indicator[1]	Lower target corridor limit	Target	Upper target corridor limit	Actually achieved value LTIP of Merck KGaA, Darmstadt, Germany, tranche 2013	Target achievement LTIP of Merck KGaA, Darmstadt, Germany, tranche 2013
Share price development relative to the DAX® (external key performance indicator)	–20%	0%	50%	30.4%	130.5%
EBITDA pre margin (internal key performance indicator)	24%	27%	30%	28.8%	130.1%

[1] The key performance indicator organic sales growth became a component of the Long-Term Incentive Plan of Merck KGaA, DArmstadt, Germany, in 2017 and is therefore not relevant for target achievement of the tranche in fiscal 2013.

Key performance indicator[1]	Lower target corridor limit	Target	Upper target corridor limit	Actually achieved value LTIP of Merck KGaA, Darmstadt, Germany, tranche 2014	Target achievement LTIP of Merck KGaA, Darmstadt, Germany, tranche 2014
Share price development relative to the DAX® (external key performance indicator)	–20%	0%	50%	36.3%	136.3%
EBITDA pre margin (internal key performance indicator)	25%	28%	31%	29.6%	126.7%

[1] The key performance indicator organic sales growth became a component of the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, in 2017 and is therefore not relevant for target achievement of the tranche in fiscal 2014.

TOTAL COMPENSATION

Pursuant to the German Commercial Code (HGB), the total compensation of the members of the Executive Board of Merck KGaA, Darmstadt, Germany, is as follows, broken down by performance-independent and performance-related compensation components:

		Performance-independent components		Performance-related components				Total	Expense (+)/ Income (–) recorded in the period for share-based compensation[3]
		Fixed compensation	Additional benefits	Profit sharing (without a long-term incentive effect)	Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany (with a long-term incentive effect)				
		(€ thousand)	(€ thousand)	(€ thousand)	Grant value (€ thousand)	Number of MSUs[1]	Time value[2] (€ thousand)	(€ thousand)	(€ thousand)
Current members									
Stefan Oschmann	2017	1,300	164	3,700	2,255	23,581	2,146	7,310	–375
	2016	1,267	24	3,278	2,000	22,748	1,549	6,118	2,279
Udit Batra (since April 30, 2016)	2017	1,000	12	2,800	1,705	17,830	1,623	5,435	–335
	2016	667	4	1,398	1,700	19,336	1,316	3,385	648
Kai Beckmann	2017	1,000	36	2,400	1,430	14,954	1,361	4,797	–388
	2016	1,000	31	2,238	1,430	16,265	1,107	4,376	2,062
Walter Galinat (since April 30, 2016)	2017	800	32	2,200	1,320	13,804	1,256	4,288	91
	2016	533	50	1,098	1,150	13,081	891	2,572	438
Belén Garijo	2017	1,100	49	3,000	1,870	19,555	1,779	5,928	–376
	2016	1,067	6	2,683	1,700	19,336	1,316	5,072	840
Marcus Kuhnert	2017	800	21	2,200	1,320	13,804	1,256	4,277	–385
	2016	800	20	1,956	1,320	15,014	1,022	3,798	1,518
Karl-Ludwig Kley (until August 31, 2016)	2017	–	–	–	–	–	–	–	–
	2016	867	14	2,756	1,500	17,061	1,162	4,799	2,847
Bernd Reckmann (until April 29, 2016)	2017	–	–	–	–	–	–	–	–
	2016	400	17	1,353	1,000	11,374	774	2,544	1,898
Total	**2017**	**6,000**	**314**	**16,300**	**9,900**	**103,528**	**9,421**	**32,035**	**–1,768**
	2016	**6,601**	**166**	**16,760**	**11,800**	**134,215**	**9,137**	**32,664**	**12,530**

[1] Number of the potential MSUs subject to target achievement. For details see page 175/176 et seq. The actual number of MSUs to be granted after the expiration of the three-year performance cycle may deviate from this.

[2] Time value on the date of the grant (date of the legally binding entitlement). The amount of a payment is thus not predefined. Payment is subject to target achievement and is only made on a specified date after the expiration of the three-year performance cycle. The time value of the obligations was calculated using a Monte Carlo simulation based on the previously described KPIs. The expected volatilities are based on the implicit volatility of shares of Merck KGaA, Darmstadt, Germany, and the DAX® in accordance with the remaining term of the LTIP tranche. The dividend payments incorporated into the valuation model orient towards medium-term dividend expectations.

[3] In accordance with IFRS the expense recorded for 2017 includes the values for the 2015, 2016 and 2017 LTIP tranches. In accordance with IFRS the expense recorded for 2016 includes the values for the 2014, 2015 and 2016 LTIP tranches.

INFORMATION IN ACCORDANCE WITH THE REQUIREMENTS OF THE GERMAN CORPORATE GOVERNANCE CODE

In accordance with the requirements of the German Corporate Governance Code, the following tables present the compensation granted for 2017, including additional benefits and the achievable minimum and maximum values of the variable compensation components, as well as the allocation of the respective compensation components for fiscal 2017.

BENEFITS GRANTED FOR THE FISCAL YEAR

	Stefan Oschmann				Udit Batra			
	Chairman of the Executive Board				Member of the Executive Board			
Benefits granted (€ thousand)	2016	**2017**	**2017 (min.)**	**2017 (max.)**	2016	**2017**	**2017 (min.)**	**2017 (max.)**
Fixed compensation	1,267	1,300	1,300	1,300	667	1,000	1,000	1,000
Additional benefits	24	164	164	164	4	12	12	12
Total	**1,291**	**1,464**	**1,464**	**1,464**	**671**	**1,012**	**1,012**	**1,012**
Profit sharing	3,278	3,700	–	3,700	1,398	2,800	–	2,800
Multi-year variable compensation								
LTI 2016 (2016 to 2018)	1,549	–	–	–	1,316	–	–	–
LTI 2017 (2017 to 2019)	–	2,146	–	5,638	–	1,623	–	4,263
Total	**6,118**	**7,310**	**1,464**	**10,802**	**3,385**	**5,435**	**1,012**	**8,075**
Current service cost[1]	852	1,401	1,401	1,401	254	379	379	379
Total compensation	**6,970**	**8,711**	**2,865**	**12,203**	**3,639**	**5,814**	**1,391**	**8,454**

	Kai Beckmann				Walter Galinat			
	Member of the Executive Board				Member of the Executive Board			
Benefits granted (€ thousand)	2016	**2017**	**2017 (min.)**	**2017 (max.)**	2016	**2017**	**2017 (min.)**	**2017 (max.)**
Fixed compensation	1,000	1,000	1,000	1,000	533	800	800	800
Additional benefits	31	36	36	36	50	32	32	32
Total	**1,031**	**1,036**	**1,036**	**1,036**	**583**	**832**	**832**	**832**
Profit sharing	2,238	2,400	–	2,400	1,098	2,200	–	2,200
Multi-year variable compensation								
LTI 2016 (2016 to 2018)	1,107	–	–	–	891	–	–	–
LTI 2017 (2017 to 2019)	–	1,361	–	3,575	–	1,256	–	3,300
Total	**4,376**	**4,797**	**1,036**	**7,011**	**2,572**	**4,288**	**832**	**6,332**
Current service cost[1]	205	396	396	396	157	168	168	168
Total compensation	**4,581**	**5,193**	**1,432**	**7,407**	**2,729**	**4,456**	**1,000**	**6,500**

[1] For 2016, in addition to current service costs of € 852 thousand, there were past service costs of € 3,506 thousand (total service cost: € 4,358 thousand) for Stefan Oschmann due to the increase in the pensionable compensation and percentage entitlement in connection with his appointment as Chairman of the Executive Board.
For 2017, in addition to the current service costs of € 396 thousand, there were past service benefits of € 2,424 thousand (total service benefits: € 2,028 thousand) for Kai Beckmann.

	Belén Garijo				Marcus Kuhnert			
	Member of the Executive Board				Member of the Executive Board			
Benefits granted (€ thousand)	2016	**2017**	**2017 (min.)**	**2017 (max.)**	2016	**2017**	**2017 (min.)**	**2017 (max.)**
Fixed compensation	1,067	1,100	1,100	1,100	800	800	800	800
Additional benefits	6	49	49	49	20	21	21	21
Total	**1,073**	**1,149**	**1,149**	**1,149**	**820**	**821**	**821**	**821**
Profit sharing	2,683	3,000	–	3,000	1,956	2,200	–	2,200
Multi-year variable compensation								
LTI 2016 (2016 to 2018)	1,316	–	–	–	1,022	–	–	–
LTI 2017 (2017 to 2019)	–	1,779	–	4,675	–	1,256	–	3,300
Total	**5,072**	**5,928**	**1,149**	**8,824**	**3,798**	**4,277**	**821**	**6,321**
Current service cost[1]	688	398	398	398	315	426	426	426
Total compensation	**5,760**	**6,326**	**1,547**	**9,222**	**4,113**	**4,703**	**1,247**	**6,747**

	Karl-Ludwig Kley				Bernd Reckmann			
	Member of the Executive Board				Member of the Executive Board			
	left on: August 31, 2016				left on: April 29, 2016			
Benefits granted (€ thousand)	2016	**2017**	**2017 (min.)**	**2017 (max.)**	2016	**2017**	**2017 (min.)**	**2017 (max.)**
Fixed compensation	867	–	–	–	400	–	–	–
Additional benefits	14	–	–	–	17	–	–	–
Total	**881**	–	–	–	**417**	–	–	–
Profit sharing	2,756	–	–	–	1,353	–	–	–
Multi-year variable compensation								
LTI 2016 (2016 to 2018)	1,162	–	–	–	774	–	–	–
LTI 2017 (2017 to 2019)	–	–	–	–	–	–	–	–
Total	**4,799**	–	–	–	**2,544**	–	–	–
Current service cost	–	–	–	–	346	–	–	–
Total compensation	**4,799**	–	–	–	**2,890**	–	–	–

[1] For 2017, in addition to current service costs of € 398 thousand there were past service costs of € 2,184 thousand (total service cost: € 2,582 thousand) for Belen Garijo.
For 2017, in addition to current service costs of € 426 thousand, there were past service costs of € 1,178 thousand (total service cost: € 1,604 thousand) for Marcus Kuhnert.

ALLOCATION FOR THE FISCAL YEAR

	Stefan Oschmann		Udit Batra		Kai Beckmann	
	Chairman of the Executive Board		Member of the Executive Board		Member of the Executive Board	
Allocation (€ thousand)	2016	**2017**	2016	**2017**	2016	**2017**
Fixed compensation	1,267	1,300	667	1,000	1,000	1,000
Additional benefits	24	164	4	12	31	36
Total	**1,291**	**1,464**	**671**	**1,012**	**1,031**	**1,036**
Profit sharing	3,278	3,700	1,398	2,800	2,238	2,400
Multi-year variable compensation						
LTI 2013 (2013 to 2015)	2,290	–		–	2,290	–
LTI 2014 (2014 to 2016)	–	2,077	–	402	–	2,077
Total	**6,859**	**7,241**	**2,069**	**4,214**	**5,559**	**5,513**
Current service cost[1]	853	1,401	254	379	205	396
Total compensation	**7,712**	**8,642**	**2,323**	**4,593**	**5,764**	**5,909**

	Walter Galinat		Belén Garijo		Marcus Kuhnert	
	Member of the Executive Board		Member of the Executive Board		Member of the Executive Board	
Allocation (€ thousand)	2016	**2017**	2016	**2017**	2016	**2017**
Fixed compensation	533	800	1,067	1,100	800	800
Additional benefits	50	32	6	49	20	21
Total	**583**	**832**	**1,073**	**1,149**	**820**	**821**
Profit sharing	1,098	2,200	2,683	3,000	1,956	2,200
Multi-year variable compensation						
LTI 2013 (2013 to 2015)	–	–	292	–		
LTI 2014 (2014 to 2016)		140	–	1,194	–	866
Total	**1,681**	**3,172**	**4,048**	**5,343**	**2,776**	**3,887**
Current service cost[1]	157	168	688	398	315	426
Total compensation	**1,838**	**3,340**	**4,736**	**5,741**	**3,091**	**4,313**

	Karl-Ludwig Kley		Bernd Reckmann	
	Member of the Executive Board		Member of the Executive Board	
	left on: August 31, 2016		left on: April 29, 2016	
Allocation (€ thousand)	2016	**2017**	2016	**2017**
Fixed compensation	867	–	400	–
Additional benefits	14	–	17	–
Total	**881**	–	**417**	–
Profit sharing	2,756	–	1,353	–
Multi-year variable compensation				
LTI 2013 (2013 to 2015)	3,435	–	2,290	–
LTI 2014 (2014 to 2016)	–	2,769	–	2,077
Total	**7,072**	–	**4,060**	–
Current service cost	–	–	346	–
Total compensation	**7,072**	2,769	**4,406**	2,077

[1] For 2016, in addition to current service costs of € 852 thousand, there were past service costs of € 3,506 thousand (total service cost: € 4,358 thousand) for Stefan Oschmann due to the increase in the pensionable compensation and percentage entitlement in connection with his appointment as Chairman of the Executive Board.
For 2017, in addition to current service costs of € 396 thousand, there were past service benefits of € 2,424 thousand (total service benefits: € 2,028 thousand) for Kai Beckmann.
For 2017, in addition to current service costs of € 398 thousand, there were past service costs of € 2,184 thousand (total service cost: € 2,582 thousand) for Belén Garijo.
For 2017, in addition to current service costs of € 426 thousand, there were past service costs of € 1,178 thousand (total service cost: € 1,604 thousand) for Marcus Kuhnert.

COMPENSATION OF THE SUPERVISORY BOARD MEMBERS OF MERCK KGAA, DARMSTADT, GERMANY

The compensation of the Supervisory Board members is defined by Article 20 of the Articles of Association of Merck KGaA, Darmstadt, Germany. The members of the Supervisory Board receive annual fixed compensation of € 47,000. The Chairman receives double and the Vice Chairman receives one and a half times this amount. Moreover, the members receive additional compensation of € 750 per meeting. The individual values are presented in the following table:

	Fixed compensation		Compensation for meeting attendance		Total compensation	
in €	**2017**	2016	**2017**	2016	**2017**	2016
Wolfgang Büchele (Chairman)	94,000.00	94,000.00	3,000.00	3,000.00	97,000.00	97,000.00
Michael Fletterich (Vice Chairman)	70,500.00	70,500.00	3,000.00	3,000.00	73,500.00	73,500.00
Crocifissa Attardo	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Mechthild Auge	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Gabriele Eismann	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Edeltraud Glänzer	47,000.00	47,000.00	2,250.00	3,000.00	49,250.00	50,000.00
Michaela Freifrau von Glenck	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Siegfried Karjetta	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Albrecht Merck	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Dietmar Oeter	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Alexander Putz	47,000.00	47,000.00	2,250.00	2,250.00	49,250.00	49,250.00
Helga Rübsamen-Schaeff	47,000.00	47,000.00	2,250.00	2,250.00	49,250.00	49,250.00
Karl-Heinz Scheider[1]	0.00	23,500.00	0.00	1,500.00	0.00	25,000.00
Gregor Schulz	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Theo Siegert	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Tobias Thelen	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Veit Ulshöfer[2]	47,000.00	23,500.00	3,000.00	1,500.00	50,000.00	25,000.00
Total	**822,500.00**	**822,500.00**	**45,750.00**	**46,500.00**	**868,250.00**	**869,000.00**

[1] Until June 30, 2016.
[2] Since July 1, 2016.

As a member of corporate bodies of E. Merck KG, Darmstadt, Germany, Supervisory Board member Wolfgang Büchele received an additional payment of € 140,000 for performing this function in 2017 (2016: € 140,000).
As a member of corporate bodies of E. Merck KG, Darmstadt, Germany, Supervisory Board member Michaela Freifrau von Glenck received an additional payment of € 80,000 for performing this function in 2017 (2016: € 80,000).
As a member of corporate bodies of E. Merck KG, Darmstadt, Germany, Supervisory Board member Siegfried Karjetta received an additional payment of € 140,000 for performing this function in 2017 (2016: € 140,000).
As a member of corporate bodies of E. Merck KG, Darmstadt, Germany, Supervisory Board member Albrecht Merck received an additional payment of € 120,000 for performing this function in 2017 (2016: € 120,000).
As a member of corporate bodies of E. Merck KG, Darmstadt, Germany, Supervisory Board member Helga Rübsamen-Schaeff received an additional payment of € 150,000 for performing this function in 2017 (2016: € 150,000).
As a member of corporate bodies of E. Merck KG, Darmstadt, Germany, Supervisory Board member Gregor Schulz received an additional payment of € 140,000 for performing this function in 2017 (2016: € 140,000).
As a member of corporate bodies of E. Merck KG, Darmstadt, Germany, Supervisory Board member Theo Siegert received an additional payment of € 150,000 for performing this function in 2017 (2016: € 150,000).
As a member of corporate bodies of E. Merck KG, Darmstadt, Germany, Supervisory Board member Tobias Thelen received an additional payment of € 140,000 for performing this function in 2017 (2016: € 140,000).

OWNERSHIP, PURCHASE OR SALE OF SHARES IN THE COMPANY BY MEMBERS OF THE EXECUTIVE BOARD AND OF THE SUPERVISORY BOARD

As of December 31, 2017, the members of the Executive Board and of the Supervisory Board either directly or indirectly held 116,447 shares of Merck KGaA, Darmstadt, Germany. Their total ownership represents less than 1% of the issued shares of Merck KGaA, Darmstadt, Germany. Transactions executed by members of the Executive Board and of the Supervisory Board are disclosed on our website at www.emdgroup.com/en/investors/corporate-governance/directors-dealings.html.

Information on corporate governance practices

REPORTING

It is the objective of Merck KGaA, Darmstadt, Germany, to provide the latest information to all shareholders, media, financial analysts and interested members of the public, while creating the greatest possible transparency. For this reason, we use a wide range of communication platforms to engage in a timely dialogue with all interested parties about the situation of the company and business changes. Our principles include providing factually correct, comprehensive and fair information.

Information subject to disclosure requirements, as well as information that is not, can be accessed worldwide on the Merck KGaA, Darmstadt, Germany, website (www.emdgroup.com), which is the company's most important publication platform. Apart from a detailed financial calendar, quarterly statements and/or quarterly and half-year financial reports covering the past three years are available here in German and English. In addition, in line with the legal requirements, ad hoc announcements are published on the website. These contain information on circumstances and facts that could impact the share price of Merck KGaA, Darmstadt, Germany.

Regular press conferences, investor meetings on the occasion of investor conferences as well as road shows offer another platform for dialogue. The company presentations prepared for this purpose are also available on the Merck KGaA, Darmstadt, Germany, website. In addition, the Investor Relations team is always available to private and institutional investors who wish to receive further information.

To ensure the greatest possible transparency, all documents concerning the General Meeting are available on the company website. Additionally, some parts of the General Meeting are webcast live on the Internet.

DEALING WITH INSIDER INFORMATION

Dealing properly with insider information is very important to us. Our insider committee examines the existence of insider information, ensures compliance with legal obligations and prepares any necessary measures. The members of the insider committee are appointed by the Executive Board; at least two members work in Group Legal & Compliance. The insider committee meets at regular intervals, yet also meets when circumstances require. The Chief Financial Officer is vested with the authority to make the final decision on handling potential insider information.

In order to ensure a high level of protection for insider information, in 2011 the Executive Board issued internal insider guidelines applicable throughout the Group worldwide. The guidelines inform employees about their responsibilities under insider trading laws and give clear instructions for compliant behavior. In addition, they describe the function of the insider committee in detail. Moreover, our Code of Conduct, which is binding on all employees, also contains an explicit, detailed reference to the ban on using insider information. Within the scope of obligatory training courses on the Code of Conduct as well as specific training courses on insider law, all employees are instructed on the stipulations of insider trading.

ACCOUNTING AND AUDITS OF FINANCIAL STATEMENTS

Merck KGaA, Darmstadt, Germany, prepares its consolidated financial statements and combined management report in accordance with International Financial Reporting Standards (IFRS), as applicable in the EU, as well as the supplementary rules applicable under section 315e (1) of the German Commercial Code (HGB) and as stipulated by our Articles of Association. The consolidated financial statements and the combined management report are prepared by the Executive Board and examined by an auditor, taking into account the generally accepted standards for the audit of financial statements promulgated by the Institute of Public Auditors in Germany (Institut der Wirtschaftsprüfer – IDW).

The Supervisory Board commissioned KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, to audit the consolidated financial statements and the combined management report for 2017. Moreover, the Supervisory Board agreed with KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, that the auditor shall inform the Supervisory Board without delay of any grounds for disqualification or bias occurring during the audit if these cannot be immediately rectified. Additionally, the auditor shall immediately report to the Supervisory Board any findings and issues which emerge during the audit that have a direct bearing upon the tasks of the Supervisory Board. The auditor shall inform the Supervisory Board or note in the audit report any circumstances determined during the audit that would render inaccurate the Declaration of Conformity made by the Executive Board and the Supervisory Board. It has also been agreed with the auditor that in order to assess whether the Executive Board has fulfilled its obligations in accordance with section 91 (2) AktG, the audit will also cover the company's early warning risk identification system. Moreover, the auditor is required to examine and evaluate the accounting-relevant internal control system insofar as this is necessary and appropriate for assessing the accuracy of financial reporting.

Since 1995, KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, has been the audit firm for the statutory audit of the annual financial statements and consolidated financial statements of Merck KGaA, Darmstadt, Germany. The auditor responsible for auditing the consolidated financial statements changes regularly in accordance with the statutory requirements. Bodo Rackwitz is currently leading the audit engagement and has been the auditor in charge of the engagement since fiscal 2015. The Supervisory Board had KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, provide a statement regarding the scope of the business, financial, personal, and other relationships between KPMG AG, its bodies and head auditors, and Merck KGaA, Darmstadt, Germany, its Group companies and the members of their bodies (independence declaration). The statement also covers the scope of the services provided by KPMG AG in the previous fiscal year as well as the services (other than auditing services) that are contracted for the upcoming year (especially consultancy services) for Merck KGaA, Darmstadt, Germany, and its subsidiaries. Having examined the declaration, the Supervisory Board has found no grounds to doubt the independence of KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin. Neither party identified any conflicts of interest.

FURTHER REPORTS

The combined management report of Merck KGaA, Darmstadt, Germany, and the Group does not contain a non-financial declaration. Instead, we prepare a separate, combined non-financial (Group) report, which we issue pursuant to sections 289b – 289e and 315b – 315c HGB. This is available effective April 27, 2018 as an online version on our website at http://reports.emdgroup.com/2017/cr-report/. It is integrated into the 2017 Corporate Responsibility Report in accordance with DRS 20 subsection 252 (b). We have prepared an overview of the information contained in the combined non-financial (Group) declaration at https://www.emdgroup.com/nfr17.

The report on gender and salary equality pursuant to section 21 in conjunction with sections 25 and 22 of the German Transparency of Pay Act for fiscal 2016 is included as an appendix to the combined management report of Merck KGaA, Darmstadt, Germany.

VALUES AND COMPLIANCE

Based on a corporate culture that places the fundamental company values – courage, achievement, responsibility, respect, integrity and transparency – at the center of our entrepreneurial actions, our Code of Conduct (https://www.emdgroup.com/en/company/who-we-are/mission-strategy-and-values.html) helps those involved in the business process to implement the values when dealing with one another on a daily basis.

With its Code of Conduct, a revised version of which was issued at the end of 2017, our company has established a set of rules and regulations intended to help our employees to act responsibly and to make the right decisions in their daily work.

The Code of Conduct explains the company principles for dealings with business associates, shareholders, colleagues and employees and within the scope of our responsibility for society. Thus, it supports all employees in acting ethically – not only in their dealings with one another, but also outside the company. The Code of Conduct is thus the main set of rules of our compliance program. In the newly published version, we have aligned our Code of Conduct even more closely with our company values. Additionally, it has expanded the Code of Conduct to include further important topics such as data privacy, Healthcare compliance and bioethics.

To us, compliance means observing legal and company internal regulations and the basic ethical principles anchored in the company values. With the Code of Conduct and the various unit-specific ethical compliance rules, the values are integrated into daily work and business practice. The Code of Conduct is binding on all employees, both at headquarters and in the subsidiaries. We also expect our business associates worldwide to accept these principles or to have their own comparable principles. While supplier management ensures compliant behavior of suppliers, global business partner risk management encompasses the relations with sales-related business associates such as distributors and wholesalers.

The Compliance Office monitors observance of the Code of Conduct with support from corresponding monitoring and training programs throughout the Group. All employees are called upon to report potential compliance violations to their supervisor, Legal, HR or other relevant departments. Our company created the position of Group Compliance Officer in 2002. This employee is responsible for setting up, maintaining and further developing our global compliance program. By taking appropriate measures, the Group Compliance Officer and his team, including regional compliance officers, help to lower the risk of serious legal violations of, for instance, anti-trust law, anticorruption rules, or legal regulations and requirements of industry codes in the healthcare sector.

In 2014, we began appointing compliance officers for the various business sectors. In particular, they are responsible for business-specific compliance input and they evaluate sector-specific risks that are incorporated in the design of the Compliance program.

A further focal area of the Compliance program is ensuring legally and ethically correct dealings with medical professionals and adhering to the transparency requirements. Since October 2013, the Group Compliance Officer has agreed extensive measures with the affected areas of the company in order to establish an internal framework of rules as well as the corresponding approval and documentation processes that ensure correct publication. We of course also ensure compliance with the respectively valid data protection regulations.

The role of the Group Compliance Officer is reflected in the subsidiaries, which ensure via country representatives that compliance measures are implemented in the countries. Since 2013, Compliance tasks in the countries and on a regional basis have largely been performed by full-time compliance officers. As a result, a higher level of compliance expertise is based locally and the increasing tasks in all business sectors are taken into account. At the same time, the management structure was streamlined and the reporting lines for the countries were consolidated regionally. Since the end of 2016, the compliance officers in the countries have been reporting to the dedicated compliance officers for the respective business sectors (Healthcare, Life Science and Performance Materials). A separate responsibility was also created for Group functions. Regular regional compliance meetings are held to promote the exchange of information within the Compliance organization.

Newcomer training seminars were introduced in 2010 for newly appointed compliance officers. These seminars serve to build up compliance expertise and strengthen cooperation within the Compliance organization. This Group-wide network is used to steer the global compliance program.

Within the Group Compliance function in Darmstadt, a team is occupied with continuously further developing the compliance program and shaping company-internal compliance projects. In addition, the Compliance organization is involved in the integration of new businesses and in the event of potential divestments and acquisitions. It is also part of the relevant due diligence processes and the subsequent integration of a company.

Within the scope of the global compliance program, a high degree of importance is attached to regular compliance seminars of our Compliance Training Plan, which are conducted as Web-based training courses and classroom sessions. By presenting various training topics, particularly on the Code of Conduct, corruption, antitrust and competition law as well as healthcare compliance and data privacy, they serve to sensitize employees and management to the consequences of compliance violations and to show ways of avoiding them.

Since we set up a central SpeakUp line, employees and certain business partners have been able to report compliance violations by telephone or via a Web-based application in their respective national language. The SpeakUp line is available 24 hours a day, free of charge. Case numbers enable anonymous, two-way communication. The reports received are individually reviewed. If a compliance violation exists, corresponding corrective action is taken based on concrete action plans. If necessary, disciplinary measures are taken. These can range from a simple warning up to the dismissal of the employee who violated a compliance rule. In 2010, we set up a Compliance Case Committee to guide these processes. The Compliance Case Committee consists of leaders from various Group governance functions; they are involved in reviewing compliance violations and introducing countermeasures. The joint work in the Compliance Case Committee enables processes between the various Group functions to be optimally coordinated and designed efficiently.

Further significant elements of the Compliance program include requirements on locally identifying and assessing risks and reporting these, both within the subsidiary abroad and to the Group functions. Group Compliance regularly reviews and assesses the implementation status of the Compliance program at the subsidiaries abroad. In cooperation with Group Internal Auditing, the Compliance Office regularly reviews the implementation of Group-wide compliance measures at the subsidiaries abroad. The audits regularly focus on the local compliance structure, the compliance measures taken, as well as the existence of corresponding compliance guidelines and processes.

The Compliance Office reports regularly to the Executive Board and the Supervisory Board, informing them of the status of compliance activities (including training status), compliance risks and serious compliance violations.

The Executive Board informs the supervisory bodies at least once a year about the key compliance issues.

RISK AND OPPORTUNITY MANAGEMENT

The Executive Board, the Supervisory Board and the Finance Committee are regularly informed about the current risk portfolio of the Group and the individual companies. More detailed information can be found in the Report on Risks and Opportunities on page 140 et seq.

AVOIDANCE OF CONFLICTS OF INTEREST

Within the framework of their work, all Executive Board and Supervisory Board members of Merck KGaA, Darmstadt, Germany, are exclusively committed to the interests of the company and neither pursue personal interests nor grant unjustified advantages to third parties.

Before an Executive Board member takes on honorary offices, board positions or other sideline activities, this must be approved by the Personnel Committee of the Board of Partners of E. Merck KG, Darmstadt, Germany. The Chairman of the Executive Board, Stefan Oschmann, and the Chief Financial Officer, Marcus Kuhnert, are both members of the Executive Board of E. Merck KG, Darmstadt, Germany. This does not, however, create conflicts of interest.

In its report to the General Meeting, the Supervisory Board discloses any conflicts of interest involving its members and how they were dealt with. Consultancy agreements as well as other service and work contracts of a Supervisory Board member with Group members require the approval of the Supervisory Board. In fiscal 2017, there were neither conflicts of interest nor consultancy agreements or other service or work contracts with Merck KGaA, Darmstadt, Germany, involving Supervisory Board members.

ADHERENCE TO ENVIRONMENTAL AND SAFETY STANDARDS

At our company, closed-loop thinking guides the way in which we address environmental concerns and environmental protection issues. To this end, we integrate precautionary measures into our planning processes. Our Environment, Health and Safety Policy with its principles and strategies implements the guidelines formulated by the national and international associations of the chemical industry in the Responsible Care guidelines. The Responsible Care Global Charter developed by the International Council of Chemical Associations (ICCA) in 2006 puts even more emphasis than before on overall responsibility for products, supply chains and the community. We signed this expanded version of Responsible Care for the entire Group in February 2007. In addition, our company was one of the first companies in 2014 to sign the new version of the Responsible Care Global Charter, which is currently being rolled out by our company internationally. We report our ecological, economic and social performance transparently in accordance with the internationally recognized principles of the Global Reporting Initiative (GRI), taking into account the requirements of the German Sustainability Code and the principles of the UN Global Compact.

One of our major climate protection objectives is to achieve a 20% reduction in our greenhouse gas emissions by 2020 measured against the 2006 baseline.

Many guidelines specify how the sites and employees of the Group are to observe the principles in their daily work. The Group function Environment, Health, Safety, Security & Quality steers these global activities and ensures compliance with regulatory requirements, standards and business needs throughout the entire Group. In this way, Group-wide risks are minimized and continuous improvement is promoted in the areas of Environment, Health, Safety, Security and Quality. Corporate Responsibility reports are also published at regular intervals.

Procedures of the Executive Board, Supervisory Board, Board of Partners and its Committees

MEMBERS OF THE EXECUTIVE BOARD OF MERCK KGAA, DARMSTADT, GERMANY

Information on memberships of statutory supervisory boards and comparable German and foreign supervisory bodies (section 285 No. 10 HGB in conjunction with section 125 (1) sentence 5 AktG).

Member	Memberships of (a) statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Stefan Oschmann Munich, Chairman	no board positions
Udit Batra Wellesley, Massachusetts (USA), CEO Life Science	(b) – EMD Millipore Corporation, Billerica, Massachusetts (USA) (President)
Kai Beckmann Darmstadt, CEO Performance Materials	(a) – Bundesdruckerei GmbH, Berlin
Walter Galinat Eppertshausen, Member of the Executive Board	no board positions
Belén Garijo Frankfurt am Main, CEO Healthcare	(b) – Banco Bilbao Vizcaya Argentaria S.A., Bilbao, Spain – L'Oréal S.A., Clichy, France
Marcus Kuhnert Königstein, Chief Financial Officer	no board positions

The general partners with no equity interest (Executive Board) manage the business activities in accordance with the laws, the Articles of Association and the rules of procedure. They are appointed by E. Merck KG, Darmstadt, Germany, in accordance with the consent of a simple majority of the other general partners. The members of the Executive Board are jointly responsible for the entire management of the company. Certain tasks are assigned to individual Executive Board members based on a responsibility distribution plan. Each Executive Board member promptly informs the other members of any important actions or operations in his respective business area. The Executive Board is responsible for preparing the annual financial statements of Merck KGaA, Darmstadt, Germany, and of the Group as well as for approving the quarterly and half-year financial statements of the Group. In addition, the Executive Board ensures that all legal provisions, official regulations and the company's internal policies are abided by, and works to achieve compliance with them by all the companies of the Group. A Group-wide guideline defines in detail which transactions require prior Executive Board approval.

The Executive Board provides the Supervisory Board with regular, up-to-date and comprehensive reports about all company-relevant issues concerning strategy, planning, business developments, the risk situation, risk management and compliance. The rules of procedure of the Executive Board and of the Supervisory Board as well as a Supervisory Board resolution regulate further details on the information and reporting duties of the Executive Board vis-à-vis the Supervisory Board.

The Executive Board informs the Board of Partners and the Supervisory Board at least quarterly of the progress of business and the situation of the company. In addition, the Executive Board informs the aforementioned boards at least annually of the company's annual plans and strategic considerations.

The Executive Board passes its resolutions in meetings that are normally held once a month.

SUPERVISORY BOARD

Member	Memberships of (a) other statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Wolfgang Büchele Munich, Managing Director M+W Group GmbH, Stuttgart	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] – Kemira Oyj, Helsinki, Finland
Michael Fletterich Gernsheim, Chairman of the Works Council of Merck KGaA, Darmstadt, Germany, Darmstadt/Gernsheim, Vice Chairman	no board positions
Crocifissa Attardo Darmstadt, Full-time member of the Works Council of Merck KGaA, Darmstadt, Germany, Darmstadt/Gernsheim	b) – BKK of Merck KGaA, Darmstadt, Germany[1] (rotating chairperson)
Mechthild Auge Wehrheim, Full-time member of the Works Council of Merck KGaA, Darmstadt, Germany, Darmstadt/Gernsheim	no board positions
Gabriele Eismann Seeheim-Jugenheim, Senior Operational Product Manager	no board positions
Edeltraud Glänzer Hannover, Vice Chairperson of IG Bergbau, Chemie, Energie (IG BCE), Hannover	(a) – B. Braun Melsungen AG, Melsungen – Evonik Industries AG, Essen (Vice Chairperson)
Michaela Freifrau von Glenck Zurich, Switzerland, Retired teacher	no board positions
Siegfried Karjetta[2] Darmstadt, Physician	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Albrecht Merck Schriesheim, Commercial Director of the Castel Peter Winery, Bad Dürkheim	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Dietmar Oeter Seeheim-Jugenheim, Vice President Corporate Quality Assurance	no board positions
Alexander Putz Michelstadt, Full-time member of the Works Council of Merck KGaA, Darmstadt, Germany, Darmstadt/Gernsheim	no board positions
Helga Rübsamen-Schaeff Langenburg, Chairperson of the Advisory Board of AiCuris Antiinfective Cures GmbH, Wuppertal	(a) – 4SC AG, Martinsried – Supervisory Board of Bonn University Hospital (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Gregor Schulz Umkirch, Pediatrician	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Theo Siegert Düsseldorf, Managing Partner of de Haen-Carstanjen & Söhne, Düsseldorf	(a) – E.ON SE, Düsseldorf – Henkel AG & Co KGaA, Düsseldorf (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] – DKSH Holding Ltd., Zurich, Switzerland
Tobias Thelen[2] Munich, Managing Partner of Altmann Analytik GmbH & Co. KG, Munich	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1]
Veit Ulshöfer Sachsenheim, Global Head of Research and Bioinformatics	no board positions

[1] Internal board position.
[2] Members appointed according to Article 6 (5) of the Articles of Association.

The Supervisory Board performs a monitoring function. It supervises the management of the company by the Executive Board. In comparison with the supervisory board of a German stock corporation, the role of the supervisory board of a corporation with general partners (KGaA) is limited. This is due to the fact that the members of the Executive Board are personally liable partners and therefore are themselves responsible for the management of the company. In particular, the Supervisory Board is not responsible for appointing and dismissing general partners or for regulating the terms and conditions of their contracts. This is the responsibility of E. Merck KG, Darmstadt, Germany. Nor does the Supervisory Board have the authority to issue rules of procedure for the Executive Board or a catalogue of business transactions requiring approval. This authority likewise belongs to E. Merck KG, Darmstadt, Germany (Article 13 (3) sentence 1 and (4) sentence 1 of the Articles of Association). However, the fact that the Supervisory Board has no possibilities to directly influence the Executive Board restricts neither its information rights nor audit duties.

The Supervisory Board must monitor the Executive Board in terms of legality, regularity, usefulness, and economic efficiency. In particular, the Supervisory Board has the duty to examine the reports provided by the Executive Board. This includes regular reports on the intended business policy, as well as other fundamental issues pertaining to corporate planning, especially financial, investment and HR planning; the profitability of the Group; the progress of business; the risk situation; risk management (including compliance); and the internal auditing system. In addition, by means of consultation with the Executive Board, it creates the basis for supervision of the management of the company by the Supervisory Board according to section 111 (1) of the German Stock Corporation Act (AktG).

The Supervisory Board examines the annual financial statements as well as the consolidated financial statements and the combined management report, taking into account in each case the reports of the auditor. Moreover, the Supervisory Board discusses the quarterly releases and the half-year financial report, taking into account in the latter case the report of the auditor on the audit review of the abridged financial statements and the interim management report of the Group. The adoption of the annual financial statements is not the responsibility of the Supervisory Board, but of the General Meeting. The Supervisory Board normally meets four times a year. Further meetings may be convened if requested by a member of either the Supervisory Board or the Executive Board. As a rule, resolutions of the Supervisory Board are passed at meetings. At the instruction of the chairman, in exceptional cases a resolution may be passed by other means, details of which are given in the rules of procedure.

The members of the Board of Partners of E. Merck KG, Darmstadt, Germany, and of the Supervisory Board may be convened to a joint meeting if so agreed by the chairmen of the two boards.

The rules of procedure prescribe that the Supervisory Board may form committees as and when necessary. The Supervisory Board has formed a Nomination Committee comprising three shareholder representatives. Its members are Albrecht Merck, Wolfgang Büchele and Theo Siegert. The Nomination Committee is responsible for proposing to the Supervisory Board suitable candidates for its proposal to the Annual General Meeting. Apart from legal requirements and the recommendations of the German Corporate Governance Code, the "Objectives of the Supervisory Board with respect to its composition", "Profile of skills and expertise" and the "Diversity Policy" are to be taken into consideration as well. Owing to the aforementioned limited authority, and since a corresponding need has not yet arisen, the Supervisory Board currently has no further committees.

The German Stock Corporation Act prescribes that the Supervisory Board of a publicly listed company must have at least one member who has professional expertise in accounting or auditing. Theo Siegert satisfies these requirements and is furthermore the Chairman of the Finance Committee of the Board of Partners of E. Merck KG, Darmstadt, Germany.

BOARD OF PARTNERS OF E. MERCK KG, DARMSTADT, GERMANY

Some of the responsibilities that lie with the supervisory board of a German stock corporation are fulfilled at our company by E. Merck KG, Darmstadt, Germany. This applies primarily to the Board of Partners of E. Merck KG, Darmstadt, Germany. Therefore, the Board of Partners and the composition and procedures of its committees are described in the following.

The Board of Partners has nine members.

Member	Memberships of (a) other statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Johannes Baillou Vienna, Austria, Vice Chairman of the Executive Board and General Partner of E. Merck KG, Darmstadt, Germany, Chairman	no board positions
Frank Stangenberg-Haverkamp Darmstadt, Chairman of the Executive Board and General Partner of E. Merck KG, Darmstadt, Germany, Vice Chairman	(a) – Fortas AG, Rösrath (Chairman) (b) – Oras Invest Ltd, Helsinki, Finland – Travel Asset Group Ltd., London, United Kingdom (Chairman)
Wolfgang Büchele Munich, Managing Director of M+V Group GmbH, Stuttgart	(a) – Merck KGaA, Darmstadt, Germany (b) – Kemira Oyj, Helsinki, Finland
Siegfried Karjetta Darmstadt, Physician	(a) – Merck KGaA, Darmstadt, Germany
Albrecht Merck Schriesheim, Commercial Director of the Castel Peter Winery, Bad Dürkheim	(a) – Merck KGaA, Darmstadt, Germany
Helga Rübsamen-Schaeff Langenburg, Chairperson of the Advisory Board of AiCuris Antiinfective Cures GmbH, Wuppertal	(a) – Merck KGaA, Darmstadt, Germany – 4SC AG, Martinsried – Supervisory Board of Bonn University Hospital
Gregor Schulz Umkirch, Pediatrician	(a) – Merck KGaA, Darmstadt, Germany
Theo Siegert Düsseldorf, Managing Partner of de Haen-Carstanjen & Söhne, Düsseldorf	(a) – Merck KGaA, Darmstadt, Germany – E.ON SE, Düsseldorf – Henkel AG & Co KGaA, Düsseldorf (b) – DKSH Holding Ltd., Zurich, Switzerland
Tobias Thelen Munich, Managing Partner of Altmann Analytik GmbH & Co. KG, Munich	(a) – Merck KGaA, Darmstadt, Germany

The Board of Partners supervises the Executive Board in its management of the company. It informs itself about the business matters of Merck KGaA, Darmstadt, Germany, and may inspect and examine the company's accounts and other business documents, and the assets for this purpose. According to Article 13 (4) of the Articles of Association of Merck KGaA, Darmstadt, Germany, the Executive Board requires the approval of E. Merck KG, Darmstadt, Germany, for transactions that are beyond the scope of the Group's ordinary business activities. For such transactions to be approved, approval must first be obtained from the Board of Partners of E. Merck KG, Darmstadt, Germany. The Board of Partners convenes as and when necessary; however, it normally meets four times a year. The members of the Executive Board of Merck KGaA, Darmstadt, Germany, are invited to all meetings of the Board of Partners, unless the Board of Partners resolves otherwise in individual cases. The members of the Board of Partners may convene a joint meeting with the Supervisory Board of Merck KGaA, Darmstadt, Germany, if so agreed by the chairmen of the two boards.

The Board of Partners may confer the responsibility for individual duties to committees. Currently the Board of Partners has three committees in place: the Personnel Committee, the Finance Committee, and the Research and Development Committee.

PERSONNEL COMMITTEE

The Personnel Committee has four members. These are Johannes Baillou (Chairman), Wolfgang Büchele, Theo Siegert, and Frank Stangenberg-Haverkamp.

The Personnel Committee meets at least twice a year. Further meetings are convened as and when necessary. Meetings of the Personnel Committee are attended by the Chairman of the Executive Board of Merck KGaA, Darmstadt, Germany, unless the Committee decides otherwise. The Personnel Committee is responsible for, among other things, the following decisions concerning members and former members of the Executive Board: contents of and entry into employment contracts and pension contracts, granting of loans and advance payments, changes to the compensation structure and adaptation of compensation, approval for taking on honorary offices, board positions and other sideline activities, as well as division of responsibilities within the Executive Board of Merck KGaA, Darmstadt, Germany. The Personnel Committee passes its resolutions by a simple majority – in matters concerning the Chairman of the Executive Board unanimity is required. The Chairman of the Committee regularly informs the Board of Partners of its activities.

FINANCE COMMITTEE

The Finance Committee has four members. These are Theo Siegert (Chairman), Johannes Baillou, Wolfgang Büchele, and Tobias Thelen.

The Finance Committee holds at least four meetings a year, at least one of which is a joint meeting with the auditor of Merck KGaA, Darmstadt, Germany. Further meetings are convened as and when necessary. Meetings of the Finance Committee are attended by the Chief Financial Officer of Merck KGaA, Darmstadt, Germany. Other members of the Executive Board of Merck KGaA, Darmstadt, Germany, may attend the meetings upon request by the Finance Committee. These meetings regularly include the Chairman of the Executive Board.

The Finance Committee is responsible for, among other things, analyzing and discussing the annual financial statements, the consolidated financial statements and the respective reports of the auditor, as well as the half-year financial report (including the report of the auditors for the audit review of the abridged financial statements and interim management report contained in the half-year report) and the quarterly statements. Moreover, the Finance Committee recommends to the Chairman of the Supervisory Board annual audit focuses for the auditors of the annual financial statements. It also recommends to the Supervisory Board an auditor for the annual financial statements as well as auditors for the audit review of the abridged financial statements and interim management report contained in the half-year financial report for the Supervisory Board's corresponding suggestion to the General Meeting. In addition, the Finance Committee is concerned with the net assets, financial position, results of operations and liquidity of our company, as well as accounting, internal auditing, risk management and compliance issues. Upon request of the Board of Partners, the Finance Committee examines investment projects that must be approved by the Board of Partners and provides recommendations pertaining thereto. It passes its resolutions with a simple majority. The Committee Chairman regularly informs the Board of Partners of the activities of the Finance Committee.

RESEARCH AND DEVELOPMENT COMMITTEE

The Research and Development Committee has four members. These are Helga Rübsamen-Schaeff (Chairperson), Johannes Baillou, Siegfried Karjetta, and Gregor Schulz.

The Research and Development Committee is convened as and when necessary, but holds at least two meetings a year. Meetings of the Research and Development Committee are attended by members of the Executive Board of Merck KGaA, Darmstadt, Germany, upon request of the Committee. These meetings regularly include the Chairman of the Executive Board as well as the CEO Healthcare, the CEO Life Science and the CEO Performance Materials. The Research and Development Committee is responsible, among other things, for reviewing and discussing the research activities of the Healthcare as well as Life Science/Performance Materials business sectors. It passes its resolutions with a simple majority. The Chairperson of the Committee reports to the Board of Partners on the insights gained from the meetings held.

Stipulations to promote the percentage of management positions held by women pursuant to section 76 (4) and section 111 (5) AktG (German Stock Corporation Act)

STIPULATIONS PURSUANT TO SECTION 76 (4) AKTG (TARGET FOR THE PERCENTAGE OF POSITIONS HELD BY WOMEN ON THE TWO UPPER MANAGEMENT LEVELS BELOW THE EXECUTIVE BOARD)

We foster diversity within the company, which also includes ensuring a balance of genders in management. To this end, we pursue both voluntary and statutory objectives, and we work continuously and sustainably on achieving them.

On December 15, 2016, the Executive Board of Merck KGaA, Darmstadt, Germany, set the new targets for the percentage of positions held by women on the two management levels below the Executive Board as follows:

- First management level below the Executive Board: 21% of positions held by women
- Second management level below the Executive Board: 26% of positions held by women

The deadline set for reaching the new targets is December 31, 2021.

The first management level comprises all managers of Merck KGaA, Darmstadt, Germany, with a direct reporting line to the Executive Board of Merck KGaA, Darmstadt, Germany, or who belong to the global executive group. The second management level comprises all managers of Merck KGaA, Darmstadt, Germany, who report to managers with a direct reporting line to the Executive Board of Merck KGaA, Darmstadt, Germany, or the global executive group.

In addition, as a global company with correspondingly aligned global (leadership) structures, our company continues to pursue a (voluntary) global target of maintaining the proportion of leadership positions held by women (managers, experts and project managers in roles 4 and above)[1] at a stable level of 30% in the period until 2021.

STIPULATIONS PURSUANT TO SECTION 111 (5) AKTG (TARGET FOR THE PERCENTAGE OF POSITIONS ON THE SUPERVISORY BOARD HELD BY WOMEN)

Pursuant to section 111 (5) AktG, the Supervisory Board of companies that are listed or subject to co-determination stipulates binding targets for the percentage of positions on the Supervisory Board and on the Management Board held by women. However, for Merck KGaA, Darmstadt, Germany, stipulations pursuant to section 111 (5) AktG need not be set for the following reasons:

The statutory target of 30% pursuant to section 96 (2) AktG is already applied on the Supervisory Board of Merck KGaA, Darmstadt, Germany. This eliminates the obligation to stipulate a further target for the percentage of positions held by women on the Supervisory Board (see section 111 (5) sentence 5 AktG).

The obligation to stipulate a target for the percentage of positions held by women on the Management Board pursuant to section 111 (5) AktG is not applicable to the legal form of a corporation with general

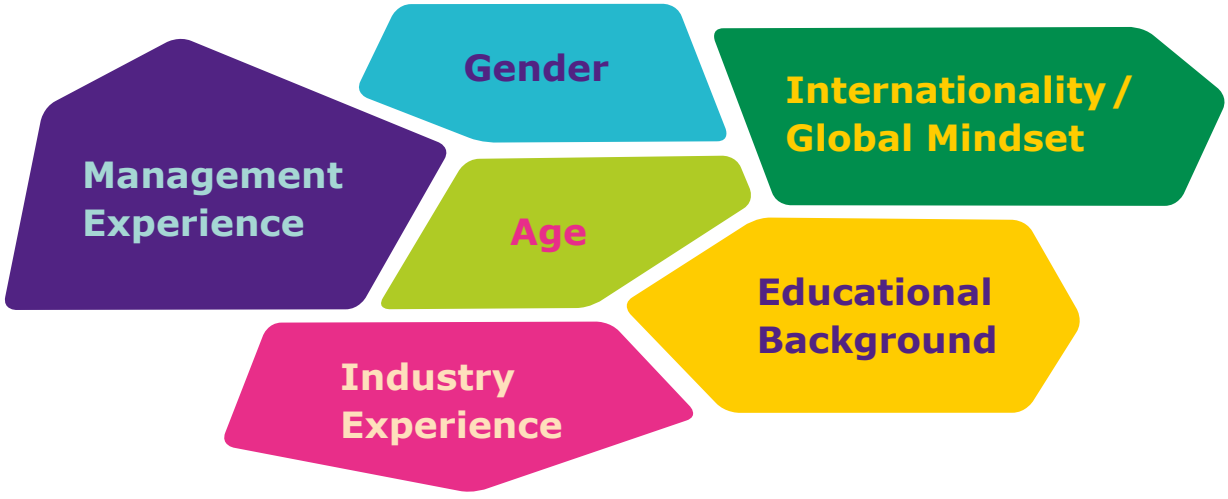
[1] Our company has changed its employee grading from Global Grades to a role-based approach. The relevant group continues to represent approximately 6% of the entire workforce; see the section entitled "Diversity and Management" on page 97 et seq.).

partners (Kommanditgesellschaft auf Aktien) as a corporation with general partners neither has a management board comparable to that of a stock corporation nor does the Supervisory Board have personnel authority over the Executive Board. Instead, the Executive Board consists of personally liable general partners (see also page 192 et seq. for the description of Supervisory Board procedures).

Diversity policy pursuant to section 289f (2) No. 6 of the German Commercial Code

We are pursuing a Group-wide, global diversity program. At our company, diversity stands for a culture of inclusion, mutual esteem and respect. To demonstrate this open and dynamic company culture, we promote diversity throughout the Group – and do so at all levels, including the Executive Board and Supervisory Board.

We believe that our innovative strength is driven by a diverse workforce and that an inclusive working environment sustainably contributes to entrepreneurial success. That is why we are furthering a culture of diversity independent of age, gender, disability, ethnic or cultural background, religion, industry experience, and educational background. The diversity policy to strategically steer the topics of diversity and inclusion at our company thus focuses on the following key criteria:



Our Group-wide diversity policy encompasses both voluntary as well as legally defined objectives that we continuously and sustainably work on to achieve.

In this context, it should be noted that with respect to the Executive Board of Merck KGaA, Darmstadt, Germany, many rules can only be applied correspondingly. This is because the Executive Board comprises personally liable general partners of Merck KGaA, Darmstadt, Germany, and is not a management board with employed members of a corporate body (for details, please also see the "Joint Report of the Executive Board and the Supervisory Board" page 170 et seq.). In addition to the aspects presented in the following, reference is made to the objectives of the Supervisory Board with respect to its composition and the competency profile of the Supervisory Board (see the information on the "Objectives of the Supervisory Board with respect to its composition and profile of skills and expertise" on page 200 et seq.). The statements made there are part of the diversity policy for the Supervisory Board presented here.

AGE

Our boards are to have a balanced age structure. This permits future-oriented and consistent succession planning and is a key element of sustainable company management and monitoring. Our diversity policy aims for an age range of at least ten years between the youngest and the oldest member of the respective board.

In their current composition, both boards meet this objective. The age range of the Executive Board is 15 years; that of the Supervisory Board is 30 years.

In addition, maximum age limits apply to both boards (for the Supervisory Board please see the information regarding the "Objectives of the Supervisory Board with respect to its composition and profile of skills and expertise" on page 200 et seq.). For Executive Board members, a maximum age of 70 applies.

GENDER

Gender diversity also plays a crucial role since it enables us to benefit from a larger talent pool, and allows us as a company to develop a better understanding of important customer groups. We have set ourselves the (global) strategic objective of maintaining the proportion of women in leadership positions (managers, experts and project managers in role 4 and higher[1]) at a stable level of 30% by 2021 (please also refer to the description on page 97 under "Diversity and Management").

Additionally, we continue to pursue representation of both genders as an objective for the Executive Board. With Ms. Belén Garijo as CEO Healthcare, at our company a woman is currently responsible for our largest business sector in terms of sales.

The statutory 30% quota pursuant to section 96 para 2 of the German Stock Corporation Act has already been applied to the Supervisory Board of Merck KGaA, Darmstadt, Germany. We consider further targets to be dispensable here.

INTERNATIONALITY AND GLOBAL MINDSET

As a global science and technology company with key sales markets on five continents and around 50,000 employees at sites in 66[2] countries, internationality and a global mindset are key success factors for us.

According to our diversity policy, the Executive Board's internationality derives from leadership experience or national origin, relative to our key sales markets or those locations that are organizationally and culturally relevant to our employee development efforts. For both criteria, Europe, North America and Asia-Pacific are currently the key regions.

The Executive Board meets this objective with management experience in the named regions, for instance in the following countries: France, Spain, Switzerland, the United States, Singapore, India, Taiwan, Malaysia, and Australia. One-third of the Executive Board members are not German citizens.

MANAGEMENT EXPERIENCE

The key prerequisites for high-performance leadership teams are both the diversity of the individual competency profiles and a balance between a Group-internal and external management perspective. Therefore, as a whole the Executive Board must have in-depth knowledge and experience in the following key areas of importance to the company: Strategy & Planning, Finance & Accounting, Sales & Operations, Human Resources, Legal & Compliance as well as Information Technology. In addition, for the composition of the Executive Board it is important to ensure a good balance of members from within and outside the company. Our diversity policy seeks to derive inspiration and innovation from outside the company and to identify the latest trends of relevance to the core businesses of the company while ensuring the sustainability and continuity in line with our corporate culture. We have therefore set ourselves the global objective of filling two-thirds of our leadership positions with candidates from within the company.

The current Executive Board meets both the aforementioned objectives: All required aspects of the competency profile are covered by at least one member of the Executive Board. Likewise, four members of the Executive Board possess multiple years of experience working within the Group prior to their appointment to the Executive Board.

INDUSTRY EXPERIENCE

To efficiently lead and manage the Group, the Executive Board must have in-depth knowledge of the key industries and business sectors that the company operates in. In accordance with the diversity policy, there should be at least one member of the Executive Board with in-depth expertise of Healthcare, Life Science or Performance Materials, respectively.

Currently, the Executive Board has the full breadth of the sector-specific experience required.

EDUCATIONAL BACKGROUND

In order to translate the tremendous innovative potential of a science and technology company into sustainable business success, interdisciplinary educational backgrounds are a key element of our diversity policy both for the Executive Board and for the Supervisory Board. The current composition of both boards illustrates this interdisciplinary aspect to a very high degree.

The members of the Executive Board bring together expertise in the fields of veterinary medicine, industrial engineering and management as well as medicine (pharmacology) and information technology, among others. In addition, one member of the Executive Board joined our company as an apprentice. More than 80% of the members of the Executive Board hold doctorates from universities either in Germany or abroad.

Moreover, the members of the Supervisory Board have a background in one or more the following fields of specialization: chemistry, biochemistry, nutrition, human medicine, business administration and economics, education, and physics, among others.

More than one-half of our Supervisory Board members are university graduates and hold doctorates.

[1] Our company has changed its role architecture from Global Grades to a role-based approach.
[2] Our company also has employees at sites which are not fully consolidated subsidiaries. These figures refer to all people directly employed by our company and therefore may deviate from figures in the financial section of this report.

Report of the Supervisory Board

The Supervisory Board again properly executed its duties in 2017 in accordance with the law as well as the company's Articles of Association and rules of procedure. In particular, the Supervisory Board monitored the work of the Executive Board diligently and regularly.

COOPERATION WITH THE EXECUTIVE BOARD

The cooperation with the Executive Board was characterized by intensive, trustworthy exchange. During fiscal 2017, the Executive Board provided the Supervisory Board with regular written and verbal reports on the business development of Merck KGaA, Darmstadt, Germany, and the Group. In particular, the Supervisory Board was informed about the market and sales situation of the company against the background of macroeconomic development, the financial position of the company and its subsidiaries, along with their earnings development, as well as corporate planning. Within the scope of quarterly reporting, the sales and operating results were presented for the Group as a whole, and broken down by business sector. Aside from the Supervisory Board meetings, the Chairman of the Supervisory Board also maintained and continues to maintain a regular exchange of information with the Chairman of the Executive Board.

KEY TOPICS OF THE SUPERVISORY BOARD MEETINGS

Four Supervisory Board meetings were held in fiscal 2017. At these meetings, the Supervisory Board intensely discussed the reports of the Executive Board and company developments and strategic issues together with the Executive Board.

At the meeting held on February 24, 2017, the Executive Board first intensively addressed the annual financial statements and consolidated financial statements for 2016, the combined management report as well as the proposal for the appropriation of the net retained profit. The auditor explained the audit report, including the focus areas of the audit. The Executive Board reported on the financial statements. Furthermore, the Supervisory Board resolved upon the report and the objectives of the Supervisory Board with respect to its composition, the Declaration of Conformity with the German Corporate Governance Code as well as the Statement on Corporate Governance, which simultaneously includes the joint report on Corporate Governance of the Executive Board and Supervisory Board. The Supervisory Board also approved the proposals to be made to the General Meeting. The Executive Board reported on business performance in 2016 and presented the plans for fiscal 2017. The Supervisory Board also took note of the written risk report as well as the report from Group Internal Auditing for 2016 and approved the performance of certain non-audit services by the auditor of the annual financial statements.

The meeting held on May 12, 2017 focused on current business developments in the first quarter of 2017. The report of the Research and Development Committee Life Science/Performance Materials of the Board of Partners of E. Merck KG, Darmstadt, Germany, was a further focus of the meeting. The Supervisory Board also dealt with the Compliance and Data Protection Report for 2016. In conclusion, the Executive Board presented the "Vision and Future Darmstadt" project, regarding the plans for the future of the Darmstadt site.

At its meeting on July 28, 2017, the Supervisory Board focused intensively on the report of the Executive Board on business performance in the second quarter of 2017. In addition, the auditor explained the half-year financial report. Risk management within the company was a further topic. The Head of Risk Management presented the status report for the first half of 2017. No risks that threaten the continued existence of the company were identified. In addition, the list of permitted non-audit services was updated, an external audit of the non-financial declaration was resolved upon and various developments in the Corporate Governance area were discussed.

At its fourth meeting on November 8, 2017, the Supervisory Board dealt with the report of the Executive Board on the third quarter of 2017. Additional topics of focus were the 2017 status reports of Group Internal Auditing and on compliance and data protection as well as the report of the Research and Development Committee Healthcare. Furthermore, the Group Executive Conference and the results of the efficiency review of the Supervisory Board were reported on and discussed. In addition, the implementation of new Corporate Governance requirements was discussed and the performance of various non-audit services by the auditor of the annual financial statements was approved.

ANNUAL FINANCIAL STATEMENTS

The annual financial statements of Merck KGaA, Darmstadt, Germany, the consolidated financial statements of the Group, and the combined management report for Merck KGaA, Darmstadt, Germany, and the Group, including the accounts, were audited by KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin.

The auditors issued an unqualified audit opinion on the annual financial statements of Merck KGaA, Darmstadt, Germany, in accordance with German Auditing Standards. The audit opinion for the annual financial statements contained the following key audit matters, in other words those matters that, in the professional judgment of the auditor, were of most significance in the audit of the annual financial statements:

- Impairment testing of interests in associates
- Recognition and measurement of provisions for tax liabilities
- Measurement of provisions for patent disputes

For the consolidated financial statements prepared in accordance with International Financial Reporting Standards, as well as the combined management report, the auditors issued the unqualified auditor's report reproduced in the Annual Report of the Group. The audit opinion for the consolidated financial statements contained the following audit topics of special importance:

- Goodwill impairment tests
- Recognition and measurement of income tax liabilities and deferred tax liabilities
- Measurement of provisions for patent disputes
- Measurement of the variable purchase price receivable from the divestment of the Biosimilars business activities.

In addition, the auditor audited the calculation of the participation of Merck KGaA, Darmstadt, Germany, in the profit of E. Merck KG, Darmstadt, Germany, in accordance with Article 27 (2) of the Articles of Association as well as the separate combined non-financial (Group) report. The annual financial statements of Merck KGaA, Darmstadt, Germany, the consolidated financial statements of the Group, the combined management report for Merck KGaA, Darmstadt, Germany, and the Group, the proposal by the Executive Board for the appropriation of the net retained profit, as well as the separate combined non-financial (Group) report were presented and distributed to the Supervisory Board, together with the auditor's reports.

In accordance with Article 14 (2) of the Articles of Association, the Supervisory Board also examined the annual financial statements of Merck KGaA, Darmstadt, Germany, the proposal for the appropriation of net retained profit and the auditor's report presented in accordance with Article 27 (2) of the Articles of Association. It also examined the consolidated financial statements of the Group as well as the combined management report for Merck KGaA, Darmstadt, Germany, and the Group, and took note of the auditor's report of KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin. The Supervisory Board paid special attention to the aforementioned key audit matters contained in the respective audit opinion, to the respectively resulting risks for the financial statements, to the respectively described audit procedure as well as to the respective conclusions drawn by the auditors. Furthermore, the Supervisory Board also examined the separate combined non-financial (Group) report and the memorandum on a limited assurance engagement prepared by the auditor on behalf of the Supervisory Board. The discussion of the relevant agenda item at the Supervisory Board's meeting on February 28, 2018 to approve the financial statements was also attended by the auditors who sign the audit opinion on the annual financial statements of Merck KGaA, Darmstadt, Germany, and the consolidated financial statements of the Group as well as the separate combined non-financial (Group) report. These auditors furthermore reported on their audit at this meeting.

The Supervisory Board took note of and approved the results of the audit. On completion of its examination, the Supervisory Board raised no objections and thus approved the annual financial statements for Merck KGaA, Darmstadt, Germany, the consolidated financial statements of the Group and the combined management report of Merck KGaA, Darmstadt, Germany, and the Group prepared by the Executive Board, the report presented by the auditor in accordance with Article 27 (2) of the Articles of Association as well as the separate combined non-financial (Group) report. The Supervisory Board gave its consent to the proposal of the Executive Board for the appropriation of net retained profit.

CORPORATE GOVERNANCE AND DECLARATION OF CONFORMITY

Corporate governance is a topic of high priority for the Supervisory Board. In its own estimation, the Supervisory Board has an adequate number of independent members. There were no conflicts of interest, as defined by the German Corporate Governance Code, involving Supervisory Board members during 2017.

After addressing corporate governance topics in detail, the Executive Board and Supervisory Board resolved to adopt and issue the updated Declaration of Conformity on February 14, 2018 (Executive Board) and on February 28, 2018 (Supervisory Board) and jointly issued it on February 28, 2018 in accordance with section 161 of the German Stock Corporation Act. The statement is permanently available on the website of Merck KGaA, Darmstadt, Germany (https://www.emdgroup.com/en/investors/corporate-governance.html). More information about corporate governance at Merck KGaA, Darmstadt, Germany, including the compensation of the Executive Board and Supervisory Board, is given in the Statement on Corporate Governance on pages 170 et seq. of the Annual Report.

COMMITTEES

Apart from the Nomination Committee, the Supervisory Board of Merck KGaA, Darmstadt, Germany, currently has no further committees on account of the special features that apply to the Supervisory Board of a corporation with general partners (KGaA) under German company law and because a corresponding need for this has not emerged to date. The members of the Nomination Committee did not convene in fiscal 2017. No report is given on the work of further committees.

PERSONNEL MATTERS

With the exception of Helga Rübsamen-Schaeff, who was excused and absent from the meeting on February 24, 2017, Edeltraud Glänzer, who was excused and absent from the meeting on May 12, 2017, and Alexander Putz, who was excused and absent from the meeting on July 28, 2017, all the Supervisory Board members attended all the Supervisory Board meetings.

Darmstadt, February 28, 2018

The Supervisory Board of Merck KGaA, Darmstadt, Germany

Wolfgang Büchele
Chairman

Objectives of the Supervisory Board with respect to its composition and profile of skills and expertise

INITIAL SITUATION

According to section 5.4.1 of the German Corporate Governance Code, the Supervisory Board shall specify concrete objectives regarding its composition and prepare a profile of skills and expertise for the entire board. Within the scope of the company-specific situation, the composition of the Supervisory Board shall appropriately reflect the international activities of the enterprise, potential conflicts of interest, the number of independent Supervisory Board members, an age limit to be specified for the members of the Supervisory Board, a regular limit to be specified for the length of Supervisory Board membership, as well as diversity.

GENERAL NOTES ON THE COMPOSITION OF THE SUPERVISORY BOARD

The Supervisory Board of Merck KGaA, Darmstadt, Germany, currently comprises 16 members, eight of whom represent the shareholders and a further eight who represent the employees. The eight employee representative members are elected by employee delegates pursuant to the provisions of the German Co-determination Act (Mitbestimmungsgesetz – "MitbestG"). These consist of six company employees, including a senior executive, as well as two union representatives. The Supervisory Board has no statutory proposal right with respect to electing the delegates or employee representatives. Owing to a delegation right of E. Merck Beteiligungen KG, Darmstadt, Germany, a related party of Merck KGaA, Darmstadt, Germany, two of the eight shareholder representatives are specified. The Supervisory Board likewise has no statutory proposal right with respect to exercising this delegation right. The remaining six shareholder representatives are elected by the General Meeting. In accordance with section 124 (3) sentence 1 AktG, the Supervisory Board shall propose to the General Meeting Supervisory Board members for election. These proposals require a majority of the votes of the shareholder representative members of the Supervisory Board. The next scheduled election to the Supervisory Board shall take place at the 2019 General Meeting. The General Meeting is not required to follow the election proposals. The appointment objectives and competency requirements that the Supervisory Board sets forth below therefore do not represent requirements to be met by those eligible to elect or to delegate members. Instead, they are intended to express the objectives pursued by the Supervisory Board in office with regard to its advisory and monitoring functions.

For the Supervisory Board of Merck KGaA, Darmstadt, Germany, professional qualifications and personal expertise are the two most important prerequisites for appointments to seats on the Supervisory Board. When proposing Supervisory Board candidates for election or delegation, the Supervisory Board will always give top priority to these prerequisites, which are essential for fulfilling its legal duties. Overall, the Supervisory Board's policy is to optimally meet its monitoring and advisory duties by having diversity among its members. Diversity includes, in particular, internationality as well as different experience backgrounds and career paths. The proportion of women on the Supervisory Board is also considered to be an aspect of diversity. When preparing proposals for election or delegation, due consideration shall be given in individual cases to the extent to which different, yet complementary professional profiles, career and life experiences as well as appropriate representation of both genders can benefit the work of the Supervisory Board. Additionally, the Supervisory Board shall support the Executive Board in its efforts to increase diversity within the company.

OBJECTIVES OF THE SUPERVISORY BOARD REGARDING ITS COMPOSITION

In accordance with section 5.4.1 (2) of the German Corporate Governance Code, the Supervisory Board has specified the following objectives regarding its composition and reports on the status of implementation below:

Internationality

The Supervisory Board shall have at least three members with business experience in the main sales markets of Merck KGaA, Darmstadt, Germany. Currently, the main sales markets of Merck KGaA, Darmstadt, Germany, are Europe, North and Latin America, and Asia-Pacific. The present composition of the Supervisory Board satisfies this objective. More than three Supervisory Board members have entrepreneurial experience in Europe, in a large range of countries. More than three Supervisory Board members have experience in management positions in companies that operate globally.

Women on the Supervisory Board
Six women are currently members of the Supervisory Board of Merck KGaA, Darmstadt, Germany. Accordingly, women make up 37.5% of the Supervisory Board. When nominating candidates for election to the Supervisory Board or making proposals for delegations, the Supervisory Board shall examine whether the percentage of women can be increased by suitable candidates. The Supervisory Board considers the 37.5% share of women members to be satisfactory at the present time. This applies both owing to the percentage of women in leadership positions at our company as well as the fact that the supervisory boards of other companies have a comparable percentage of women.

Number of independent members/ no material conflicts of interest
The Supervisory Board shall have an appropriate number of independent members. Assuming that the status of being an employee representative per se does not justify doubts with respect to the independence criteria within the meaning of section 5.4.2 of the German Corporate Governance Code, as a rule all employee representatives shall be independent within the meaning of the Code. In any case, at least four of the shareholder representatives on the Supervisory Board shall be independent. According to the Articles of Association of Merck KGaA, Darmstadt, Germany, six members representing the shareholders are to be elected by the General Meeting and two members are to be delegated. Taking this and the special ownership structure of our company into account, the Supervisory Board considers four shareholder representatives to be an appropriate number of independent members. In the Supervisory Board's estimation, the objectives concerning independent members are met at the present time. The Supervisory Board considers the following members to be independent: Crocifissa Attardo, Mechthild Auge, Wolfgang Büchele, Gabriele Eismann, Michael Fletterich, Edeltraud Glänzer, Michaela Freifrau von Glenck, Siegfried Karjetta, Albrecht Merck, Dietmar Oeter, Alexander Putz, Helga Rübsamen-Schaeff, Gregor Schulz, Theo Siegert, Tobias Thelen, and Veit Ulshöfer. In particular, the Supervisory Board does not believe that membership of the Board of Partners of E. Merck KG, Darmstadt, Germany, conflicts with independence. The Board of Partners exists complementary to the competencies and the activities of the Supervisory Board. It is not to be expected that this will lead to material and not merely temporary conflicts of interest. It should also be taken into account that due to its substantial capital investment and unlimited personal liability, E. Merck KG, Darmstadt, Germany, has a strong interest in the businesses of Merck KGaA, Darmstadt, Germany, operating efficiently and in compliance with procedures, counteracting from the outset conflicts of interest between E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, and thus also corresponding conflicts of interest between the members of the respective corporate boards. Moreover, no one shall be proposed for election to the Supervisory Board who simultaneously serves on a board of or advises a major competitor of the company, or owing to another function, e.g. advisor to major contract partners of the company, could potentially become involved in a conflict of interest. No Supervisory Board member serves on a board of or advises a major competitor. No Supervisory Board member performs a function that could lead to a lasting conflict of interest.

Age limit
As a rule, the members of the Supervisory Board shall not exceed the age of 75. This objective is met at the present time.

Regular limit on the length of Supervisory Board membership
The objective of the Supervisory Board regarding its composition is that as a rule, all members belong to the board for an uninterrupted period of no more than 15 years (corresponds to three regular terms of office). With one exception, this objective is also met at the present time.

PROFILE OF SKILLS AND EXPERTISE

Additionally, in accordance with 5.4.1 (2) of the German Corporate Governance Code, the Supervisory Board has prepared a profile of skills and expertise and reports on the status of implementation below.

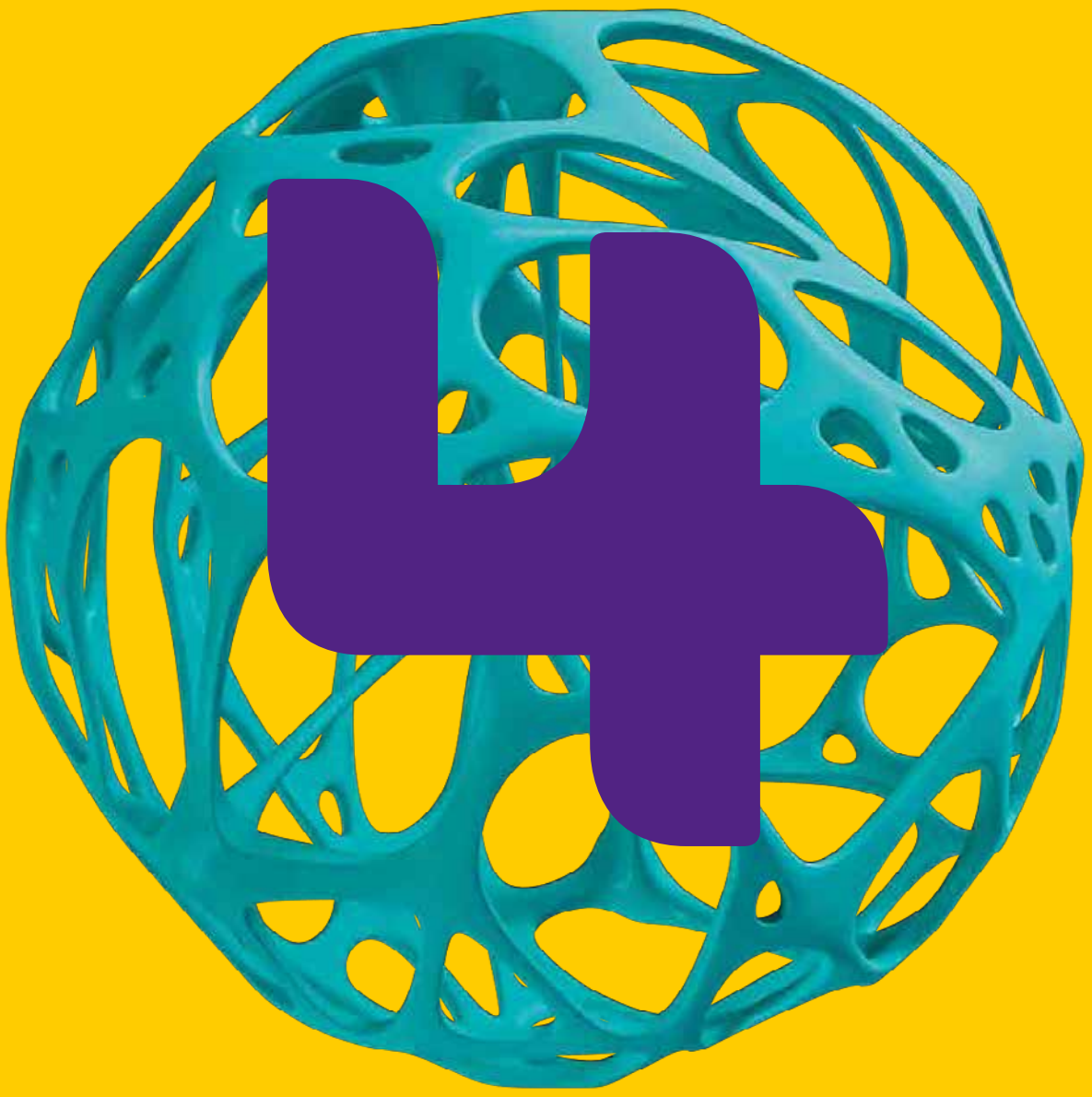
In-depth knowledge of the fields relevant to the company
The Supervisory Board shall have at least four members with in-depth knowledge and experience in fields that are important to the company, including at least one expert for the Healthcare and Life Science/ Performance Materials sectors, respectively. This requirement is met at the present time. At present, the Supervisory Board has more than four members who have in-depth knowledge and experience of Healthcare and Life Science/Performance Materials sectors. Likewise, more than four Supervisory Board members have leadership experience in companies that also operate or exclusively operate in the Healthcare and/or Life Science/Performance Materials sectors.

Management experience
The Supervisory Board shall have at least three members who have experience in managing or supervising a medium- or large-sized company. The Supervisory Board has more than three members who have the corresponding experience. This includes both Supervisory Board members who were or still are management board members or directors in such companies, as well as Supervisory Board members who have gained experience in supervisory boards of German and/ or foreign companies of this size.

Knowledge of business administration
The Supervisory Board shall have at least four members who have in-depth knowledge of business administration. This requirement is met at the present time.

Experience in other supervisory or control boards
Lastly, the Supervisory Board shall have at least four members who have experience as members of other supervisory or control boards (whereby possible membership of the Board of Partners of E. Merck KG, Darmstadt, Germany, is not taken into account). This requirement is also met at the present time.

CONSOLIDATED FINANCIAL STATEMENTS



CONSOLIDATED FINANCIAL STATEMENTS

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Consolidated Income Statement

€ million	Note	2017	2016
Net sales	→ 7	**15,327**	**15,024**
Cost of sales	→ 8	–5,320	–5,201
(of which: amortization of intangible assets)[1]		*(–179)*	*(–181)*
Gross profit		**10,007**	**9,823**
Marketing and selling expenses	→ 9	–4,702	–4,526
(of which: amortization of intangible assets)[1]		*(–1,017)*	*(–1,032)*
Administration expenses		–930	–854
Research and development costs	→ 10	–2,140	–1,976
(of which: amortization of intangible assets)[1]		*(–5)*	*(–4)*
Other operating income	→ 11	1,227	996
Other operating expenses	→ 12	–937	–981
Operating result (EBIT)[2]		**2,525**	**2,481**
Financial result	→ 13	–300	–326
Profit before income tax		**2,224**	**2,154**
Income tax	→ 14	386	–521
Profit after tax		**2,610**	**1,633**
of which: attributable to shareholders of Merck KGaA, Darmstadt, Germany (net income)		2,600	1,629
of which: attributable to non-controlling interests	→ 25	10	4
Earnings per share (in €)	→ 15		
basic		5.98	3.75
diluted		5.98	3.75

[1] Excluding amortization of internally generated or separately acquired software.
[2] Not defined by International Financial Reporting Standards (IFRS).

Consolidated Statement of Comprehensive Income

€ million	Note	2017	2016
Profit after tax		**2,610**	**1,633**
Items of other comprehensive income that will not be reclassified to profit or loss in subsequent periods:			
Remeasurement of the net defined benefit liability			
Changes in remeasurement	→ 26	141	–424
Tax effect		2	79
Changes recognized in equity		**142**	**–344**
		142	**–344**
Items of other comprehensive income that may be reclassified to profit or loss in subsequent periods:			
Available-for-sale financial assets			
Fair value adjustments		–	49
Reclassification to profit or loss		8	–31
Tax effect		–1	1
Changes recognized in equity		**7**	**19**
Derivative financial instruments			
Fair value adjustments		88	–90
Reclassification to profit or loss		12	65
Reclassification to assets		–	–
Tax effect		–31	10
Changes recognized in equity		**69**	**–15**
Exchange differences on translating foreign operations			
Changes taken directly to equity		–2,011	591
Reclassification to profit or loss		–51	–74
Changes recognized in equity		**–2,062**	**517**
		–1,985	**521**
Other comprehensive income		**–1,843**	**177**
Comprehensive income		**767**	**1,810**
of which: attributable to shareholders of Merck KGaA, Darmstadt, Germany		761	1,804
of which: attributable to non-controlling interests	→ 25	6	6

Consolidated Balance Sheet

€ million	Note	Dec. 31, 2017	Dec. 31, 2016
Non-current assets[1]			
Goodwill[1]	→ 16	13,582	15,015
Other intangible assets[1]	→ 17	8,317	9,980
Property, plant and equipment[1]	→ 18	4,512	4,231
Non-current financial assets	→ 19	444	218
Other non-current assets	→ 20	205	131
Deferred tax assets	→ 14	1,106	1,013
		28,166	**30,589**
Current assets[1]			
Inventories[1]	→ 21	2,632	2,609
Trade accounts receivable	→ 22	2,923	2,889
Current financial assets	→ 19	90	145
Other current assets[1]	→ 20	731	672
Income tax receivables	→ 23	490	403
Cash and cash equivalents	→ 24	589	939
Assets held for sale	→ 4	–	12
		7,455	**7,670**
Total assets[1]		**35,621**	**38,258**
Total equity	→ 25		
Equity capital		565	565
Reserves		12,357	10,362
Gains/losses recognized in equity		1,082	3,062
Equity attributable to shareholders of Merck KGaA, Darmstadt, Germany		**14,003**	**13,989**
Non-controlling interests		63	61
		14,066	**14,050**
Non-current liabilities[1]			
Provisions for pensions and other post-employment benefits	→ 26	2,257	2,313
Other non-current provisions	→ 27	788	834
Non-current financial liabilities	→ 28	8,033	8,809
Other non-current liabilities	→ 29	354	439
Deferred tax liabilities[1]	→ 14	1,489	2,724
		12,919	**15,119**
Current liabilities[1]			
Current provisions	→ 27	414	412
Current financial liabilities	→ 28	2,790	3,788
Trade accounts payable	→ 30	2,195	2,048
Income tax liabilities	→ 31	1,059	883
Other current liabilities[1]	→ 29	2,175	1,950
Liabilities directly related to assets held for sale	→ 4	–	8
		8,635	**9,089**
Total equity and liabilities[1]		**35,621**	**38,258**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

Consolidated Cash Flow Statement

€ million	Note	2017	2016
Profit after tax		**2,610**	**1,633**
Depreciation/amortization/impairment losses/reversals of impairments		1,758	1,934
Changes in inventories		–184	23
Changes in trade accounts receivable		–221	–73
Changes in trade accounts payable		234	76
Changes in provisions		103	–51
Changes in other assets and liabilities		–1,256	–587
Neutralization of gains/losses on disposal of assets		–346	–451
Other non-cash income and expenses		–3	14
Net cash flows from operating activities	→ 34	**2,696**	**2,518**
thereof: from discontinued operations		–	–
Payments for investments in intangible assets		–392	–132
Payments from the disposal of intangible assets		4	2
Payments for investments in property, plant and equipment		–919	–716
Payments from the disposal of property, plant and equipment		44	21
Payments for investments in financial assets		–219	–344
Payments for acquisitions less acquired cash and cash equivalents		–17	–156
Payments from the disposal of other financial assets		185	457
Payments from divestments less transferred cash and cash equivalents		11	5
Payments from other divestments		–	–3
Payments from divestment of assets held for sale		156	364
Net cash flows from investing activities	→ 35	**–1,147**	**–503**
thereof: from discontinued operations		–	24
Dividend payments to shareholders of Merck KGaA, Darmstadt, Germany		–155	–136
Dividend payments to non-controlling interests		–4	–3
Dividend payments to E. Merck KG, Darmstadt, Germany		–466	–461
Payments from new borrowings of financial liabilities from E. Merck KG, Darmstadt, Germany		349	881
Repayments of financial liabilities to E. Merck KG, Darmstadt, Germany		–314	–729
Repayment of bonds		–932	–272
Payments from new borrowings of other current and non-current financial liabilities		147	236
Repayments of other current and non-current financial liabilities		–496	–1,424
Net cash flows from financing activities	→ 36	**–1,870**	**–1,908**
thereof: from discontinued operations		–	–
Changes in cash and cash equivalents		**–320**	**107**
Changes in cash and cash equivalents due to currency translation		–30	8
Cash and cash equivalents as of January 1		939	832
Changes in cash and cash equivalents due to changes in scope of consolidation		–	–8
Cash and cash equivalents as of December 31		589	939
Plus cash and cash equivalents included in assets held for sale		–	–
Cash and cash equivalents as of December 31 (consolidated balance sheet)	→ 24	**589**	**939**

Consolidated Statement of Changes in Net Equity

For details see Note (25) “Equity”.

	Equity capital			Retained earnings	
€ million	General partner’s equity Merck KGaA, Darmstadt, Germany	Subscribed capital Merck KGaA, Darmstadt, Germany	Capital reserves (share premium) Merck KGaA, Darmstadt, Germany	Retained earnings/ Net retained profit	Remeasurement of defined benefit plans
Balance as of January 1, 2016	**397**	**168**	**3,814**	**7,025**	**–1,160**
Profit after tax	–	–	–	1,629	–
Other comprehensive income	–	–	–	–	–344
Comprehensive income	**–**	**–**	**–**	**1,629**	**–344**
Dividend payments	–	–	–	–136	–
Profit transfer to/from E. Merck KG, Darmstadt, Germany, including changes in reserves	–	–	–	–466	–
Transactions with no change of control	–	–	–	–	–
Changes in scope of consolidation/Other	–	–	–	–3	3
Balance as of December 31, 2016	**397**	**168**	**3,814**	**8,049**	**–1,501**
Balance as of January 1, 2017	**397**	**168**	**3,814**	**8,049**	**–1,501**
Profit after tax	–	–	–	2,600	–
Other comprehensive income	–	–	–	–	142
Comprehensive income	**–**	**–**	**–**	**2,600**	**142**
Dividend payments	–	–	–	–155	–
Profit transfer to/from E. Merck KG, Darmstadt, Germany, including changes in reserves	–	–	–	–593	–
Transactions with no change of control	–	–	–	–	–
Changes in scope of consolidation/Other	–	–	–	1	–
Balance as of December 31, 2017	**397**	**168**	**3,814**	**9,901**	**–1,358**

Gains/losses recognized in equity					
Available-for-sale financial assets	Derivative financial instruments	Currency translation difference	Equity attributable to shareholders of Merck KGaA, Darmstadt, Germany	Non-controlling interests	Total equity
5	**–176**	**2,714**	**12,787**	**68**	**12,855**
–	–	–	1,629	4	1,633
19	–15	515	175	2	177
19	**–15**	**515**	**1,804**	**6**	**1,810**
–	–	–	–136	–3	–139
–	–	–	–466	–	–466
–	–	–	–	–	–
–	–	–	–	–10	–10
24	**–191**	**3,229**	**13,989**	**61**	**14,050**
24	**–191**	**3,229**	**13,989**	**61**	**14,050**
–	–	–	2,600	10	2,610
7	69	–2,057	–1,839	–4	–1,843
7	**69**	**–2,057**	**761**	**6**	**767**
–	–	–	–155	–4	–159
–	–	–	–593	–	–593
–	–	–	–	–	–
–	–	–	1	–	1
31	**–121**	**1,171**	**14,003**	**63**	**14,066**

Notes to the Consolidated Financial Statements

General

(1) Company information

The accompanying consolidated financial statements as of December 31, 2017 have been prepared with MERCK Kommanditgesellschaft auf Aktien (Merck KGaA, Darmstadt, Germany), Frankfurter Strasse 250, 64293 Darmstadt, Germany, as parent company. Merck KGaA, Darmstadt, Germany, which manages the operations of the Group, is registered under HRB 6164 with the Commercial Register of Darmstadt. In accordance with the provisions of the German financial reporting disclosure law (Publizitätsgesetz), consolidated financial statements are also prepared for E. Merck Kommanditgesellschaft (E. Merck KG, Darmstadt, Germany), Darmstadt, Germany, the ultimate parent company and general partner of Merck KGaA, Darmstadt, Germany, with an equity interest of 70.274% as of December 31, 2017 (December 31, 2016: 70.274%). These consolidated financial statements include Merck KGaA, Darmstadt, Germany, and its subsidiaries. The authoritative German versions of these financial statements are filed with the German Federal Gazette (Bundesanzeiger) and can be accessed at www.bundesanzeiger.de.

(2) Reporting principles

These consolidated financial statements have been prepared in accordance with the International Financial Reporting Standards in force on the reporting date as issued by the International Accounting Standards Board and the IFRS Interpretations Committee (IFRS and IAS, as well as IFRIC and SIC) and as adopted by the European Union as well as the additionally applicable provisions of section 315e of the German Commercial Code (HGB). The fiscal year corresponds to the calendar year. These financial statements have been prepared in euros, the reporting currency. The figures reported in the consolidated financial statements have been rounded, which may lead to individual values not adding up to the totals presented.

In comparison with the previous year, there were no material changes to accounting and measurement principles. The accounting and measurement policies used in the consolidated financial statements are presented in Notes (51) “Measurement policies” to (69) “Share-based compensation programs”.

The following rules take effect as of fiscal 2017:

- Amendment to IAS 7 “Statement of Cash Flows”
- Amendments to IAS 12 “Income Taxes”
- Annual Improvements to IFRSs 2014 – 2016 Cycle: Amendment to IFRS 12 “Disclosure of Interests in Other Entities”

The amendments had no material effects on the consolidated financial statements.

The following rules take effect as of fiscal 2018:

- IFRS 9 “Financial Instruments”
- IFRS 15 “Revenue from Contracts with Customers”
- Amendment to IFRS 4 “Insurance Contracts”
- Amendments to IFRS 15 “Revenue from Contracts with Customers”
- Annual Improvements to IFRSs 2014 - 2016 Cycle: Amendments to IFRS 1 “First-time Adoption of International Financial Reporting Standards” and to IAS 28 “Investments in Associates and Joint Ventures”

We did not opt for early application of any of these rules.

Over the past two years, an in-depth analysis of the impact of the new IFRS 9 rules was performed with respect to the accounting practices and processes in place at the Group. The following table highlights the major subject areas for the Group and their estimated impact on Group equity as of January 1, 2018, before taking into account deferred taxes.

Subject area	Accounting change	Expected effect on Group equity as of January 1, 2018, in € million[1] (increase (+)/decrease (–))
Classification of financial assets	In individual cases, the classification of financial assets will change, with subsequent measurement being recorded either in other comprehensive income or in the consolidated income statement. The expected material effect on the Group is represented by the change from previous classification as available for sale debt instruments to future classification as "measured at fair value through profit or loss".	–
Measurement of equity instruments	For all material equity instruments existing as of January 1, 2018, and not held for trading, the Group will make the election to recognize future changes in fair value in other comprehensive income and to continue to present these changes in equity after the disposal of the financial instrument.	–
Measurement of trade accounts receivable and other financial assets	In future, loss allowances for trade accounts receivable are determined on the basis of their lifetime expected credit losses. The first-time application of IFRS 9 will lead to an increase in allowances for losses from expected credit risks of financial assets, particularly trade accounts receivable.	–5 to –10
Designation of hedging instruments	The existing hedge accounting relationships can remain in place also after the first-time application of the requirements of IFRS 9. For hedging relationships where the Group uses options, only the intrinsic value of options will be designated as the hedged item. For hedging relationships where the Group uses forward contracts, only the spot element will be designated as the hedged item. Changes in the fair value of the forward element in forward contracts or in the time value component of option contracts will initially be recorded in a new hedging cost reserve within Group equity. The further accounting treatment of these amounts depends on the type of hedged transaction.	1

[1] Before taking deferred taxes into consideration.

In addition, the implementation of IFRS 9 will change the presentation of financial instruments in the consolidated income statement and the consolidated balance sheet.

The Group will make use of the following practical expedients provided by IFRS 9:

- Possibility of modified initial application to record the cumulative adjustment from initial application as of January 1, 2018. Comparative information for prior periods as regards classification and measurement as well as impairment is not disclosed under IFRS 9.
- Application of the simplified impairment model in accordance with IFRS 9 for the recognition of lifetime expected credit losses of contract assets as well as trade receivables, lease receivables, receivables from licenses and commission receivables.

The implementation of the new IFRS 9 rules in the systems and processes of Group companies was correspondingly prepared in 2016 and 2017. The necessary adjustments to the system relate in particular to the new impairment rules, the new classification of financial assets and expanded disclosure requirements in the notes to the consolidated financial statements.

Since the beginning of 2015, a cross-functional project team has been analyzing the effects of the new rules on revenue recognition of IFRS 15, using quantitative and qualitative analyses, surveys and contract analyses to do so.

The Group generates more than 95% of its revenues from contracts on the sale of goods that usually have a simple structure and normally do not constitute long-term contracts. Based on the knowledge as of the date of preparing these consolidated financial statements, the initial application of IFRS 15 is not expected to have any material impact on the consolidated income statement for 2018.

The expected adjustment effects on Group equity as of January 1, 2018, before taking into account deferred taxes, can be summarized as follows.

Subject area	Accounting change	Expected effect on Group equity as of January 1, 2018, in € million[1] (increase (+)/decrease (–))
Date of the transfer of control within the context of product sales	In the case of specific supplies of goods, the transfer of control and thus the date of revenue recognition in accordance with IFRS 15 will occur later than the transfer of risks and rewards within the meaning of IAS 18. This affects in particular overseas shipping transports in the Healthcare business sector.	–20
Out-licensing of intellectual property	Out-licensing intellectual property may, in some cases, lead to an earlier revenue recognition as compared with IAS 18 if the outlicensed intellectual property meets the criteria of right-of-use asset (recognition of revenue at a point in time), rather than an access right (recognition over a period of time) and the consideration is not paid in the form of sales- or usage-based royalties.	17
Long-term supply contracts with minimum purchase quantities (take-or-pay contracts)	In individual cases, contracts with customers provide for minimum purchase quantities. In such cases, in accordance with IFRS 15, the expected transaction price attributable to the minimum purchase quantity has to be allocated to the individual supplies. However, under IAS 18, revenue is recognized in the amount of the invoiced selling price for the individual supplies.	4
Multiple-element arrangements	In the Life Science business sector, there are multiple-element arrangements with service elements to minor extent. In future, the transaction price will have to be allocated in some cases in a different manner than previously.	1
Presentation of payments to customers as sales deduction rather than operating expenses	In individual cases, payments to customers will be presented in the consolidated income statement as sales deductions rather than operating expenses.	–

[1] Before taking deferred taxes into consideration.

Moreover, the new rules of IFRS 15 in the following areas are of no or only of very minor relevance for the Group:

- variable consideration
- revenue recognition over time for long-term service contracts and customer-specific construction contracts
- consignment arrangements
- costs of obtaining or fulfilling a contract
- principal-agent relationships
- bill-and-hold arrangements
- financing components
- barter transactions
- repurchase agreements
- separate performance obligations from transportation or other logistics services
- gross presentation of rights of return granted by recognition of an asset for expected physical returns by customers

Collaboration agreements are within the scope of IFRS 15 only if there is a customer-supplier relationship. This is normally not the case for the existing collaborations, most of which relate to the Healthcare business sector.

The implementation of the new rules in the systems and processes of the Group companies commenced in 2016 and was completed in the course of 2017. The necessary system adaptations related in particular to the expanded disclosure requirements in the Notes to the Consolidated Financial Statements.

The Group will make use of the following practical expedients of IFRS 15:

- Possibility of applying the modified retrospective method where the cumulative effect of initially applying IFRS 15 as of January 1, 2018 is recognized as an adjustment of Group equity
- The promised amount of consideration is not adjusted for the effects of a significant financing component if the period between the fulfillment of a performance obligation and the payment by the customer amounts to up to one year
- Costs of obtaining a contract are expensed as incurred if the amortization period is one year or less.

The following standard is required to be applied as of fiscal 2019:
- IFRS 16 "Leases"

The impact of IFRS 16 on the consolidated financial statements is currently being examined. The standard will not be applied early.

The implementation of IFRS 16 will mean that as a lessee, for all leases the Group will generally be required to recognize a liability and a corresponding right of use in its balance sheet. The possibility to classify a lease as an operating lease and to recognize the associated expenses in the period in which they are incurred will no longer exist. The Group will make use of the option under IFRS 16 to continue to refrain from recognizing rights of use and the corresponding liabilities from leases of low-value assets in its balance sheet. At the time of initial application, the Group will also make use of the transition relief provided by IFRS 16 to recognize the cumulative transition effect instead of adjusting the prior-year periods retroactively. In order to determine the impact of IFRS 16, around 7,000 leases have been identified and analyzed to date. According to the current status of the analysis, with the transition to IFRS 16, the increase in the balance sheet total will be less than 2%.

As of the balance sheet date, the following standards were published by the International Accounting Standards Board and the IFRS Interpretations Committee, but not yet endorsed by the European Union:
- IFRS 14 "Regulatory Deferral Accounts"
- IFRS 17 "Insurance Contracts"
- IFRIC 22 "Foreign Currency Transactions and Advance Consideration"
- IFRIC 23 "Uncertainty over Income Tax Treatments"
- Amendments to IAS 28 "Investments in Associates and Joint Ventures"
- Amendment to IAS 40 "Investment Property"
- Amendment to IFRS 2 "Share-based Payment"
- Amendment to IFRS 9 "Financial Instruments"
- Amendment to IFRS 10 "Consolidated Financial Statements"
- Annual Improvements to IFRSs 2015 – 2017 Cycle

From today's perspective, the new rules are not expected to have any material effects on the consolidated financial statements.

(3) Changes in the scope of consolidation

The scope of consolidation changed as follows in the reporting period:

Fully consolidated companies as of December 31, 2016		**313**
Additions	Establishments	2
	Acquisitions	2
	Materiality	8
Retirements	Liquidations/Mergers	–10
	Divestments	–
	Immateriality	–1
	Loss of control	–
Fully consolidated companies as of December 31, 2017		**314**
Non-consolidated subsidiaries as of December 31, 2016		48
Non-consolidated subsidiaries as of December 31, 2017		57

Overall, the impact of subsidiaries not consolidated due to immateriality on sales, profit after tax, assets and equity was less than 1% relative to the entire Group. The interests in subsidiaries not consolidated due to immateriality were classified as available-for-sale financial assets and presented under non-current financial assets (see Note (19) "Financial Assets").

The list of shareholdings presents all of the companies included in the consolidated financial statements as well as all of the shareholdings of Merck KGaA, Darmstadt, Germany (see Note (70) "List of shareholdings").

(4) Acquisitions and divestments

ACQUISITIONS IN THE FISCAL YEAR

On May 8, 2017, the Group acquired all of the shares in Grzybowski Scientific Inventions Ltd. (GSI) headquartered in Evanston, USA. GSI developed Chematica, a computer-aided retro-synthesis tool. The software uses advanced reaction rules and proprietary algorithms to identify synthesis pathways that meet user-defined constraints. GSI is being integrated into the Life Science business sector of the Group. The purchase price comprises fixed compensation of US$ 7 million (€ 7 million) as well as milestone payments of up to US$ 1 million (€ 1 million).

On September 15, 2017 the Group acquired a 100% interest in Natrix Separations, Inc. (Natrix). The company, which is headquartered in Burlington, Canada, supplies hydrogel membrane products for single-use chromatography. Natrix is being integrated into the Life Science business sector of the Group. The purchase price comprises fixed compensation of around US$ 14 million (€ 12 million) as well as milestone payments of up to US$ 8 million (€ 7 million).

As of December 31, 2017, the purchase price allocations for GSI and Natrix had not been completed in respect of intangible assets and deferred taxes. The most significant impact from the preliminary purchase price allocations resulted, in both cases, from the remeasurement of technology-related intangible assets. Both acquisitions only contributed immaterially to the sales and earnings of the Group.

ACQUISITION IN THE PREVIOUS YEAR

BioControl Systems, Inc., USA

Effective December 21, 2016, the Group acquired a 100% interest in BioControl Systems, Inc., Bellevue, USA (BioControl), a company that develops, manufactures and commercializes materials and systems to check food safety. BioControl was integrated into the Life Science business sector of the Group. The purchase price amounted to US$ 169 million (€ 161 million). The purchase price allocation had not been completed by December 31, 2016; therefore, the acquired assets and liabilities were measured at preliminary carrying values in 2016. The corresponding adjustments to the year-earlier figures in the consolidated balance sheet due to the completed purchase price allocations are presented under “Adjustment of the consolidated balance sheet for 2016 due to the completion of the purchase price allocation in 2017”. The acquired assets and liabilities were measured at fair values in the balance sheet as follows:

€ million	Fair values on the acquisition date
Non-current assets	
Other intangible assets (excluding goodwill)	56
Property, plant and equipment	2
Other non-current assets	1
	59
Current assets	
Cash and cash equivalents	4
Inventories	6
Receivables	5
Other current assets	1
	15
Assets	**75**
Non-current liabilities	
Deferred tax liabilities	4
	4
Current liabilities	
Other current liabilities and provisions	3
	3
Liabilities	**8**
Acquired net assets	**67**
Purchase price for the acquisition of shares	**161**
Positive difference (goodwill)	**94**

The most significant impact of the purchase price allocation resulted from the remeasurement of customer-related and technology-related intangible assets which are amortized over a period of 13 years.

The positive difference of € 94 million was recognized as goodwill. This comprised anticipated synergies from the integration of BioControl into the Life Science business sector as well as intangible assets that are not recognizable, such as the expertise of the workforce. Goodwill is allocated to the Life Science business sector and is deductible for tax purposes.

Costs of € 4 million directly related to the acquisition of the company were incurred almost in full in 2016 and were recorded under other operating expenses.

Within the scope of the acquisition, no contingent consideration was agreed upon which the Group would possibly have to pay in the future. The selling shareholders did not contractually indemnify the Group for the outcome of a contingency or uncertainty related to the acquired assets or liabilities.

The development of goodwill, which is carried in U.S. dollars, during the period from December 31, 2016 to December 31, 2017 was as follows:

€ million	**Development of goodwill**
Goodwill on December 31, 2016[1]	94
Exchange rate effects	–9
Goodwill on December 31, 2017	**85**

[1] Previous year's figure has been adjusted.

No material contingent liabilities were identified in the course of the preliminary purchase price allocation.

ADJUSTMENT OF THE CONSOLIDATED BALANCE SHEET FOR 2016 DUE TO THE COMPLETION OF THE PURCHASE PRICE ALLOCATION IN 2017

The purchase price allocation for BioControl was completed in 2017.

The values in the consolidated balance sheet as of December 31, 2016 were retroactively adjusted as follows:

PREVIOUS-YEAR ADJUSTMENT

	Dec. 31, 2016		
€ million	Pre adjustment	BioControl Systems, Inc.	Post adjustment
Non-current assets	**30,582**	**7**	**30,589**
of which:			
Goodwill	15,064	–49	15,015
Other intangible assets	9,925	55	9,980
Property, plant and equipment	4,230	1	4,231
Unadjusted non-current assets	1,362	–	1,362
Current assets	**7,670**	**–**	**7,670**
of which:			
Inventories	2,607	2	2,609
Other current assets	674	–2	672
Unadjusted current assets	4,389	–	4,389
Total assets	**38,251**	**7**	**38,258**
Total equity	**14,050**	**–**	**14,050**
Non-current liabilities	**15,115**	**4**	**15,119**
of which:			
Deferred tax liabilities	2,720	4	2,724
Unadjusted non-current liabilities	12,395	–	12,395
Current liabilities	**9,086**	**3**	**9,089**
of which:			
Other current liabilities	1,947	3	1,950
Unadjusted current liabilities	7,139	–	7,139
Total equity and liabilities	**38,251**	**7**	**38,258**

DIVESTMENT OF THE BIOSIMILARS BUSINESS

On August 31, 2017, the Group completed the divestment of the Biosimilars business to subsidiaries of Fresenius SE & Co. KGaA. Since fiscal 2016, the Biosimilars business, which is part of the Healthcare business sector, had been reported as a disposal group and consists of allocable goodwill, inventories, property, plant and equipment, pension obligations, and intangible assets. In addition to the divestment of the business activities, the contract parties entered into supply and services agreements, which include drug development support and manufacturing services.

As compensation for the sale of the business activities, the Group received an upfront payment of € 156 million. According to the agreed terms of the transaction, the Group is entitled to future milestone payments of up to € 497 million, which will partly be covered by services to be performed, as well as tiered royalties on product sales. Additionally, the Group received an advance payment of € 45 million for services to be performed at short notice. As of 2018, the Group will receive further payments for services performed, partly from future milestone payments. The fair values determined by an independent external expert for the contingent consideration components of the business activities being divested were classified as available-for-sale financial assets. A sensitivity analysis of the measurement of the contingent consideration can be found in Note (6) “Management judgments and sources of estimation uncertainty”. The calculated disposal gain amounted to € 319 million and was recorded under other operating income. Revenue from the provision of services is mainly recorded as part of net sales.

(5) Collaborations of material significance

STRATEGIC ALLIANCE WITH PFIZER INC., USA, TO CO-DEVELOP AND CO-COMMERCIALIZE ACTIVE INGREDIENTS IN IMMUNO-ONCOLOGY

On November 17, 2014 the Group formed a global strategic alliance with Pfizer Inc., USA, (Pfizer) to co-develop and co-commercialize the anti-PD-L1 antibody avelumab. In 2017, this antibody was approved for the first time under the trade name Bavencio® for the treatment of patients with metastatic Merkel cell carcinoma (in the United States, the European Union, Iceland, Japan, Canada, Liechtenstein, Norway, and Switzerland) as well as patients with locally advanced or metastatic urothelial cancer (in the United States). This antibody is also being studied in multiple clinical trials as a potential treatment for further tumor types. The active ingredient is to be developed as a single agent as well as in various combinations with a broad portfolio of approved and investigational active ingredients. As part of the strategic alliance, the two companies have combined resources and expertise to also co-develop and co-commercialize Pfizer's anti-PD-1 antibody. The overriding objective of the strategic alliance is sharing the development risks and to accelerate the two companies' presence in immuno-oncology.

According to the collaboration agreement, during the development period each company will bear one-half of the development expenses. In the commercialization phase, the Group realizes the vast majority of sales from the commercialization of Bavencio® while Pfizer realizes the vast majority of sales from the commercialization of its anti-PD-1 antibody. At the same time, the Group and Pfizer evenly split defined income and expense components. The execution of the collaboration agreement is not being structured through a separate vehicle.

Under the terms of the agreement, in 2014 Pfizer made an upfront cash payment of US$ 850 million (€ 678 million) to the Group after the closing. Pfizer also committed to make further payments of up to US$ 2 billion to the Group subject to the achievement of defined regulatory and commercial milestones. Based on the collaboration agreement, the Group additionally received the right to co-promote for multiple years Xalkori® (crizotinib), a kinase inhibitor indicated for the treatment of patients with metastatic non-small cell lung cancer (NSCLC) whose tumors are anaplastic lymphoma kinase (ALK)-positive. In the United States and Europe, Xalkori® is also indicated for the treatment of metastatic NSCLC in patients whose tumors are ROS1-positive. During co-promotion of Xalkori®, the Group receives from Pfizer a profit share, which is reported in net sales. In 2017, this profit share income amounted to € 72 million (2016: € 64 million). At initial recognition, the right was measured at fair value by an independent external expert using the multi-period excess earnings method. The right was capitalized when it was granted and is being amortized over the term of the agreement. The residual book value of this intangible asset of December 31, 2017 was € 93 million (December 31, 2016: € 153 million). The need to recognize an impairment loss arose for Xalkori® in both 2017 and 2016. More information on the impairments recognized can be found in Note (6) "Management judgments and sources of estimation uncertainty."

On the date of the closing of the collaboration agreement, both the upfront payment received and the value of the right to co-promote Xalkori® were recognized in the balance sheet as deferred income under other liabilities. Both amounts are being recognized as income over the expected period during which the Group is to meet certain obligations and will be presented under other operating income (2017: € 191 million/2016: € 191 million). More information on the exercise of management judgments and estimation uncertainties in this regard can be found in Note (6) "Management judgments and sources of estimation uncertainty." In fiscal 2017, the Group generated sales of € 21 million with Bavencio® (2016: € 0 million), recorded research and development expenses of € 264 million (2016: € 245 million) and received milestone payments amounting to € 124 million (2016: € 0 million), which were recorded under other operating income.

AGREEMENT WITH BRISTOL-MYERS SQUIBB COMPANY, USA FOR THE CO-COMMERCIALIZATION OF GLUCOPHAGE® IN CHINA

In March 2013, the Group established an agreement with Bristol-Myers Squibb Company, USA, (BMS) for the co-commercialization of the antidiabetic agent Glucophage® (active ingredient: metformin hydrochloride) for the treatment of type 2 diabetes in China. Based on this agreement, as of fiscal 2017 the Group took over the exclusive distribution of Glucophage® in China. Instead of commission income, the Group has recorded sales of Glucophage in China and has made license payments to BMS since then. In fiscal 2017, the Group generated sales of € 279 million with Glucophage® in China (2016: commission income amounting to € 104 million).

AGREEMENT WITH INTREXON CORPORATION, USA, ON THE JOINT DEVELOPMENT AND COMMERCIALIZATION OF CAR-T CANCER THERAPIES

In March 2015, the Group and Intrexon Corporation, USA, entered into an exclusive strategic collaboration and license agreement to develop and commercialize Chimeric Antigen Receptor T-cell (CAR-T) cancer therapies. The agreement provided the Group exclusive access to Intrexon's proprietary and complementary suite of technologies to engineer T-cells with optimized and inducible gene expression. Intrexon will be responsible for all platform and product developments until the investigational new drug application is submitted for regulatory approval. The Group will select targets of interest for which CAR-T products will be developed. The Group will also lead the regulatory submission process and pre-submission interactions with the regulatory authorities, as well as clinical development and commercialization. Intrexon received an upfront payment of US$ 115 million. This amount was recognized as part of intangible assets not yet available for use (carrying amount as of December 31, 2017: € 104 million/December 31, 2016: € 104 million). For the first two targets of interest selected by the Group, Intrexon will receive research funding and is eligible to receive up to US$ 826 million development, regulatory and commercial milestones, as well as tiered royalties on product sales. In addition, Intrexon is also eligible to receive further payments upon achievement of certain technology development milestones.

DEVELOPMENT AGREEMENT WITH AVILLION LLP, UNITED KINGDOM, TO DEVELOP ANTI-IL-17 A/F NANOBODY®

On March 30, 2017, the Group announced an agreement with a subsidiary of Avillion LLP, London, United Kingdom (Avillion), to develop the anti-IL-17-A/F-Nanobody® M1095. The Group acquired full, exclusive rights to anti-IL-17 A/F Nanobody® through a global development and commercialization license from Ablynx nv, Ghent, Belgium, in 2013. This Nanobody® is an investigational therapy which has completed Phase I development. As part of the cooperation, Avillion will be responsible for developing anti-IL-17 A/F Nanobody® from Phase II through Phase III in plaque psoriasis. Avillion will also finance the clinical program through to regulatory submission. During the development stages, the Group recognizes a financial liability for potential repayment obligations to Avillion and records a corresponding expense as research and development costs.

IMMUNO-ONCOLOGY COLLABORATION WITH F-STAR DELTA LTD., UNITED KINGDOM

On June 4, 2017, the Group announced a strategic collaboration with F-star Delta Ltd, Cambridge, United Kingdom (F-star), for the development and commercialization of bispecific immuno-oncology antibodies. The Group has the option, upon delivery of pre-defined data packages by F-star, to fully acquire the company that owns five bispecific programs, including the preclinical lead asset FS118. In return, the Group made upfront payments to F-star and its shareholders totaling € 60 million, which were capitalized in 2017. Moreover, payments to finance R&D and for the achievement of certain milestones in an amount totaling up to € 55 million will be made during the first two years. The milestone payments will be capitalized when they are incurred. R&D financing will be recorded under research and development expenses. If the option is exercised and defined milestones are reached, the Group will incur further payment obligations of up to € 715 million.

(6) Management judgments and sources of estimation uncertainty

The preparation of the consolidated financial statements requires the Group to make discretionary decisions and assumptions as well as estimates to a certain extent. The discretionary decisions, assumptions relating to the future and sources of estimation uncertainty described below are associated with the greatest potential effects on these consolidated financial statements.

RECOGNITION AND MEASUREMENT OF ASSETS, LIABILITIES AND CONTINGENT LIABILITIES ACQUIRED IN THE CONTEXT OF BUSINESS COMBINATIONS

The recognition and measurement of assets, liabilities and contingent liabilities at fair value during purchase price allocations involve the use of estimates. The expertise of external valuation experts is normally obtained here. The fair values of the assets and liabilities recognized as part of the purchase price allocations for BioControl Systems, Inc., USA, Grzybowski Scientific Inventions, USA, as well as Natrix Separations, Inc., Canada, can be found in Note (4) "Acquisitions and divestments".

CONTINGENT CONSIDERATION

To the extent that, in the context of the divestment or the acquisition of businesses, contingent consideration is contractually agreed with the acquirer or seller, the fair value of the transaction is recognized in the balance sheet as a financial asset classified as available for sale or financial liability. As of December 31, 2017, the Group reported financial assets from contingent consideration in the amount of € 277 million (December 31, 2016: € 51 million) and financial liabilities from contingent consideration amounting to € 3 million (December 31, 2016: € 1 million). The assets mainly were based on contractual entitlements from potential future milestone payments and royalties in connection with the disposal of the Biosimilars business in 2017 as well as the disposal of the Kuvan® business in 2016. The determination of the fair value of contingent consideration is, to large extent, subject to judgment. The most significant parameters for the measurement of contingent consideration are the estimated probabilities of success of the individual milestone events, the sales planning assumed to derive the royalties as well as the discount factor used. Any change in these material input factors may lead to significant changes in the value of the recognized financial assets or financial liabilities.

The most significant contingent consideration is the future purchase price claim from the disposal of the Biosimilars business (see Note (4) "Acquisitions and divestments"). It was determined by an external expert and amounted to € 228 million. If, in the context of determining the fair value of this contingent consideration at the date of transaction, the probability of approval as well as the discount factor of the three major development programs had been estimated to be lower or higher to the extent presented below, this would have led to the following changes in the measurement and the corresponding effects on the profit before tax:

		Change in probability of regulatory approval		
€ million		–10%	unchanged	10%
Change of discount rate	6.0%	–42	6	54
	unchanged (6.5%)	–47	–	47
	7.0%	–52	–6	39

SALES DEDUCTIONS

The Group grants its customers various kinds of rebates and discounts. In addition, expected returns, state compulsory charges and rebates from health plans and programs are also deducted from sales.

The most significant portion of these deductions from sales was attributable to the Healthcare business sector. The most substantial sales deductions in this business sector relate to government rebate programs in North America.

Insofar as sales deductions were not already made on payments received, the Group determined the level of sales deductions on the basis of current experience and recognizes them as a liability (carrying amount on December 31, 2017: € 435 million/December 31, 2016: € 443 million). The sales deductions reduce gross sales. Adjustments of liabilities can lead to subsequent increases or reductions in net sales in later periods.

IMPAIRMENT TESTS OF GOODWILL AND INTANGIBLE ASSETS NOT YET AVAILABLE FOR USE

The goodwill (carrying amount as of December 31, 2017: € 13,582 million/December 31, 2016: € 15,015 million[1]) and other intangible assets not yet available for use (carrying amount as of December 31, 2017: € 421 million/December 31, 2016: € 181 million) reported in the consolidated financial statements are tested for impairment at least once a year or when a triggering event arises.

Owing to the termination of development projects in the Healthcare business sector, in 2017 impairment losses of other intangible assets not yet available for use were recorded in the amount of € 17 million (2016: € 12 million).

[1] Previous year's figure has been adjusted, see Note (4) "Acquisitions and divestments".

The carrying amounts of goodwill were allocated to the following cash-generating units or groups of cash-generating units on which level the impairment tests were performed:

€ million	Dec. 31, 2017	Dec. 31, 2016
Biopharma	1,534	1,560
Consumer Health	251	251
Life Science[1]	10,519	11,752
Performance Materials	1,278	1,452
Goodwill[1]	**13,582**	**15,015**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

The changes in the carrying amounts over the previous year were mainly attributable to currency effects.

The identified cash-generating units or groups of cash-generating units represented the lowest level at which goodwill was monitored by management.

As in 2016, no impairment losses for goodwill were recorded in the year under review.

When conducting the impairment tests the following parameters were used:

Measurement basis	Value in use
Impairment test level	Biopharma (including Allergopharma; in 2016 also including Biosimilars[1]) Consumer Health Life Science Performance Materials
Planning basis	Most recent financial medium-term planning approved by the Executive Board and used for internal purposes
Detailed planning period	4 years
Key assumptions	Net cash flows Long-term growth rate after the detailed planning period Discount rate after tax (weighted average cost of capital after tax – WACC)
Determination of the value of the key assumptions	Net cash flows • Sales growth Based on internal planning, taking into consideration internal and external market information and market estimations, e.g. regarding market shares, excluding approvals of new compounds from the development pipeline and other expansion investments • Profit margins Based on past experiences, adjusted for expected changes Long-term growth rate after the detailed planning period Based on long-term inflation expectations and expected long-term sector growth Discount rate after taxes (weighted average cost of capital after tax – WACC) • Cost of equity Risk-free interest rate: Derived from the returns of long-term government bonds Beta factor: Derived from the respective peer group Market risk premium: Range as recommended by the Technical Committee for Business Valuation and Commerce of the Institute of Public Auditors in Germany (Institut der Wirtschaftsprüfer e.V. – IDW) • Cost of debt and capital structure Derived from market data and the respective peer group

[1] Biosimilars was not yet reported as a disposal group when the impairment test was performed.

The long-term growth rates and weighted average costs of capital (WACC) used to conduct the goodwill impairment tests were as follows:

	Long-term growth rate		Cost of capital after tax		Cost of capital before tax	
	2017	2016	**2017**	2016	**2017**	2016
Biopharma	0.00%	0.00%	6.7%	6.1%	8.9%	8.1%
Consumer Health	2.00%	2.00%	6.6%	5.9%	8.2%	7.2%
Life Science	1.75%	1.75%	6.8%	6.1%	8.4%	7.5%
Performance Materials	0.50%	0.50%	5.9%	6.1%	7.5%	7.9%

Net cash flows were discounted using cost of capital after tax. The aforementioned cost of capital before tax was subsequently derived iteratively. All of the aforementioned assumptions are considered a source of estimation uncertainty due to their inherent uncertainty.

In all the impairment tests performed, the recoverable amount was more than 10% higher than the carrying amount of the respective cash-generating unit or group of cash-generating units. Irrespective of this, the planning data used were checked for plausibility against externally available forecasts and the recoverable amounts determined were validated using valuation multiples based on peer group information. In addition, sensitivity analyses of the key assumptions were performed as part of the impairment tests. Overall, no change of a significant assumption deemed possible by management would have resulted in an impairment. The following table presents the amount by which key assumptions would have to change before an impairment would need to be recognized as a result of the impairment tests:

	Decrease in long-term growth rate		Increase in cost of capital after tax		Decrease in net cash flows	
	2017	2016	**2017**	2016	**2017**	2016
	in percentage points		in percentage points		in %	
Biopharma	> 2.0	> 2.0	> 2.0	> 2.0	> 5%	> 5%
Consumer Health	> 2.0	> 2.0	> 2.0	> 2.0	> 5%	> 5%
Life Science	> 2.0	> 2.0	> 1.5	> 1.5	> 5%	> 5%
Performance Materials	> 2.0	> 2.0	> 2.0	> 2.0	> 5%	> 5%

DETERMINATION OF THE AMORTIZATION OF INTANGIBLE ASSETS WITH FINITE USEFUL LIVES

In addition to goodwill and intangible assets not yet available for use, the Group has a significant amount of intangible assets with finite useful lives. This relates in particular to intangible assets from customer relationships, brands, trademarks, marketing authorizations, patents, licenses and similar rights (carrying amount as of December 31, 2017: € 7,549 million/December 31, 2016: € 9,516 million[1]). Substantial assumptions and estimates are required to determine the appropriate level of amortization of these intangible assets. This related in particular to the determination of the underlying remaining useful life, which the Group reviews regularly and adjusts if necessary. The Group considers factors including the typical product life cycles for each asset and publicly available information about the estimated useful lives of similar assets.

If the amortization of intangible assets from customer relationships, brands, trademarks, marketing authorizations, patents, licenses and similar rights had been 10% higher, for example due to shortened remaining useful lives, profit before tax would have been € 120 million lower in fiscal 2017 (2016: € 122 million).

In fiscal 2017, a reduction of the useful life of the intangible asset reported in connection with the drug Rebif® by one year would have lowered profit before tax by € 184 million (2016: € 123 million). An extension of the useful life by one year would have increased profit before tax by € 92 million (2016: € 74 million).

[1] Previous year's figure has been adjusted, see Note (4) "Acquisitions and divestments".

RESEARCH AND DEVELOPMENT COLLABORATIONS AS WELL AS IN- AND OUT-LICENSING OF INTANGIBLE ASSETS

The Group is regularly a partner of research and development collaborations with research institutions, biotechnology companies or other contract parties. These collaborations are aimed at developing marketable products. The Group also enters into in-licensing agreements regarding intellectual property of contract partners. Such agreements typically involve making upfront payments and payments for the achievement of certain milestones related to development and commercialization. In this context, the Group has to judge to what extent upfront or milestone payments represent remuneration for services received (research and development expense) or whether such payments result in an in-licensing of an intangible asset that has to be capitalized. This assessment is regularly subject to judgment.

The Group regularly receives upfront and milestone payments as part of research and development collaborations or out-licensing agreements. In this context, income may only be recognized if the Group has transferred all material risks and rewards of an intangible asset to the acquirer, has no interest in the remaining business activities and has no material continuing commitment. If these criteria are not deemed to be met, the received payments are deferred and recognized over the period in which the Group is expected to fulfill its performance obligations. Both the assessment of the criteria for income recognition and the determination of the appropriate period during which income is recognized are subject to judgment.

If the consideration that was received as part of the strategic alliance with Pfizer Inc., USA, in November 2014 and deferred as a liability had been recognized in the income statement over a shorter period reduced by one year, in 2017 this would have increased other operating income and thus profit before tax would have increased by € 96 million (2016: € 64 million). Recognition over a period extended by one year would have lowered other operating income and profit before tax by € 48 million (2016: € 38 million).

IDENTIFICATION OF IMPAIRMENT OR REVERSALS OF IMPAIRMENT OF NON-FINANCIAL ASSETS

Discretionary decisions are required in the identification of objective evidence of impairment as well as in the identification of a reversal of impairment of other intangible assets and property, plant and equipment. As of December 31, 2017, the carrying amounts of these assets totaled € 12,829 million (December 31, 2016: € 14,211 million[1]). External and internal information is used to identify indications of impairment and reversals of impairment. For example, the approval of a competing product in the Healthcare business sector or the closure of a site can be an indicator of impairment.

In 2017 impairment losses for the biopharmaceutical production facility in Corsier-sur-Vevey, Switzerland, were reversed in the amount of € 69 million to depreciated historical cost. The impairment loss reversal was recorded under other operating income and allocated to the Healthcare business sector. The impairment loss reversal was recorded under other operating income and allocated to the Healthcare business sector. The decision to reverse the impairment loss was due to improved expectations for the capacity utilization of the production facility, particularly owing to the recent approvals of the immuno-oncology medicine Bavencio®, which is to be produced in this facility. An impairment loss of € 165 million was originally recognized for the facility in 2011.

In addition, the intangible asset in connection with the co-promotion right for Xalkori® (crizotinib), a medicine to treat patients with ALK-positive metastatic non-small cell lung cancer, was subjected to an impairment test, as in the prior year owing to negative developments in the market environment. This test led to an impairment loss of € 33 million (2016: € 71 million) on the intangible asset, which was reported under other operating expenses. Within the scope of the impairment test, the recoverable amount was determined using a discount rate before tax of 7.5%. This included an asset-specific risk premium.

IMPAIRMENT OF FINANCIAL ASSETS

On every balance sheet date, the Group reviews whether there is any objective evidence that a financial asset is impaired and, if this is the case, recognizes allowances to the extent estimated as necessary. Particularly important in this context are allowances on trade accounts receivable, whose carrying amount was € 2,923 million as of December 31, 2017 (December 31, 2016: € 2,889 million).

Key indicators for the identification of impaired receivables and the subsequent recoverability tests are, in particular, payment default or delay in the payment of interest or principal, negative changes in economic framework conditions as well as considerable financial difficulties of a debtor. These estimates are discretionary.

OTHER PROVISIONS AND CONTINGENT LIABILITIES

As a global company for high-tech products, the Group is exposed to a multitude of litigation risks. In particular, these include risks from product liability, competition and antitrust law, pharmaceutical law, patent law, tax law and environmental protection. The Group is engaged in legal proceedings and official investigations, the outcomes of which are uncertain. A description of the most important legal matters as of the balance sheet date can be found in Notes (27) “Other provisions” and (40) “Contingent liabilities”. The provisions recognized for legal disputes mainly relate to the Healthcare and Performance Materials business sectors and amounted to € 526 million as of the balance sheet date (December 31, 2016: € 483 million).

[1] Previous year’s figure has been adjusted, see Note (4) “Acquisitions and divestments”.

To assess a reporting obligation in relation to provisions and to quantify pending outflows of resources, the Group draws on the knowledge of the legal department as well as other outside counsel. In spite of this, both the assessment of the existence of a present obligation and the estimate of the probability of a future outflow of resources are highly subject to uncertainty. Equally, the measurement of provisions is to be considered a major source of estimation uncertainty.

To a certain extent, the Group is obliged to take measures to protect the environment and reported provisions for environmental protection of € 137 million as of December 31, 2017 (December 31, 2016: € 142 million). The underlying obligations were located mainly in Germany and Latin America. Provisions were recognized primarily for obligations from soil remediation and groundwater protection in connection with the discontinued crop protection business.

The calculation of the present value of the future settlement amount requires, among other things, estimates of the future settlement date, the actual severity of the identified contamination, the applicable remediation methods, the associated future costs, and the discount rate. The measurement is carried out regularly in consultation with independent experts. The determination of the future settlement amount of the provisions for environmental protection measures is subject to a considerable degree of uncertainty.

In the event of the discontinuation of clinical development projects, the Group is regularly required to bear unavoidable subsequent costs for a certain future period of time. The measurement of these provisions requires estimates regarding the length of time and the amount of the follow-on costs.

Apart from provisions, contingent liabilities are also subject to estimation uncertainties and discretionary judgments. Accordingly, contingent liabilities from legal and tax disputes are subject to the same estimation uncertainties and discretionary judgment as provisions for litigation. Therefore, the existence and the amount of the outflow of resources, which is not remote, are subject to estimation uncertainties similarly to the date on which a potential obligation arises.

SHARE-BASED COMPENSATION PROGRAMS

Provisions for employee benefits included amongst others obligations from long-term variable compensation programs in the form of cash-settled share-based compensation programs. The amounts disbursed to the beneficiaries largely depend on long-term indicators of company performance and the share price development. The strongest influence comes from price fluctuations of share of Merck KGaA, Darmstadt, Germany, in relation to the DAX®. More information can be found in Notes (27) “Other provisions” and (69) “Share-based compensation programs”. The amount recognized in the consolidated balance sheet as of December 31, 2017, as non-current provisions, which comprises the 2016 and 2017 tranches from long-term variable compensation programs, amounted to € 22 million. The following overview shows the amounts by which the non-current provisions would have been impacted by changes in the DAX® (increase or decrease by 10%, respectively) and the closing price of shares of Merck KGaA, Darmstadt, Germany, as of December 31, 2017 (increase or decrease by 10%, respectively). The amounts stated would have led to a corresponding reduction or increase in profit before tax.

€ million		Increase (+)/ decrease (–) in the provision
Change in the share price of Merck KGaA, Darmstadt, Germany	10%	15
	–10%	–2
Change in DAX®	10%	–
	–10%	16

Sensitivities were determined in general on the basis of the respective observed parameters, with all other measurement assumptions remaining unchanged. The 2015 tranche reported under current provisions will not be subject to any value fluctuations between December 31, 2017 and the payout date and was therefore not included in the sensitivity analysis.

PROVISIONS FOR PENSIONS AND OTHER POST-EMPLOYMENT BENEFITS

The Group maintains several defined benefit pension plans, particularly in Germany, Switzerland and the United Kingdom. The amount recorded in the consolidated balance sheet for provisions for pensions and other post-employment benefits amounted to € 2,257 million as of the balance sheet date (December 31, 2016: € 2,313 million). The present value of the defined benefit obligations was € 4,707 million as of December 31, 2017 (December 31, 2016: € 4,698 million). The determination of the present value of the obligation from these defined benefit pension plans primarily requires discretionary judgment as regards the selection of methods to determine discount rates as well as estimates of future salary increases and future pension increases. The actuarial assumptions which are used as the basis for the calculation of the defined benefit obligation, e.g. discount rates, salary and pension trends, which were used to calculate the benefit obligation, were determined on a country-by-country basis in line with the economic conditions prevailing in each country; the latest country-specific actuarial mortality table was used in each case. The respective discount rates are generally determined on the basis of the returns on high-quality corporate bonds issued with adequate maturities and currencies. For euro-denominated obligations, bonds with ratings of at least "AA" from one of the three rating agencies Standard & Poor's, Moody's or Fitch, and a euro swap rate of adequate duration served as the basis for the data.

The following overview shows how the present value of all defined benefit obligations would have been impacted by changes to relevant actuarial assumptions.

€ million	**Dec. 31, 2017**	Dec. 31, 2016
Increase (+)/decrease (–) in the present value of all defined benefit obligations if		
the discount rate is 50 basis points higher	–438	–441
the discount rate is 50 basis points lower	508	518
the expected rate of future salary increases is 50 basis points higher	155	160
the expected rate of future salary increases is 50 basis points lower	–133	–138
the expected rate of future pension increases is 50 basis points higher	256	280
the expected rate of future pension increases is 50 basis points lower	–198	–209

To determine the sensitivities, in principle each of the observed parameters was varied while keeping the measurement assumptions otherwise constant. The amounts for social security vary in line with the salary trend. Further information on the existing pension obligations is provided in Note (26) "Provisions for pensions and other post-employment benefits" and under "Accounting and measurement policies" in Note (67) "Provisions for pensions and other post-employment benefits".

INCOME TAXES

The calculation of the reported assets and liabilities from current and deferred income taxes requires extensive discretionary judgments, assumptions and estimates. Income tax liabilities were € 1,059 million as of December 31, 2017 (December 31, 2016: € 883 million). The carrying amounts of deferred tax assets amounted to € 1,106 million (December 31, 2016: € 1,013 million), the carrying amounts of deferred tax liabilities were € 1,489 million as of December 31, 2017 (December 31, 2016: € 2,724 million[1]).

The recognized income tax liabilities and provisions are partially based on estimates and interpretations of tax laws and ordinances in different jurisdictions.

With regard to deferred tax items, there are degrees of uncertainty concerning the date on which an asset is realized or a liability settled and concerning the tax rate applicable on this date. This particularly relates to deferred tax liabilities recognized in the context of the acquisitions of the Sigma-Aldrich Corporation, the Millipore Corporation, Serono SA, and AZ Electronic Materials S.A. The recognition of deferred tax assets from loss carryforwards requires an estimate of the probability of the future realizability of loss carryforwards. Factors considered in this estimate are results history, results planning and the existing tax planning of the respective Group company.

More information on management judgments made in connection with the accounting treatment of the U.S. tax reform can be found in Note (14) "Income Taxes".

ASSETS HELD FOR SALE, DISPOSAL GROUPS AND DISCONTINUED OPERATIONS

The assessment as to when a non-current asset, disposal group or discontinued operation meets the prerequisites of IFRS 5 for a classification as "held for sale" is subject to significant discretionary judgment. Even in the case of an existing management decision to review a disposal, an assessment subject to uncertainties has to be made as to the probability that a corresponding disposal will occur during the year or not.

[1] Previous year's figure has been adjusted, see Note (4) "Acquisitions and divestments".

On September 5, 2017, the Group announced that it is preparing strategic options for its Consumer Health business. Potential candidates were approached and, in November 2017, they were sent information about the Consumer Health business. They were requested to submit non-binding offers in the course of December 2017. The analysis of these offers had not been completed by December 31, 2017. Based on these offers, the Executive Board is currently analyzing which strategic options are to be pursued. In addition, if a disposal is intended, the structure of the business to be potentially divested has to be defined. The analysis of the strategic options had not been completed as of the date of preparation.

Only on the basis of this information will candidates be able to submit binding offers that can be analyzed by the Group based on its price expectations. Only in the case of subsequent negotiations with potential candidates will it be possible to define the transaction in more specific terms, i.e. material changes are not unlikely until negotiations are completed.

Against this background, the Executive Board's view as of December 31, 2017 is that a disposal of the Consumer Health business within the next 12 months cannot be regarded as highly likely.

The carrying amount of the assets of the Consumer Health business as of December 31, 2017 was € 647 million. The corresponding liabilities amounted to € 192 million as of December 31, 2017. In fiscal 2017, the Consumer Health business generated net sales of € 911 million and profit after tax of € 99 million (calculated on the basis of the operating result (EBIT) and the income tax rates applicable in the individual jurisdictions).

OTHER JUDGMENTS, ASSUMPTIONS AND SOURCES OF ESTIMATION UNCERTAINTY

The Group makes other judgments, assumptions and estimates in the following areas:

- Cash flow hedging for highly probable forecast transactions
- Determination of the fair value of financial instruments classified as available-for-sale and of derivative financial instruments
- Determination of the fair value of plan assets.

Notes to the Consolidated Income Statement

(7) Net sales

Net sales were generated primarily from the sale of goods and to a limited degree also included revenues from services rendered, commission income as well as profit-sharing from collaborations. Net sales totaled € 15,327 million in 2017 (2016: € 15,024 million), which represented an increase of 2.0% compared with 2016. The breakdown of net sales is presented in the Segment Reporting in Note (32) "Information by business sector/country and region.".

(8) Cost of sales

Cost of sales primarily included the cost of manufactured products sold as well as merchandise sold. Cost comprises overheads and, if necessary, inventory write-downs, in addition to directly attributable costs, such as the cost of materials, personnel and energy, as well as depreciation/amortization. On the occasion of the 350th anniversary of the company in 2018, a promise of a one-time bonus was made to employees of the Group. This led to an expense of € 13 million within cost of sales.

(9) Marketing and selling expenses

Marketing and selling expenses comprised the following:

€ million	**2017**	2016
Sales force	–1,033	–1,063
Internal sales services	–852	–903
Sales promotion	–630	–598
Logistics	–680	–614
Amortization of intangible assets[1]	–1,017	–1,032
Royalty and license expenses	–227	–177
Other marketing and selling expenses	–263	–140
Marketing and selling expenses	**–4,702**	**–4,526**

[1] Excluding amortization of internally generated or separately acquired software.

Amortization of intangible assets was mainly attributable to customer relationships, marketing authorizations, licenses and similar rights, brands and trademarks, which could be functionally allocated to Marketing and Selling.

€ 90 million (2016: € 97 million) of royalty, license and commission expenses related to the commercialization of Erbitux® outside the United States and Canada, while € 44 million of the license expenses arose in connection with the amended commercialization structure for Glucophage® in China with the distribution partner Bristol-Myers Squibb (see Note (5) "Collaborations of material significance").

(10) Research and development costs

Research and development costs totaled € 2,140 million in 2017 (2016: € 1,976 million).

Reimbursements for research and development amounting to € 29 million (2016: € 84 million) were offset against research and development costs. This figure also included government subsidies of € 6 million (2016: € 3 million). As in the previous year, the reimbursements were mainly from the strategic alliance with Pfizer Inc., USA, in the field of immuno-oncology.

The breakdown of research and development costs by region is presented in the Segment Reporting (see Note (32) "Information by business sector/country and region").

(11) Other operating income

Other operating income was as follows:

€ million	2017	2016
Income from milestone payments, rights and royalties	568	317
Gains on disposal of businesses and non-current assets	352	483
Reversals of allowances for receivables	97	59
Reversals of impairment losses on non-current assets	87	1
Income from miscellaneous services	12	18
Gains from the release of provisions for litigation	10	23
Remaining other operating income	101	95
Other operating income	**1,227**	**996**

The income from milestone payments, rights and royalties of € 568 million (2016: € 317 million) primarily resulted from the collaboration agreement entered into with Pfizer Inc., USA, in 2014 in the field of immuno-oncology. This related to milestone payments received in the amount of € 124 million due to the marketing authorizations of Bavencio® in 2017 as well as to the pro rata recognition of deferred income from the upfront payment as well as the value of the right to co-promote Xalkori® in the amount of € 191 million (2016: € 191 million) (see Note (5) "Collaborations of material significance"). Income from royalties was mainly due to an agreement about a one-off payment of € 116 million as settlement for license payments due in the future as well as due to a license for interferon beta products (Biogen Inc., USA) in the amount of € 87 million.

The gains on disposal of businesses and non-current assets of € 352 million (2016: € 483 million) were mainly attributable to the sale of the Biosimilars business activities (€ 319 million). The gains in the prior year related to the sale of the rights to Kuvan® (€ 330 million), the deconsolidation of the Venezuelan entities (€ 50 million) as well as the disposal of other equity investments.

The reversals of allowances for receivables in the amount of € 97 million (2016: € 59 million) included receivables from Mylan Inc., USA, in the amount of € 20 million in connection with the sales of the Generics business in 2007. Moreover, in fiscal 2017, the improved solvency, above all in relation to customers from the Middle East, resulted in reversals of allowances for receivables.

The reversals of impairment losses on non-current assets of € 87 million (2016: € 1 million) were attributable to the biopharmaceutical production plant in Corsier-sur-Vevey, Switzerland, due to improved expectations as regards capacity utilization, primarily owing to the marketing authorizations for Bavencio® (€ 69 million), as well as to the intangible asset for cladribine as a result of the marketing authorization of Mavenclad® (€ 17 million).

The remaining other operating income included, among other things, gains in the amount of € 47 million (2016: € 0 million) from the reclassification of foreign exchange differences from equity to profit or loss due to capital decreases at subsidiaries.

(12) Other operating expenses

The breakdown of other operating expenses was as follows:

€ million	2017	2016
Integration costs/IT costs	–160	–193
Litigation	–108	–104
Impairment losses	–86	–134
Restructuring costs	–77	–22
Non-income-related taxes	–55	–68
Premiums, fees and contributions	–41	–65
Employee bonus for the 350-year anniversary	–40	–
Allowances for receivables	–39	–52
Profit share expenses	–27	–39
Losses on disposal of businesses and non-current assets	–25	–22
Costs of examining strategic options for the Consumer Health business	–24	–
Expenses for miscellaneous services	–14	–15
Project costs	–7	–11
Acquisition costs	–6	–7
Exchange rate differences from operating activities (net)	–3	–57
Remaining other operating expenses	–225	–192
Other operating expenses	**–937**	**–981**

Integration and IT costs amounting to € 160 million (2016: € 193 million) were incurred for the global harmonization of the IT landscape and in connection with the integration of acquired and existing businesses. In 2016, this related mainly to the Sigma-Aldrich integration.

Litigation expenses amounting to € 108 million (2016: € 104 million) arose primarily in connection with the antitrust review proceedings for the Sigma-Aldrich acquisition (see Note (50) “Subsequent Events”).

The restructuring costs amounting to € 77 million (2016: € 22 million) arose mainly in connection with the planned closure of German sites of the Life Science business sector as well as the relocation of the shared service organization. These related mainly to personnel measures. In addition, restructuring costs arose in connection with the reorganization of businesses in the Healthcare business sector. In 2016, restructuring costs were primarily incurred in connection with the “Fit for 2018” transformation and growth program and also related mainly to personnel measures.

On the occasion of the 350th anniversary of the company in 2018, a promise of a one-time bonus was made to employees of the Group. This led to an expense of € 40 million in other operating expenses.

Additionally, other operating expenses also included special environmental protection costs as well as personnel expenses not allocable to the functional areas.

The restructuring costs and impairment losses as well as personnel expenses for the one-time bonus as part of the company's 350th anniversary contained in other operating expenses were allocable to functional costs as follows:

€ million	**2017**	2016
Restructuring costs	–77	–22
thereof: marketing and selling expenses	–30	–3
thereof: administration expenses	–43	–19
thereof: research and development costs	–	–
thereof: other operating expenses	–3	–
Impairment losses	–86	–134
thereof: cost of sales	–6	–19
thereof: marketing and selling expenses	–33	–93
thereof: administration expenses	–	–2
thereof: research and development costs	–33	–14
thereof: other operating expenses	–14	–5
Employee bonus for the 350-year anniversary	–40	–
thereof: marketing and selling expenses	–12	–
thereof: administration expenses	–22	–
thereof: research and development costs	–5	–
thereof: other operating expenses	–1	–

(13) Financial result

€ million	**2017**	2016
Interest income and similar income	26	20
Interest expenses and similar expenses	–283	–277
Interest expenses from interest rate derivatives	–13	–13
Interest result	**–271**	**–270**
Interest component of the additions to pension provisions and other non-current provisions	–52	–52
Currency differences from financing activities	22	–4
Financial result	**–300**	**–326**

Currency differences from financing activities mainly included gains or losses from hedging intragroup transactions in foreign currency.

(14) Income tax

€ million	2017	2016
Current income taxes in the period	–780	–671
Income taxes for previous periods	–12	–19
Deferred taxes in the period	1,179	168
Income tax	**386**	**–521**

IMPACT OF TAX REFORM IN THE UNITED STATES

On December 22, 2017, extensive changes in tax legislation were enacted in the United States as a result of the U.S. tax reform "Tax Cuts and Jobs Act". The changes resulting from the U.S. tax reform are very complex and extensive and relate to both current taxes and the measurement of deferred taxes in fiscal 2017. They were analyzed by the Group and had the following material effects:

- The remeasurement of deferred taxes resulting from measurement differences of assets and liabilities using the changed Federal Tax Rate of 21% (previously 35%) led to deferred tax income of € 619 million. This was mainly the result of measurement differences in relation to intangible assets recognized primarily in connection with the acquisition of Sigma-Aldrich Corporation, USA, in fiscal 2015 in the United States.
- The reversal of deferred tax liabilities from outside basis differences for planned dividend payouts resulted in tax income in the amount of € 401 million.
- The new rules for the taxation of gains from foreign subsidiaries (tax toll charge) led to additional taxes to be paid on prior-period income which had not been subject to taxes and increased current tax expenses by € 114 million (see Note (29) "Other liabilities").

TAX RECONCILIATION

The following table presents the tax reconciliation from theoretical income tax expense to income tax expense according to the consolidated income statement. The theoretical income tax expense is determined by applying the statutory tax rate of a corporation headquartered in Darmstadt. As a result of the increase in the trade tax rate of the city of Darmstadt to 454% in 2017 (2016: 425%), the tax rate increased by one percentage point to 31.7% (2016: 30.7%).

€ million	2017	2016
Profit before income tax	2,224	2,154
Tax rate	31.7%	30.7%
Theoretical income tax expense	–705	–661
Tax rate differences	248	235
Tax effect of companies with a negative contribution to consolidated profit	–72	–38
Income taxes for previous periods	–12	–19
Tax credits	196	4
Tax effect on tax loss carryforwards	1	1
Tax effect of non-deductible expenses/Tax-free income/Other tax effects	730	–43
thereof: from the U.S. tax reform (deferred taxes on temporary differences)	*619*	–
thereof: from the U.S. tax reform (deferred taxes on outside basis differences)	*401*	–
thereof: from the U.S. tax reform (one-time transition tax on foreign earnings)	*–114*	–
Income tax expense according to consolidated income statement	**386**	**–521**
Effective tax rate according to consolidated income statement	–17.3%	24.2%

Income taxes consisted of corporation and trade taxes for the companies domiciled in Germany as well as comparable income taxes for foreign companies.

The higher tax credits arose primarily in the United States due to the consideration of dividend income. However, this dividend income was also taxable in the United States; the related tax expense of € 227 million was included under "Tax effect of non-deductible expenses/Tax-free income/Other tax effects." This item also includes the effects of U.S. tax reform on deferred taxes.

After eliminating the effects of U.S. tax reform, the effective tax rate for the Group was in the lower range of the expected bandwidth between 23% and 25%.

DEFERRED TAXES AS REPORTED IN THE CONSOLIDATED INCOME STATEMENT

The reconciliation between deferred taxes in the consolidated balance sheet and deferred taxes in the consolidated income statement is presented in the following table:

€ million	**2017**	2016[1]
Change in deferred tax assets (consolidated balance sheet)	93	–37
Change in deferred tax liabilities (consolidated balance sheet)	1,235	202
Change in deferred taxes credited/debited to equity	15	–85
Changes in scope of consolidation/currency translation/other changes	–164	88
Deferred taxes (consolidated income statement)	**1,179**	**168**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

Deferred taxes for remeasurements of the net liability from defined benefit pension plans and other benefit commitments recognized in other comprehensive income led to an increase in equity of € 2 million (2016: increase in equity of € 79 million). Fair value changes of available-for-sale financial assets and of derivatives used for hedging purposes recognized in other comprehensive income resulted in a decrease in equity from deferred taxes in the amount of € 32 million (2016: increase in equity of € 11 million). The aforementioned effects on equity are reported in the statement of comprehensive income.

The item "Changes in scope of consolidation/currency translation/other changes" primarily includes currency translation effects of € –196 million (2016: € 9 million) that mainly result from exchange rate changes between the euro and the U.S. dollar.

CHANGES IN TAX LOSS CARRYFORWARDS

Tax loss carryforwards were structured as follows:

	Dec. 31, 2017			Dec. 31, 2016		
€ million	**Germany**	**Abroad**	**Total**	Germany	Abroad	Total
Tax loss carryforwards	117	1,054	**1,171**	88	959	**1,047**
Tax loss carryforwards for which a deferred tax asset is recognized	56	160	**216**	13	322	**335**
Tax loss carryforwards for which no deferred tax asset is recognized	61	894	**955**	75	637	**712**
Recognized deferred tax assets	19	269	**288**	13	230	**243**
Recognized deferred tax assets on tax loss carryforwards	7	25	**32**	2	74	**76**
Not recognized deferred tax assets on tax loss carryforwards	12	244	**256**	11	156	**167**

The vast majority of the tax loss carryforwards either has no expiry date or can be utilized for up to 20 years. In 2017, the income tax expense was reduced by € 1 million (2016: € 1 million) due to the utilization of tax loss carryforwards from prior years for which no deferred tax asset had been recognized in prior periods.

DEFERRED TAXES AS REPORTED IN THE CONSOLIDATED BALANCE SHEET

Deferred tax assets and liabilities correspond to the following balance sheet items:

	Dec. 31, 2017		Dec. 31, 2016[1]	
€ million	**Assets**	**Liabilities**	Assets	Liabilities
Intangible assets	111	1,555	71	2,727
Property, plant and equipment	23	98	25	114
Current and non-current financial assets	5	41	4	11
Inventories	554	14	589	14
Current and non-current receivables/Other assets	21	2	27	2
Provisions for pensions and other post-employment benefits	485	92	460	85
Current and non-current other provisions	190	35	355	41
Current and non-current liabilities	69	9	106	13
Tax loss carryforwards	32	–	76	–
Tax refund claims/Other	58	86	50	467
Deferred taxes (before offsetting)	**1,548**	**1,931**	**1,764**	**3,475**
Offset deferred tax assets and liabilities	–442	–442	–751	–751
Deferred taxes (consolidated balance sheet)	**1,106**	**1,489**	**1,013**	**2,724**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments" .

In addition to deferred tax assets on tax loss carryforwards amounting to € 32 million (December 31, 2016: € 76 million), deferred tax assets of € 1,074 million were recognized for temporary differences (December 31, 2016: € 937 million).

The significant decline in deferred tax liabilities in the item "Tax refund claims/other" resulted from planned dividend payouts in the United States that will generally be tax-exempt in future pursuant to the U.S. tax reform and will therefore no longer represent a future tax burden for the Group. Deferred tax liabilities from outside basis differences for planned dividend payouts were recorded in the amount of € 17 million (December 31, 2016: € 466 million).

Temporary differences relating to the retained earnings of subsidiaries, for which no deferred taxes are recognized, amounted to € 2,856 million (December 31, 2016: € 5,669 million).

(15) Earnings per share

Basic earnings per share are calculated by dividing the profit after tax (net income of the Group) attributable to the shareholders of Merck KGaA, Darmstadt, Germany, by the weighted average number of theoretical shares outstanding. The use of a theoretical number of shares takes into account the fact that the general partner's capital is not represented by shares. The share capital of € 168 million was divided into 129,242,252 shares. Accordingly, the general partner's capital of € 397 million was divided into 305,535,626 theoretical shares. Overall, the total capital thus amounted to € 565 million or 434,777,878 theoretical shares outstanding. The weighted average (basic) number of shares in 2017 was likewise 434,777,878.

The calculation of diluted earnings per share has to take into account a potential dilution effect arising from the announced free grant of shares of Merck KGaA, Darmstadt, Germany, to eligible employees on the occasion of the 350th anniversary of the company in 2018. While the necessary shares will be purchased in 2018 on the market and an issue of new shares is not planned, the announced share grant of Merck KGaA, Darmstadt, Germany, led to an increase in the weighted average (diluted) number of shares by 1,149 shares to 434,779,027 shares in accordance with IAS 33. However, this did not lead to an arithmetical dilution effect on the indicator so that diluted earnings per share were equivalent to basic earnings per share.

Notes to the Consolidated Balance Sheet

(16) Goodwill

	Goodwill[1]			
€ million	Healthcare	Life Science	Performance Materials	**Total**
Cost at January 1, 2016	**1,823**	**11,272**	**1,397**	**14,492**
Changes in scope of consolidation	–3	92	–	89
Additions	–	–	–	–
Disposals	–	–	–	–
Transfers	–	–	–	–
Classification as held for sale or transfer to a disposal group	–9	–	–	–9
Currency translation	–	387	55	443
December 31, 2016	**1,811**	**11,752**	**1,452**	**15,015**
Accumulated amortization and impairment losses, January 1, 2016	**–**	**–**	**–**	**–**
Changes in scope of consolidation	–	–	–	–
Impairment losses	–	–	–	–
Disposals	–	–	–	–
Transfers	–	–	–	–
Reversals of impairment losses	–	–	–	–
Classification as held for sale or transfer to a disposal group	–	–	–	–
Currency translation	–	–	–	–
December 31, 2016	**–**	**–**	**–**	**–**
Net carrying amount as of December 31, 2016	**1,811**	**11,752**	**1,452**	**15,015**
Cost at January 1, 2017	**1,811**	**11,752**	**1,452**	**15,015**
Changes in scope of consolidation	–	17	–	17
Additions	–	–	–	–
Disposals	–	–	–	–
Transfers	–	–	–	–
Classification as held for sale or transfer to a disposal group	–25	–	–	–25
Currency translation	–1	–1,250	–174	–1,425
December 31, 2017	**1,785**	**10,519**	**1,278**	**13,582**
Accumulated amortization and impairment losses, January 1, 2017	**–**	**–**	**–**	**–**
Changes in scope of consolidation	–	–	–	–
Impairment losses	–	–	–	–
Disposals	–	–	–	–
Transfers	–	–	–	–
Reversals of impairment losses	–	–	–	–
Classification as held for sale or transfer to a disposal group	–	–	–	–
Currency translation	–	–	–	–
December 31, 2017	**–**	**–**	**–**	**–**
Net carrying amount as of December 31, 2017	**1,785**	**10,519**	**1,278**	**13,582**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

Goodwill was incurred mainly in connection with the acquisition of the Sigma-Aldrich Corporation, AZ Electronic Materials S.A., the Millipore Corporation, and Serono SA. The changes in goodwill caused by foreign exchange rates resulted almost exclusively from translating the goodwill from the acquisitions of the Sigma-Aldrich Corporation, AZ Electronic Materials S.A. and the Millipore Corporation, part of which is carried in U.S. dollars, into the reporting currency. Further information about changes in the scope of consolidation due to the acquisition of BioControl Systems, Inc. can be found in Note (4) "Acquisitions and divestments."

The reclassification to assets held for sale referred to the disposal of the Biosimilars business activities (see Note (4) "Acquisitions and divestments").

As in the prior year, goodwill was not subject to impairment in fiscal 2017. The assumptions used for the goodwill impairment tests are presented in Note (6) "Management judgments and sources of estimation uncertainty."

(17) Other intangible assets

€ million	Customer relationships, brands and trademarks	Marketing authorizations, patents, licenses, similar rights and other[1]		Software and software in development[2]	Advance payments[2]	**Total[1]**
		Finite useful life	Not yet available for use			
Cost at January 1, 2016	**7,743**	**10,712**	**757**	**529**	**–**	**19,741**
Changes in scope of consolidation	35	21	–	–	–	56
Additions	–	16	12	107	–	136
Disposals	–	–1	–2	–10	–	–13
Transfers	–3	–	–	7	–	4
Classification as held for sale or transfer to a disposal group	–	–	–2	–	–	–2
Currency translation	236	76	–	5	–	317
December 31, 2016	**8,011**	**10,824**	**766**	**639**	**–**	**20,239**
Accumulated amortization and impairment losses, January 1, 2016	**–1,052**	**–6,896**	**–574**	**–289**	**–**	**–8,811**
Changes in scope of consolidation	–	–	–	–	–	–
Amortization	–464	–754	–	–59	–	–1,277
Impairment losses	–17	–77	–12	–12	–	–118
Disposals	–	–	2	10	–	12
Transfers	3	–	–	–	–	3
Reversals of impairment losses	–	–	–	–	–	–
Classification as held for sale or transfer to a disposal group	–	–	–	–	–	–
Currency translation	–30	–32	–	–6	–	–69
December 31, 2016	**–1,560**	**–7,759**	**–585**	**–356**	**–**	**–10,259**
Net carrying amount as of December 31, 2016	**6,451**	**3,065**	**181**	**283**	**–**	**9,980**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".
[2] As of 2017, software in development and software are shown in one category; previous year's figures have been adjusted.

€ million	Customer relationships, brands and trademarks	Marketing authorizations, patents, licenses, similar rights and other[1]		Software and software in development[2]	Advance payments[2]	**Total[1]**
		Finite useful life	Not yet available for use			
Cost at January 1, 2017	**8,011**	**10,824**	**766**	**639**	**–**	**20,239**
Changes in scope of consolidation	–1	21	–	–	–	20
Additions	–	24	263	110	1	398
Disposals	–	–1	–5	–27	–	–32
Transfers	–2	6	–8	8	–2	4
Classification as held for sale or transfer to a disposal group	–	–	2	–	–	2
Currency translation	–838	–190	–1	–25	–	–1,053
December 31, 2017	**7,171**	**10,685**	**1,017**	**705**	**–**	**19,577**
Accumulated amortization and impairment losses, January 1, 2017	**–1,560**	**–7,759**	**–585**	**–356**	**–**	**10,259**
Changes in scope of consolidation	–	–	–	–	–	–
Amortization	–451	–751	–	–41	–	–1,243
Impairment losses	–	–50	–17	–	–	–67
Disposals	–	1	5	27	–	33
Transfers	–	2	–	–2	–	1
Reversals of impairment losses	–	17	–	–	–	17
Classification as held for sale or transfer to a disposal group	–	–	–	–	–	–
Currency translation	142	100	1	15	–	258
December 31, 2017	**–1,868**	**–8,438**	**–596**	**–357**	**–**	**11,260**
Net carrying amount as of December 31, 2017	**5,303**	**2,246**	**421**	**348**	**–**	**8,317**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".
[2] As of 2017, software in development and software are shown in one category; previous year's figures have been adjusted.

The carrying amounts of customer relationships, brands and trademarks as well as marketing authorizations, patents, licenses, similar rights and other were attributable to the business sectors as follows:

€ million	Remaining useful life in years	Healthcare	Life Science	Performance Materials	**Total Dec. 31, 2017**	Total Dec. 31, 2016[1]
Customer relationships, brands and trademarks		**3**	**5,135**	**165**	**5,303**	**6,451**
Customer relationships	0.5 – 19.9	–	4,265	157	4,422	5,342
thereof: acquisition of Sigma-Aldrich Corporation	*18.9 – 19.9*	–	*3,536*	*157*	*3,693*	*4,425*
thereof: acquisition of Millipore Corporation	*0.5 – 9.5*	–	*681*	–	*681*	*859*
Brands and trademarks	1.0 – 9.9	3	870	8	881	1,109
thereof: acquisition of Sigma-Aldrich Corporation	*9.9*	–	*695*	–	*695*	*864*
Marketing authorizations, patents, licenses, similar rights and other						
Finite useful life		**1,074**	**390**	**780**	**2,246**	**3,065**
Rebif®	2.0	737	–	–	737	1,105
Gonal-f®	1.0	95	–	–	95	190
Xalkori®	4.0	93	–	–	93	153
Saizen®	2.0	62	–	–	62	92
Other marketing authorizations	–	49	–	–	49	68
Technologies	0.1 – 15.3	–	384	771	1,156	1,420
thereof: acquisition of AZ Electronic Materials S.A.	*3.3 – 15.3*	–	–	*741*	*741*	*918*
Others	–	38	6	9	54	37
Not yet available for use	**–**	**421**	**–**	**–**	**421**	**181**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

The changes in the scope of consolidation in 2016 mainly included the additions to intangible assets resulting from the acquisition of BioControl Systems, Inc., USA. In fiscal 2017, the changes in the scope of consolidation largely include additions to intangible assets from the acquisition of Natrix Separations, Inc., Canada, and Grzybowski Scientific Inventions Ltd., USA, as well as the changes from the initial consolidation of Merck Window Technologies B.V., Eindhoven, Netherlands, a subsidiary of Merck KGaA, Darmstadt, Germany. The acquisitions are detailed in Note (4) "Acquisitions and divestments".

The net carrying amount of marketing authorizations, patents, licenses, similar rights and other with finite useful lives amounting to € 2,246 million (December 31, 2016: € 3,065 million[1]) mainly included the identified and capitalized intangible assets in connection with the acquisition of the Sigma-Aldrich Corporation, AZ Electronic Materials S.A., the Millipore Corporation, and Serono SA. The capitalized customer relationships under customer relationships, brands and trademarks are mainly attributable to these acquisitions (December 31, 2017: € 5,303 million; December 31, 2016: € 6,451 million[1]).

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

The additions to intangible assets with finite useful lives amounted to € 24 million in 2017 (2016: € 16 million), and were largely attributable to the Healthcare (€ 10 million) and Life Science (€ 9 million) business sectors.

In fiscal 2017, impairment losses on marketing authorizations, patents, licenses, similar rights and other with finite useful lives totaled € 50 million (2016: € 77 million), of which € 33 million related to the Healthcare business sector. They referred to the co-promotion right for Xalkori® and were attributable to the revised profit forecasts. In addition, technologies no longer used led to an impairment loss of € 17 million in the Performance Materials business sector. These items were recorded in the consolidated income statement in impairment losses under other operating expenses.

Reversals of impairment losses on intangible assets with finite useful lives in the amount of € 17 million (2016: € 0 million) were recognized in fiscal 2017 in the Healthcare business sector. The reversal up to amortized cost was attributable to the marketing authorization of the multiple sclerosis drug Mavenclad®. The item was reported in the consolidated income statement under other operating income as reversals of impairment losses from non-current assets.

The additions to marketing authorizations, patents, licenses, similar rights and other not yet available for use amounted to € 263 million in fiscal 2017 (2016: € 12 million) and were attributable almost entirely to the Healthcare business sector. Above all, the additions resulted from a license agreement with Vertex Pharmaceuticals Inc., USA, which comprised the purchase of two clinical as well as further novel pre-clinical research programs in the areas of oncology and immuno-oncology.

The impairment losses for marketing authorizations, patents, licenses, similar rights and other not yet available for use amounted to € 17 million (2016: € 12 million) and were related to the Healthcare business sector. Of that amount, € 13 million were attributable to the partial impairment of a compound in connection with the license agreement concluded with Vertex Pharmaceuticals Inc., USA. The impairment was reported in the consolidated income statement in impairment losses under other operating expenses.

The additions to software and software in development in the amount of € 110 million (2016: € 107 million) were mainly attributable to new ERP developments in the Life Science (€ 45 million) and Healthcare (€ 42 million) business sectors.

The reclassification to assets held for sale were made in connection with the disposal of the Biosimilars businesses (see Note (4) “Acquisitions and divestments”).

In 2017, borrowing costs of € 7 million (2016: € 3 million) directly allocable to qualified assets were capitalized.

(18) Property, plant and equipment

€ million	Land, land rights and buildings, including buildings on third-party land[1]	Plant and machinery[1]	Other facilities, operating and office equipment	Construction in progress and advance payments to vendors and contractors	Total[1]
Cost at January 1, 2016	**3,284**	**3,879**	**1,091**	**592**	**8,846**
Changes in the scope of consolidation	–2	–9	–7	–	–18
Additions	17	36	32	669	753
Disposals	–59	–82	–68	–4	–214
Transfers	154	221	78	–460	–8
Classification as held for sale or transfer to a disposal group	–41	–2	–	–	–42
Currency translation	37	26	11	12	85
December 31, 2016	**3,391**	**4,068**	**1,136**	**807**	**9,402**
Accumulated depreciation and impairment losses January 1, 2016	**–1,289**	**–2,732**	**–817**	**–**	**–4,838**
Changes in the scope of consolidation	–	8	5	–	13
Depreciation	–147	–281	–100	–	–529
Impairment losses	–4	–1	–2	–4	–11
Disposals	47	78	64	–	189
Transfers	3	–3	–	–	–
Reversals of impairment losses	1	1	–	–	1
Classification as held for sale or transfer to a disposal group	41	1	–	–	41
Currency translation	–13	–19	–7	–	–38
December 31, 2016	**–1,361**	**–2,949**	**–858**	**–4**	**–5,171**
Net carrying amount as of December 31, 2016	**2,030**	**1,119**	**279**	**804**	**4,231**
Cost at January 1, 2017	**3,391**	**4,068**	**1,136**	**807**	**9,402**
Changes in the scope of consolidation	49	2	–24	–	28
Additions	30	54	35	818	936
Disposals	–50	–142	–34	–16	–241
Transfers	184	258	96	–543	–5
Classification as held for sale or transfer to a disposal group	41	–2	–	–	39
Currency translation	–131	–103	–33	–40	–306
December 31, 2017	**3,514**	**4,136**	**1,176**	**1,026**	**9,852**
Accumulated depreciation and impairment losses January 1, 2017	**–1,361**	**–2,949**	**–858**	**–4**	**–5,171**
Changes in the scope of consolidation	–31	2	21	–	–9
Depreciation	–147	–266	–103	–	–516
Impairment losses	–2	–2	–	–	–5
Disposals	39	138	32	–	209
Transfers	–	–	–	–	–
Reversals of impairment losses	35	35	–	–	69
Classification as held for sale or transfer to a disposal group	–41	1	–	–	–40
Currency translation	37	63	21	–	122
December 31, 2017	**–1,472**	**–2,978**	**–886**	**–4**	**–5,340**
Net carrying amount as of December 31, 2017	**2,042**	**1,158**	**291**	**1,022**	**4,512**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

Changes in the scope of consolidation in 2016 mainly included the additions to property, plant and equipment from the acquisition of BioControl Systems, Inc., USA, as well as the disposals owing to the divestment of the Pakistani subsidiaries and the deconsolidation of the Venezuelan entities. A detailed presentation of these acquisitions can be found in Note (4) "Acquisitions and divestments". In fiscal 2017, the changes in the scope of consolidation in particular comprise additions to property, plant and equipment from the first-time consolidation of Merck Wohnungs- und Grundstücksverwaltungsgesellschaft mbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, and Merck Window Technologies B.V., Eindhoven, Netherlands, a subsidiary of Merck KGaA, Darmstadt, Germany.

Material additions to construction in progress were attributable to the expansion of global headquarters, the construction of an Innovation Center and a new laboratory building at the Darmstadt site as well as the construction of a new Life Science facility in the United States. In addition, investments were made in production sites in China, Italy, the United States and Germany. Transfers relating to construction in progress mainly included completed subprojects within the context of the construction works at Group headquarters in Darmstadt as well as investments in the United States, France, China, and Switzerland.

In 2017, impairment losses amounted to € 5 million (2016: € 11 million). They mainly related to assets attributable to the Life Science business sector. Reversals of impairment losses were immaterial overall. The reversals of impairment losses in fiscal 2017 in the amount of € 69 million (2016: € 1 million) were fully attributable to the Healthcare business sector and the write-up of the biopharmaceutical production plant in Corsier-sur-Vevey, Switzerland. As a result of improved expectations regarding capacity utilization of the production plant, mainly due to the authorizations of the immuno-oncology product Bavencio®, which is to be produced in this plant, a write-up to the amortized remaining carrying amount was recognized. The plant was impaired in fiscal 2011 by € 165 million.

The reclassification to assets held for sale were made in connection with the disposal of the Biosimilars businesses (see Note (4) "Acquisitions and divestments").

Directly allocable borrowing costs on qualified assets in the amount of € 5 million (2016: € 6 million) were capitalized.

The carrying amounts of assets classified as finance leases were as follows:

€ million	**Dec. 31, 2017**	Dec. 31, 2016
Land and buildings	5	4
Vehicles	–	1
Other property, plant and equipment	1	1
Net carrying amount of assets classified as finance lease	**5**	**6**

(19) Financial assets

€ million	**current**	**non-current**	**Dec. 31, 2017**	current	non-current	Dec. 31, 2016
Available-for-sale financial assets	35	420	454	43	191	233
Loans and receivables	47	12	59	44	10	55
Derivative assets (financial transactions)	9	13	22	59	17	76
Financial assets	**90**	**444**	**535**	**145**	**218**	**364**

Current available-for-sale financial assets included bonds amounting to € 26 million (December 31, 2016: € 29 million).

Non-current available-for-sale financial assets mainly included entitlements related to contingent consideration amounting to € 266 million (December 31, 2016: € 38 million) in connection with the divestment of the Biosimilars business (see Note (4) "Acquisitions and divestments") and Kuvan®. In addition, the item included investments in companies amounting to € 121 million (December 31, 2016: € 112 million) and investments in subsidiaries that were not consolidated due to their minor significance in the amount of € 1 million (December 31, 2016: € 24 million).

Impairment losses were recognized for investments in companies and other non-current financial assets held for sale in a total amount of € 14 million (2016: € 5 million). Positive and negative fair value adjustments recognized in equity offset each other in 2017 (2016: € 50 million). The prior-year amount included fair value adjustments previously recognized in equity in the amount of € 31 million that were reclassified to the consolidated income statement upon the disposal of a minority shareholding.

The loans and receivables contained in financial assets are neither past due nor impaired.

(20) Other assets

Other assets comprised:

€ million	current	non-current	Dec. 31, 2017	current[1]	non-current	Dec. 31, 2016[1]
Other receivables	247	29	276	272	5	277
Derivative assets (operative)	30	62	92	7	5	12
Financial items	**277**	**91**	**367**	**279**	**10**	**289**
Receivables from non-income related taxes	239	38	277	205	29	234
Prepaid expenses	99	8	107	71	12	82
Assets from defined benefit plans	1	–	1	–	–	–
Remaining other assets	115	69	184	118	81	199
Non-financial items	**454**	**114**	**568**	**394**	**121**	**515**
Other assets	**731**	**205**	**936**	**672**	**131**	**804**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

Other receivables included current receivables from related parties amounting to € 141 million (December 31, 2016: € 124 million). They resulted from refund claims to companies from taxes paid for the account of such companies.

Other receivables also comprised license receivables in the amount of € 28 million (December 31, 2016: € 38 million).

The changes in non-current assets from derivatives (operative) (€ 62 million; December 31, 2016: € 5 million) were mainly attributable to the purchase of an option on equity instruments.

The carrying amounts of other receivables from third parties were as follows:

€ million	Dec. 31, 2017	Dec. 31, 2016
Neither past due nor impaired	258	270
Past due, but not impaired		
up to 3 months	4	3
up to 6 months	7	–
up to 12 months	1	2
up to 24 months	6	1
over 2 years	–	–
Impaired	–	–
Other receivables	**276**	**277**

In 2017, a reversal of an impairment loss for other receivables was recognized in the amount of € 20 million (2016: € 0 million). The reversal was made in connection with contractual refund claims from the sale of the Generics business in 2007.

As in the prior year, there were no new allowances for other receivables in 2017.

(21) Inventories

This item comprised:

€ million	Dec. 31, 2017	Dec. 31, 2016[1]
Raw materials and supplies	481	501
Work in progress	795	694
Finished goods/goods for resale	1,355	1,415
Inventories	**2,632**	**2,609**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

Write-downs of inventories in 2017 amounted to € 154 million (2016: € 236 million); reversals amounted to € 110 million (2016: € 59 million).

The lower write-downs and the higher reversal of write-downs recorded in prior periods in relation to inventories were mainly due to process optimization measures in the supply chains of the Life Science business sector due to the further advanced Sigma-Aldrich integration and the related improved availability and usability of finished goods and goods for resale.

As of the balance sheet date, no inventories were pledged as security for liabilities.

(22) Trade accounts receivable

The maturity structure of the carrying amounts of trade accounts receivable was as follows:

€ million	Dec. 31, 2017	Dec. 31, 2016
Neither past due nor impaired	2,391	2,458
Past due, but not impaired	–	
up to 3 months	392	232
up to 6 months	50	20
up to 12 months	32	8
up to 24 months	7	3
over 2 years	1	1
Impaired	51	168
Trade accounts receivable	**2,923**	**2,889**

The corresponding allowances developed as follows:

€ million	2017	2016
January 1	**–464**	**–165**
Additions	–39	–52
Reversals/Utilizations	99	76
Change in scope of consolidation	–	–302
Currency translation and other changes	37	–20
December 31	**–367**	**–464**

In fiscal 2017, previously recognized allowances were reversed as a result of the improved solvency of customers, particularly in the Middle East. The increase in allowances from changes in the scope of consolidation in 2016 resulted from the receivables attributable to the deconsolidated Venezuelan entities, for which impairment losses in the full amount had been recognized.

In the period from January 1 to December 31, 2017, trade accounts receivable in Italy with a nominal value of € 25 million were sold for € 24 million. Previous impairments in this context amounting to € 1 million were reversed and disclosed under other operating income. The sold receivables do not involve any further rights of recovery against the Group.

(23) Tax receivables

Income tax receivables amounted to € 490 million (December 31, 2016: € 403 million). Tax receivables resulted primarily from tax prepayments that exceeded the actual amount of tax payable for 2017 and prior fiscal years, and from refund claims for prior years.

(24) Cash and cash equivalents

This item comprised:

€ million	Dec. 31, 2017	Dec. 31, 2016
Cash, bank balances and cheques	481	662
Short-term cash investments (up to 3 months)	108	277
Cash and cash equivalents	**589**	**939**

Changes in cash and cash equivalents as defined by IAS 7 are presented in the consolidated cash flow statement.

Cash and cash equivalents included restricted cash amounting to € 250 million (December 31, 2016: € 238 million). This relates mainly to cash and cash equivalents with subsidiaries which the Group only had restricted access to owing to foreign exchange controls.

The maximum default risk is equivalent to the carrying value of the cash and cash equivalents.

(25) Equity

EQUITY CAPITAL

The total capital of the company consists of the share capital composed of shares and the equity interest held by the general partner E. Merck KG, Darmstadt, Germany. As of the balance sheet date, the company's share capital amounting to € 168 million was divided into 129,242,251 no-par value bearer shares plus one registered share and is disclosed as subscribed capital. Each share therefore corresponds to € 1.30 of the share capital. The amount resulting from the issue of shares by Merck KGaA, Darmstadt, Germany, exceeding the nominal amount was recognized in the capital reserves. The equity interest held by the general partner amounted to € 397 million. As in the prior year, the share capital did not change in fiscal 2017.

SHARE OF NET PROFIT OF E. MERCK KG, DARMSTADT, GERMANY

E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, engage in reciprocal net profit transfers. This makes it possible for E. Merck KG, Darmstadt, Germany, the general partner of Merck KGaA, Darmstadt, Germany, and the shareholders to participate in the net profit/loss of Merck KGaA, Darmstadt, Germany, in accordance with the ratio of the general partner's equity interest and the share capital (70.274% or 29.726% of the total capital).

The allocation of net profit/loss is based on the net income of both E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, determined in accordance with the provisions of the German Commercial Code. These results are adjusted for trade tax and/or corporation tax and create the basis for the allocation of net profit/loss. The adjustment for corporation tax is made to compensate for the difference in the tax treatment between the general partner and the limited liability shareholders. Corporation tax is only calculated on the income received by the limited liability shareholders. Its equivalent is the income tax applicable to the partners of E. Merck KG, Darmstadt, Germany, which has to be paid by them directly. The adjustment thus ensures that the share in net profit corresponds to the respective interests held by the two shareholder groups. The reciprocal net profit/loss transfer between E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, as stipulated by the Articles of Association was as follows:

		2017		2016	
€ million		**E. Merck KG, Darmstadt, Germany**	**Merck KGaA, Darmstadt, Germany**	E. Merck KG, Darmstadt, Germany	Merck KGaA, Darmstadt, Germany
Result of E. Merck KG, Darmstadt, Germany		–16	–	–6	–
Net income of Merck KGaA, Darmstadt, Germany		–	723	–	556
Corporation tax		–	56	–	11
Basis for appropriation of profits	**(100%)**	**–16**	**780**	**–6**	**567**
Profit transfer to E. Merck KG, Darmstadt, Germany Ratio general partner's capital to total capital	(70.274%)	548	–548	398	–398
Profit transfer from E. Merck KG, Darmstadt, Germany Ratio of share capital to total capital	(29.726%)	5	–5	2	–2
Corporation tax		–	–56	–	–11
Net income		**537**	**171**	**394**	**156**

The result of E. Merck KG, Darmstadt, Germany, on which the appropriation of profits adjusted for trade tax is based amounted to € –16 million (2016: € –6 million). This resulted in a profit/loss transfer to Merck KGaA, Darmstadt, Germany, of € –5 million (2016: € –2 million). The net income of Merck KGaA, Darmstadt, Germany, adjusted for corporation tax, on which the appropriation of its profit is based, amounted to € 780 million (2016: € 567 million). Merck KGaA, Darmstadt, Germany, transferred a gain in the amount of € 548 million of its profit to E. Merck KG, Darmstadt, Germany (2016: € 398 million). In addition, an expense from corporation tax charges amounting to € 56 million resulted (2016: expense of € 11 million).

APPROPRIATION OF PROFITS

The profit distribution to be resolved upon by shareholders also defines the amount of that portion of net profit/loss freely available to E. Merck KG, Darmstadt, Germany. If the shareholders resolve to carry forward or to allocate to retained earnings a portion of the net retained profit of Merck KGaA, Darmstadt, Germany, to which they are entitled, then E. Merck KG, Darmstadt, Germany, is obligated to allocate to the profit brought forward/retained earnings of Merck KGaA, Darmstadt, Germany, a comparable sum determined in accordance with the ratio of share capital to general partner's capital. This ensures that the retained earnings and the profit carried forward of Merck KGaA, Darmstadt, Germany, correspond to the ownership ratios of the shareholders on the one hand and E. Merck KG, Darmstadt, Germany, on the other hand. Consequently, for distributions to E. Merck KG, Darmstadt, Germany, only the amount is available that results after netting the profit transfer of Merck KGaA, Darmstadt, Germany, with the amount either allocated or withdrawn by E. Merck KG, Darmstadt, Germany, from retained earnings/profit carried forward. This amount corresponds to the amount that is paid as a dividend to the shareholders, and reflects their pro rata shareholding in the company.

€ million	2017 E. Merck KG, Darmstadt, Germany	2017 Merck KGaA, Darmstadt, Germany	2016 E. Merck KG, Darmstadt, Germany	2016 Merck KGaA, Darmstadt, Germany
Net income	537	171	394	156
Profit carried forward previous year	39	16	37	15
Withdrawal from revenue reserves	–	–	–	–
Transfer to revenue reserves	–	–	–	–
Retained earnings Merck KGaA, Darmstadt, Germany	**–**	**187**		**171**
Withdrawal by E. Merck KG, Darmstadt, Germany	–515	–	–392	
Dividend proposal		–162		–155
Profit carried forward	**60**	**25**	**39**	**16**

For 2016, a dividend of € 1.20 per share was distributed. The dividend proposal for fiscal 2017 will be € 1.25 per share, corresponding to a total dividend payment of € 162 million (2016: € 155 million) to shareholders. The amount withdrawn by E. Merck KG, Darmstadt, Germany, would amount to € 515 million (2016: € 392 million). The withdrawal, which is high as compared to the proposed payout to the limited liability shareholders, is due to the relatively strong increase in corporation tax in the year under review.

APPROPRIATION OF PROFITS AND CHANGES IN RESERVES

€ million	2017 Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany	2017 Merck KGaA, Darmstadt, Germany	2017 Total	2016 Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany	2016 Merck KGaA, Darmstadt, Germany	2016 Total
Profit transfer to E. Merck KG, Darmstadt, Germany	–63	–548	–611	–68	–398	–466
Profit transfer from E. Merck KG, Darmstadt, Germany		–5	–5		–2	–2
Changes in reserves		22	22		2	2
Profit transfer to E. Merck KG, Darmstadt, Germany, including changes in reserves	**–63**	**–531**	**–593**	**–68**	**–398**	**–466**
Result of E. Merck KG, Darmstadt, Germany, before reciprocal profit transfer adjusted for trade tax		–16			–6	
Profit transfer to E. Merck KG, Darmstadt, Germany/withdrawal by E. Merck KG, Darmstadt, Germany	**–63**	**–515**		**–68**	**–392**	

Based on the assumed appropriation of profits, the profit transfer to E. Merck KG, KGaA, Darmstadt, Germany, for 2017, including changes in reserves, amounted to € –593 million. This consisted of the profit transfer to E. Merck KG, Darmstadt, Germany (€ –548 million), the result transfer from E. Merck KG, Darmstadt, Germany, to Merck KGaA, Darmstadt, Germany (€ –5 million), the change in profit carried forward of E. Merck KG, Darmstadt, Germany, (€ 22 million) as well as the profit transfer from Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany, to E. Merck KG, Darmstadt, Germany (€ –63 million). For 2016 the profit transfer to E. Merck KG, Darmstadt, Germany, including changes in reserves amounted to € –466 million. This consisted of the profit transfer to E. Merck KG, Darmstadt, Germany (€ –398 million), the result transfer from E. Merck KG, Darmstadt, Germany, to Merck KGaA, Darmstadt, Germany, (€ –2 million), the change in profit carried forward of E. Merck KG, Darmstadt, Germany, (€ 2 million) as well as the profit transfer from Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany, to E. Merck KG, Darmstadt, Germany (€ –68 million).

Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany, is a partnership under Swiss law that is controlled by Merck KGaA, Darmstadt, Germany, but distributes its operating result directly to E. Merck KG, Darmstadt, Germany. This distribution is a payment to shareholders and is therefore also presented under changes in equity.

The proposed withdrawal of E. Merck KG, Darmstadt, Germany, in the amount of € 515 million (2016: € 392 million) results from the total amount of the profit transfer to E. Merck KG, Darmstadt, Germany, including changes in reserves, and the result of E. Merck KG, Darmstadt, Germany, before reciprocal profit transfer.

NON-CONTROLLING INTERESTS

The calculation of non-controlling interests was based on the stated equity of the subsidiaries concerned after any adjustment required to ensure compliance with the accounting policies of the Group, as well as pro rata consolidation entries.

The net equity and profit attributable to non-controlling interests mainly related to the minority interests in the publicly traded companies Merck Ltd., Mumbai, India, a subsidiary of Merck KGaA, Darmstadt, Germany, and P.T. Merck Tbk, Jakarta, Indonesia, a subsidiary of Merck KGaA, Darmstadt, Germany, as well as in the company Merck Ltd., Bangkok, Thailand, a subsidiary of Merck KGaA, Darmstadt, Germany.

OTHER CHANGES IN EQUITY

On the occasion of the 350th anniversary of the company in 2018, a promise of a one-time grant in the form of shares of Merck KGaA, Darmstadt, Germany, in the amount of € 350 per person was made to employees of the Group in Germany. The shares of Merck KGaA, Darmstadt, Germany, required to issue such awarded shares in 2018 will be purchased by third parties on the market on behalf of the Group and subsequently transferred to the entitled employees. Accordingly, it is not intended to issue new shares. In fiscal 2017, in accordance with IFRS 2, the award led to personnel expenses of € 1 million as well as to a corresponding increase in retained earnings in equity which was recorded in the item “Other”.

(26) Provisions for pensions and other post-employment benefits

Depending on the legal, economic and fiscal circumstances prevailing in each country, different retirement benefit systems are provided for the employees. Generally, these systems are based on the years of service and salaries of the employees. Pension obligations include both defined benefit and defined contribution plans and comprise both obligations from current pensions and accrued benefits for pensions payable in the future. Defined benefit plans are funded and unfunded.

In order to limit the risks of changing capital market conditions and other developments, for many years now newly hired employees have been offered plans that are not based on final salary.

The value recognized in the consolidated balance sheet for pensions and other post-employment benefits was derived as follows:

€ million	Dec. 31, 2017	Dec. 31, 2016
Present value of all defined benefit obligations	**4,707**	**4,698**
Fair value of the plan assets	–2,452	–2,386
Funded status	**2,255**	**2,312**
Effects of asset ceilings	1	1
Net defined benefit liability recognized in the balance sheet	**2,256**	**2,313**
Assets from defined benefit plans	1	–
Provisions for pensions and other post-employment benefits	**2,257**	**2,313**

The calculation of the defined benefit obligations was based on the following actuarial parameters:

	Germany		Switzerland		United Kingdom		Other countries	
	2017	2016	**2017**	2016	**2017**	2016	**2017**	2016
Discount rate	1.90%	1.90%	0.70%	0.60%	2.56%	2.69%	2.99%	3.08%
Future salary increases	2.51%	2.51%	1.80%	1.80%	2.00%	2.53%	3.66%	3.59%
Future pension increases	1.75%	1.75%	–	–	3.04%	3.10%	1.94%	1.68%

These were average values weighted by the present value of the respective benefit obligation.

The defined benefit obligations were based on the following types of benefits provided by the respective plan:

	Germany	Switzerland	United Kingdom	Other countries	Total
€ million	**Dec. 31, 2017**	**Dec. 31, 2017**	**Dec. 31, 2017**	**Dec. 31, 2017**	**Dec. 31, 2017**
Benefit based on final salary					
Annuity	2,710	1	497	92	3,300
Lump sum	–	–	–	105	105
Installments	2	–	–	–	2
Benefit not based on final salary					
Annuity	378	760	–	73	1,211
Lump sum	–	–	7	37	44
Installments	7	–	–	–	7
Other	–	–	–	9	9
Medical plan	–	–	–	29	29
Present value of defined benefit obligations	**3,097**	**761**	**504**	**345**	**4,707**

The main benefit rules are as follows:

Companies in Germany accounted for € 3,097 million of the defined benefit obligations (December 31, 2016: € 2,990 million) as well as for € 1,178 million of the plan assets (December 31, 2016: € 1,116 million). Of these amounts the vast majority in each case were attributable to plans that encompass old-age, disability and surviving dependent pensions. On the one hand, these obligations were based on benefit rules comprising benefit commitments dependent upon years of service and final salary from which newly hired employees have been excluded. On the other hand, the benefit rules applicable to employees newly hired since January 1, 2005 comprise a direct commitment that is not based on the final salary. The benefit entitlement results from the cumulative total of annually determined pension components that are calculated on the basis of a defined benefit expense and an age-dependent annuity table. Statutory minimum funding obligations do not exist.

Pension plans in Switzerland accounted for € 761 million of the defined benefit obligations (December 31, 2016: € 808 million) as well as for € 648 million of the plan assets (December 31, 2016: € 648 million). The agreed benefits comprise old-age, disability and surviving dependent benefits. The employer and the employees make contributions to the plans. Statutory minimum funding obligations exist.

Pension plans in the United Kingdom accounted for € 504 million of the defined benefit obligations (December 31, 2016: € 549 million) as well as for € 469 million of the plan assets (December 31, 2016: € 460 million). These obligations resulted primarily from benefit plans which are based on years of service and final salary and were closed to newly hired employees in 2006. The agreed benefits comprise old-age, disability and surviving dependent benefits. The employer and the employees make contributions to the plans. Statutory minimum funding obligations exist.

In the reporting period, the following items were recognized in income:

€ million	**2017**	2016
Current service cost	–160	–140
Past service cost	–8	18
Gains (+) or losses (–) on settlement	–	11
Other effects recognized in income	–	–3
Interest expense	–86	–92
Interest income	43	51
Total amount recognized as expenses (–)/income (+)	**–211**	**–155**

With the exception of the net balance of interest expense on the defined benefit obligations and interest income from the plan assets, which is recorded under the financial result, the expenses for defined benefit pension systems were allocated to the individual functional areas.

During the reporting period, the present value of the defined benefit obligations changed as follows:

€ million	**Funded benefit obligations**	**Benefit obligations funded by provisions**	**2017**	Funded benefit obligations	Benefit obligations funded by provisions	2016
Present value of the defined benefit obligations on January 1	4,311	387	4,698	3,810	343	4,153
Currency translation differences recognized in equity	–61	–6	–67	–66	2	–64
Currency translation differences recognized in income	–40	–	–40	4	–	4
Current service cost	140	20	160	124	16	140
Past service cost	7	1	8	–18	–	–18
Gains (–) or losses (+) on settlement	–	–	–	–11	–	–11
Interest expense	78	8	86	84	8	92
Actuarial gains (–)/losses (+)	–19	–1	–20	457	35	492
Contributions by plan participants	13	–	13	10	–	10
Pension payments	–112	–15	–127	–101	–8	–109
Changes in the scope of consolidation	–	–	–	–	–2	–2
Other effects recognized in income	3	–	3	–	–	–
Reclassification to liabilities directly related to assets held for sale	–20	–	–20	–	–	–
Other changes	6	7	13	18	–7	11
Present value of the defined benefit obligations on December 31	**4,306**	**401**	**4,707**	**4,311**	**387**	**4,698**

A sensitivity analysis of the key parameters is given in Note (6) "Management judgments and sources of estimation uncertainty".

The fair value of the plan assets changed in the reporting period as follows:

€ million	**2017**	2016
Fair value of the plan assets on January 1	2,386	2,323
Currency translation differences recognized in equity	–46	–62
Currency translation differences recognized in income	–33	3
Interest income from plan assets	43	51
Actuarial gains (+)/losses (–) arising from experience adjustments	121	69
Employer contributions	36	35
Employee contributions	13	10
Pension payments from plan assets	–51	–38
Changes in the scope of consolidation	–	–
Plan administration costs paid from the plan assets recognized in income	–2	–2
Other effects recognized in income	–2	–
Reclassification to liabilities directly related to assets held for sale	–14	–
Other changes	1	–3
Fair value of the plan assets on December 31	**2,452**	**2,386**

The actual return on plan assets amounted to € 164 million in 2017 (2016: € 120 million).

In 2017, the effects of the asset ceilings in accordance with IAS 19.64 changed as follows:

€ million	**2017**	2016
Effects of the asset ceilings on January 1	1	–
Currency translation differences recognized in equity	–	–
Interest expense	–	–
Actuarial gains (–)/losses (+) arising from changes in the effects of the asset ceilings	–	1
Effects of the asset ceilings on December 31	**1**	**1**

The development of cumulative actuarial gains (+) and losses (–) was as follows:

€ million	**2017**	2016
Cumulative actuarial gains (+)/losses (–) recognized in equity on January 1	–1,820	–1,420
Currency translation differences	11	21
Remeasurements of defined benefit obligations		
Actuarial gains (+)/losses (–) arising from changes in demographic assumptions	5	4
Actuarial gains (+)/losses (–) arising from changes in financial assumptions	8	–484
Actuarial gains (+)/losses (–) arising from experience adjustments	7	–12
Remeasurements of plan assets		
Actuarial gains (+)/losses (–) arising from experience adjustments	121	69
Effects of the asset ceilings		
Actuarial gains (+)/losses (–)	–	–1
Reclassification within retained earnings	–	3
Cumulative actuarial gains (+)/losses (–) recognized in equity on December 31	**–1,668**	**–1,820**

Plan assets for funded defined benefit obligations primarily comprised fixed-income securities, stocks, and investment funds. They did not directly include financial instruments issued by Group companies or real estate used by Group companies.

The plan assets serve exclusively to meet the defined benefit obligations. Covering the benefit obligations with financial assets represents a means of providing for future cash outflows, which occur in some countries (e.g. Switzerland and the United Kingdom) on the basis of legal requirements and in other countries (e.g. Germany) on a voluntary basis.

The ratio of the fair value of the plan assets to the present value of the defined benefit obligations is referred to as the degree of pension plan funding. If the benefit obligations exceed the plan assets, this represents underfunding of the pension fund.

It should be noted, however, that both the benefit obligations as well as the plan assets fluctuate over time. This could lead to an increase in underfunding. Depending on the statutory regulations, it could become necessary in some countries to reduce underfunding through additions of liquid assets. The reasons for such fluctuations could include changes in market interest rates and thus the discount rate as well as adjustments to other actuarial assumptions (e.g. life expectancy, inflation rates).

In order to minimize such fluctuations, in managing its plan assets, the Group also pays attention to potential fluctuations in liabilities. In the ideal case, assets and liabilities develop in opposite directions when exposed to exogenous factors, thus creating a natural defense against these factors.

The fair value of the plan assets can be allocated to the following categories:

	Dec. 31, 2017			Dec. 31, 2016		
€ million	**Quoted market price in an active market**	**No quoted market price in an active market**	**Total**	Quoted market price in an active market	No quoted market price in an active market	Total
Cash and cash equivalents	77	–	77	72	–	72
Equity instruments	814	–	814	729	–	729
Debt instruments	957	–	957	968	–	968
Direct investments in real estate	–	94	94	–	102	102
Investment funds	420	1	421	379	–	379
Insurance contracts	–	81	81	–	82	82
Other	8	–	8	54	–	54
Fair value of the plan assets	**2,276**	**176**	**2,452**	**2,202**	**184**	**2,386**

Employer contributions to plan assets and direct payments to beneficiaries will probably amount to around € 32 million and € 75 million in 2018. The weighted duration amounted to 21 years.

The cost of ongoing contributions for defined contribution plans that are financed exclusively by external funds and for which the companies of the Group are only obliged to pay the contributions amounted to € 86 million (2016: € 54 million); this amount was distributed to the individual functions. In addition, employer contributions amounting to € 76 million (2016: € 67 million) were transferred to the German statutory pension insurance system and € 46 million (2016: € 42 million) to statutory pension insurance systems abroad.

(27) Other provisions

Other provisions developed as follows:

€ million	Litigation	Restructuring	Personnel	Environmental protection	Acceptance and follow-on obligations	Other	**Total**
January 1, 2017	**483**	**73**	**336**	**142**	**45**	**167**	**1,246**
Additions	92	53	128	31	9	79	392
Utilizations	–15	–27	–115	–11	–7	–38	–214
Release	–42	–5	–69	–23	–20	–33	–193
Interest portion	10	–	1	–1	–	–	9
Currency translation	–2	–1	–17	–1	–2	–9	–31
Changes in scope of consolidation/Other	–	–	–10	–	–	1	–8
December 31, 2017	**526**	**92**	**254**	**137**	**26**	**166**	**1,202**
thereof: current	104	26	87	27	26	145	414
thereof: non-current	421	66	168	111	–	22	788

LITIGATION

As of December 31, 2017, the provisions for legal disputes amounted to € 526 million (December 31, 2016: € 483 million). The legal matters described below represented the most significant legal risks.

Product-related and patent disputes

Rebif®: The Group is involved in a patent dispute with Biogen Inc., USA, (Biogen) in the United States. Biogen claims that the sale of Rebif® in the United States infringes on a Biogen patent. The disputed patent was granted to Biogen in 2009 in the United States. Subsequently, Biogen sued the Group and other pharmaceutical companies for infringement of this patent. The Group defended itself against all allegations and brought a countersuit claiming that the patent was invalid and not infringed on by the Group's actions. A Markman hearing took place in January 2012, leading to a decision in the first quarter of 2016. A first-instance ruling is now expected for 2018. Court-ordered mediation proceedings did not lead to an agreement. The Group has taken appropriate accounting measures. Cash outflow is not expected to occur within the next 12 months.

PS-VA liquid crystals mixtures: In the Performance Materials business sector, the Group is involved in a legal dispute with JNC Corporation, Japan, (JNC). JNC claims that by manufacturing and marketing certain liquid crystals mixtures, the Group has infringed JNC patents. The Group maintains that JNC's patent infringement assertion is invalid owing to relevant prior art and has filed the corresponding nullity actions, which in three cases were already successful in first-instance proceedings. JNC has filed complaints in each case. In a correction trial, a decision in favor of JNC was issued in the second instance. Both the Group and the Korean Patent Office have filed complaints with the Korean Supreme Court. In parallel, JNC filed two patent infringement suits. In 2017, a first-instance decision was issued in favor of the Group, which JNC then appealed. The Group has taken appropriate accounting measures. Based on current judgment, an outflow of resources is not likely to occur within the next 12 months.

Antitrust and other proceedings

Antitrust review proceedings for the Sigma-Aldrich acquisition: On July 6, 2017, the Group received notice from the European Commission (EU Commission), in which the EU Commission informed the Group of its preliminary conclusion that the Group and Sigma-Aldrich allegedly transmitted incorrect and/or misleading information within the scope of the acquisition of Sigma-Aldrich. The EU Commission had received registration of the merger on April 21, 2015 and granted clearance on June 15, 2015 subject to the condition that the Group and Sigma-Aldrich divest parts of the European solvents and inorganic chemicals businesses of Sigma-Aldrich in order to resolve antitrust concerns.

According to the preliminary viewpoint of the EU Commission communicated in the letter dated July 6, 2017, the Group and Sigma-Aldrich withheld in this connection important information about an innovation project allegedly relevant for certain laboratory chemicals of significance to the analysis by the EU Commission. According to the EU Commission, the innovation project should have been included in the remedies package. A meeting of the cooperation procedure between the EU Commission and the Group took place on February 5, 2018 (see Note (50) "Subsequent events"). The ongoing investigations are limited to the examination of violations of EU merger control procedures and do not affect the validity of the EU Commission's decision to approve the merger. Based on the estimations by the Executive Board, a provision was set up. An outflow of resources is expected in 2018.

Raptiva®: In December 2011, the Brazilian federal state of São Paulo sued the Group for damages because of alleged collusion between various pharmaceutical companies and an association of patients suffering from psoriasis and vitiligo. The collusion is alleged to have aimed at an increase in the sales of the involved companies' drugs to the detriment of patients and state coffers. Moreover, in connection with the product Raptiva®, patients have filed suit to receive compensatory damages. The Group has taken appropriate accounting measures for these legal disputes. These are different legal disputes. An outflow of resources is not expected to occur within the next 12 months.

Paroxetine: In connection with the divested generics business, the Group is subject to antitrust investigations by the British Competition and Market Authority ("CMA") in the United Kingdom. In March 2013, the CMA informed the Group of the assumption that a settlement agreement entered into in 2002 between Generics (UK) Ltd. and several subsidiaries of GlaxoSmithKline plc., United Kingdom, in connection with the antidepressant drug paroxetine violates British and European competition law. As the owner of Generics (UK) Ltd. at the time, the Group was allegedly involved in the settlement negotiations and is therefore liable. The investigations into Generics (UK) Ltd. started in 2011, without this being known to the Group. On February 11, 2016, the CMA imposed a fine in this matter. The Group took legal action against this fine. The Group has taken appropriate accounting measures. According to current estimation, a decision and outflow of resources are considered likely in 2018.

Trademark rights/breach of agreement: The Group is involved in various legal disputes with Merck & Co. Inc., Kenilworth, NJ, USA, of the United States (outside the United States and Canada: Merck Sharp & Dohme Corp. (MSD)), among other things due to breach of the co-existence agreement between the two companies and/or trademark/name right infringement regarding the use of the designation "Merck". In this context, the Group has sued MSD in various countries and has been sued by MSD in the United States. As in 2016, the Group did not consider recourse and a related outflow of resources to be likely as of the balance sheet date (see Note (40) "Contingent liabilities"). The Group has taken appropriate accounting measures solely for any costs of legal defense. An outflow of resources solely for the costs of external legal counsel is expected for 2018.

In addition to provisions for the mentioned litigation, provisions existed as of the balance sheet date for various pending legal disputes.

RESTRUCTURING

Provisions for restructuring mainly included commitments to employees in connection with restructuring projects and provisions for onerous contracts. These were recognized once detailed restructuring plans had been prepared and communicated.

The addition to restructuring provisions in the amount of € 53 million was mainly attributable to the following measures. The Life Science business sector will make relocations and gradually close operations in the course of the years 2019 to 2022 at various German sites. In addition, shared service functions in Finance have been relocated from Darmstadt to Wrocław, Poland, and Manila, the Philippines. Outflows of resources are expected within the next three years.

The utilization of restructuring provisions in the amount of € 27 million was mainly attributable to the "Fit for 2018" transformation and growth program, which was introduced in 2012. The aim of this program was to secure the competitiveness and the growth of the Group over the long term. The provisions in this context mainly consist of commitments to employees from partial and early retirement arrangements. Further payment outflows within the scope of this program are largely expected up until 2019.

PROVISIONS FOR EMPLOYEE BENEFITS/ SHARE-BASED PAYMENT

Provisions for employee benefits include obligations from long-term variable compensation programs. More information on these compensation programs can be found in Note (69) "Share-based compensation programs". The following table presents the key parameters as well as the development of the potential number of Share Units ("MSUs") for the individual tranches:

	2015 tranche	2016 tranche	**2017 tranche**
Performance cycle	Jan. 1, 2015 – Dec. 31, 2017	Jan. 1, 2016 – Dec. 31, 2018	Jan. 1, 2017 – Dec. 31, 2019
Term	3 years	3 years	3 years
Reference price of shares of Merck KGaA, Darmstadt, Germany, in € (60-day average share price of Merck KGaA, Darmstadt, Germany, prior to the start of the performance cycle)	74.53	87.92	95.63
DAX® value (60-day average of the DAX® prior to the start of the performance cycle)	9,403.99	10,669.76	10,822.06
Potential number of MSUs			
Potential number offered for the first time in 2015	609,799	–	–
Forfeited	21,447	–	–
Status as on Dec. 31, 2015	588,352	–	–
Potential number offered for the first time in 2016	–	763,463	–
Forfeited	35,691	24,392	–
Status as on Dec. 31, 2016	552,661	739,071	–
Potential number offered for the first time in 2017	–	–	853,624
Forfeited	17,227	31,105	24,897
Status as on Dec. 31, 2017	**535,434**	**707,966**	**828,727**

The value of the provisions was € 45 million as of December 31, 2017 (December 31, 2016: € 133 million). In fiscal 2017, net income of € 13 million resulted (2016: net expense of € 76 million). The three-year tranche issued in 2014 ended at the end of 2016 and was paid out in 2017 in the amount of € 75 million.

Provisions for employee benefits included an amount of € 51 million for the promise of a one-time bonus for employees on the occasion of the company's 350th anniversary in 2018.

Provisions for employee benefits also included obligations for the partial retirement program and other severance pay that were not set up in connection with restructuring programs as well as obligations in connection with long-term working hour accounts and anniversary bonuses.

With respect to provisions for pensions and other post-employment benefits, see Note (26) "Provisions for pensions and other post-employment benefits".

ENVIRONMENTAL PROTECTION

Provisions for environmental protection, particularly for obligations from soil remediation and groundwater protection, mainly existed in connection with the crop protection business that was discontinued in 1987 in Germany and Latin America.

ACCEPTANCE AND FOLLOW-ON OBLIGATIONS

Provisions for acceptance and follow-on obligations primarily took into account costs stemming from discontinued research projects as well as obligation surpluses from onerous contracts. Utilizations and releases were mainly attributable to research projects discontinued in previous years.

OTHER

Other mainly included provisions for other guarantees, for uncertain commitments from contributions, duties and fees as well as for interest and penalties from tax audits.

(28) Financial liabilities/ Capital management

The composition of financial liabilities as well as a reconciliation to net financial debt are presented in the following table:

	Book value Dec. 31, 2017 € million	Book value Dec. 31, 2016 € million	Maturity	Interest rate %	Nominal volume million	Currency
USD bond 2015/2017	–	238	March 2017	variable[1]	250	USD
Eurobond 2015/2017	–	699	Sept. 2017	variable[2]	700	€
USD bond 2015/2018	335	–	March 2018	1.700%	400	USD
Bonds (current)	**335**	**937**				
Commercial paper	838	918				
Bank loans	803	1,128				
Liabilities to related parties	767	758				
Loans from third parties and other financial liabilities	19	20				
Liabilities from derivatives (financial transactions)	27	25				
Finance lease liabilities	1	1				
Current financial liabilities	**2,790**	**3,788**				
USD bond 2015/2018	–	380	March 2018	1.700%	400	USD
Eurobond 2015/2019	799	798	Sept. 2019	0.750%	800	€
Eurobond 2009/2019	70	69	Dec. 2019	4.250%	70	€
USD bond 2015/2020	626	712	March 2020	2.400%	750	USD
Eurobond 2010/2020	1,347	1,346	March 2020	4.500%	1,350	€
USD bond 2015/2022	833	947	March 2022	2.950%	1,000	USD
Eurobond 2015/2022	548	547	Sept. 2022	1.375%	550	€
USD bond 2015/2025	1,328	1,508	March 2025	3.250%	1,600	USD
Hybrid bond 2014/2074	992	990	Dec. 2074[3]	2.625%	1,000	€
Hybrid bond 2014/2074	497	497	Dec. 2074[4]	3.375%	500	€
Bonds (non-current)	**7,040**	**7,794**				
Bank loans	850	850				
Liabilities to related parties	–	–				
Loans from third parties and other financial liabilities	54	59				
Liabilities from derivatives (financial transactions)	86	103				
Finance lease liabilities	2	2				
Non-current financial liabilities	**8,033**	**8,809**				
Financial liabilities	**10,823**	**12,597**				
less:						
Cash and cash equivalents	589	939				
Current financial assets	90	145				
Net financial debt[5]	**10,144**	**11,513**				

[1] Interest rate: 0.35% spread over 3-month U.S. dollar LIBOR.
[2] Interest rate: 0.23% spread over 3-month EURIBOR.
[3] Merck KGaA, Darmstadt, Germany, has the right to prematurely repay this tranche of the hybrid bond issued in December 2014 for the first time in June 2021.
[4] Merck KGaA, Darmstadt, Germany, has the right to prematurely repay this tranche of the hybrid bond issued in December 2014 for the first time in December 2024.
[5] Not defined by International Financial Reporting Standards (IFRS).

The Group repaid a USD bond with a volume of € 232 million in March 2017 and a eurobond with a volume of € 700 million in September 2017.

For the hybrid bond 2014/2074 issued by Merck KGaA, Darmstadt, Germany, in two tranches, the rating agencies Standard & Poor's, Moody's and Scope have given equity credit treatment to half of the issuance, thus making the issuance more favorable to the Group's credit rating than a classic bond issue. The bond is recognized in full as financial liabilities in the balance sheet.

The financial liabilities of the Group were not secured by liens or similar forms of collateral. The loan agreements do not contain any financial covenants. The Group's average borrowing cost as of the balance sheet date was 2.2% (December 31, 2016: 2.0%).

Information on liabilities to related parties can be found in Note (47) "Related-party disclosures".

CAPITAL MANAGEMENT

The objective of capital management is to secure financial flexibility in order to maintain long-term business operations and to realize strategic options. Maintaining a stable investment grade rating, ensuring liquidity, limiting financial risks as well as optimizing the cost of capital are the objectives of our financial policy and set important framework conditions for capital management. The responsible committees decide on the capital structure of the balance sheet, the appropriation of net retained profit and the dividend level. In this context, net financial debt is one of the leading capital management indicators.

Traditionally, the capital market represents a major source of financing for the Group, for instance via bond issues. As of December 31, 2017, there were liabilities of € 2.77 billion (December 31, 2016: € 3.47 billion) from a Debt Issuance Program most recently renewed in 2015. In addition, the Group had access to a commercial paper program to meet short-term capital requirements with a volume of € 2 billion, of which € 838 million had been utilized as of December 31, 2017 (December 31, 2016: € 919 million).

Loan agreements represent a further source of financing for the Group. On the balance sheet date, the bank financing commitments vis-à-vis the Group were as follows:

	Dec. 31, 2017		Dec. 31, 2016			
€ million	**Financing commitments from banks**	**Utilization**	Financing commitments from banks	Utilization	Interest	Maturity of financing commitments
Syndicated loan 2013	2,000	–	2,000	–	variable	2020
Loan agreement with banking syndicate for acquisition financing	–	–	400	400	variable	2018
Bilateral credit agreement with banks	700	700	700	700	variable	2019
Bilateral credit agreement with banks	400	400	400	400	variable	2020
Bilateral credit agreement with banks	250	250	250	250	variable	2022
Various bank credit lines	581	303	336	228	variable	< 1 year
	3,931	**1,653**	**4,086**	**1,978**	**–**	**–**

There are no indications that the availability of credit lines already extended was restricted.

(29) Other liabilities

Other liabilities comprise the following:

€ million	current	non-current	Dec. 31, 2017	current[1]	non-current	Dec. 31, 2016[1]
Other financial liabilities	1,038	21	1,059	925	14	939
Liabilities from derivatives (operational)	25	18	43	71	34	105
Financial items	**1,063**	**39**	**1,102**	**996**	**48**	**1,044**
Accruals for personnel expenses	665	–	665	603	–	603
Deferred income	278	211	489	237	386	623
Advance payments received from customers	25	–	25	12	–	12
Liabilities from non-income related taxes	144	5	150	103	5	108
Other non-financial items	–	99	99	–	–	–
Non-financial items	**1,112**	**315**	**1,427**	**955**	**391**	**1,345**
Other liabilities	**2,175**	**354**	**2,529**	**1,950**	**439**	**2,389**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

As of December 31, 2017, other financial liabilities included liabilities to related companies amounting to € 584 million (December 31, 2016: € 457 million). These were profit entitlements of E. Merck KG, Darmstadt, Germany.

Moreover, other financial liabilities included interest accruals of € 95 million (December 31, 2016: € 98 million) as well as payroll liabilities of € 174 million (December 31, 2016: € 169 million). The remaining amount of € 206 million (December 31, 2016: € 215 million) recorded under other financial liabilities included, among other things, liabilities to insurers as well as contractually agreed payment obligations vis-à-vis other companies. Deferred income resulted mainly from the collaboration agreement with Pfizer Inc., USA, in immuno-oncology and was released further as planned on a pro rata basis in 2016.

Non-financial items include non-current obligations in the amount of € 99 million (December 31, 2016: € 0 million) resulting from the new legislation as regards the taxation of profit from foreign subsidiaries in the context of the U.S. tax reform. This resulted in additional taxation of past profits of foreign subsidiaries of U.S. parent companies. The Group will pay this tax payment in eight annual installments. The non-current tax liability was recorded at nominal amount and not discounted. The current portion of the obligation in the amount of € 9 million was offset against existing income tax receivables. Further information on the impact of the U.S. tax reform can be found in Note (14) "Income taxes".

(30) Trade accounts payable

Trade accounts payable amounted to € 2,195 million (December 31, 2016: € 2,048 million).

This item also included accrued amounts of € 653 million (December 31, 2016: € 544 million) for outstanding invoices and € 435 million (December 31, 2016: € 443 million) in sales deductions.

(31) Tax liabilities

Tax liabilities and provisions for tax liabilities resulted in total income tax liabilities of € 1,059 million as of December 31, 2017 (2016: € 883 million).

Segment Reporting

(32) Information by business sector/country and region

INFORMATION BY BUSINESS SECTOR

	Healthcare		Life Science	
€ million	**2017**	2016	**2017**	2016
Net sales[1]	**6,999**	**6,855**	**5,882**	**5,658**
Operating result (EBIT)[2]	**1,447**	**1,593**	**834**	**556**
Depreciation and amortization	742	746	743	797
Impairment losses	53	88	3	26
Reversals of impairment losses	–87	–3	–	–1
EBITDA[2]	**2,155**	**2,425**	**1,580**	**1,378**
Adjustments[2]	–206	–297	206	274
EBITDA pre (Segment result)[2]	**1,949**	**2,128**	**1,786**	**1,652**
EBITDA pre margin (in % of net sales)[2]	27.9%	31.0%	30.4%	29.2%
Net operating assets[2, 3]	5,728	5,600	19,449	21,860
Segment liabilities	–2,456	–2,427	–973	–953
Investments in property, plant and equipment[4]	359	315	327	254
Investments in intangible assets[4]	310	47	55	47
Net cash flows from operating activities	1,629	1,723	1,516	1,417
Business free cash flow[2]	1,448	1,648	1,402	1,144

[1] Excluding intersegment sales.
[2] Not defined by International Financial Reporting Standards (IFRS), see Note (33) "Information on Segment Reporting".
[3] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".
[4] According to the consolidated cash flow statement.

INFORMATION BY COUNTRY AND REGION

	Europe		thereof: Germany		thereof: Switzerland		North America	
€ million	**2017**	2016	**2017**	2016	**2017**	2016	**2017**	2016
Net sales by customer location[1]	4,756	4,735	979	983	226	238	3,810	3,858
Net sales by company location[1]	5,229	5,466	1,521	1,712	362	327	3,835	3,854
Goodwill and other intangible assets[2]	6,537	7,047	614	372	2,839	3,345	14,694	17,137
Property, plant and equipment[2]	2,895	2,554	1,385	1,187	623	548	927	1,016
Research and development costs	–1,864	–1,697	–701	–763	–1,050	–840	–167	–184
Number of employees	25,979	24,437	13,302	12,449	2,151	2,078	10,520	10,037

[1] Excluding intersegment sales.
[2] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

Performance Materials		Corporate and Other		Group	
2017	2016	**2017**	2016	**2017**	2016
2,446	**2,511**	**–**	**–**	**15,327**	**15,024**
689	**823**	**–445**	**–492**	**2,525**	**2,481**
232	237	41	25	1,758	1,805
26	17	4	2	86	134
–	–	–	–	–87	–5
947	**1,077**	**–400**	**–465**	**4,282**	**4,415**
33	29	99	69	132	75
980	**1,106**	**–301**	**–396**	**4,414**	**4,490**
40.1%	44.1%	–	–	28.8%	29.9%
3,629	4,146	326	200	29,131	31,805
–314	–290	–259	–106	–4,002	–3,777
116	96	116	51	919	716
14	13	13	25	392	132
969	1,054	–1,418	–1,677	2,696	2,518
906	1,011	–437	–485	3,318	3,318

thereof: USA		Asia-Pacific		thereof: China		Latin America		Middle East and Africa		Group	
2017	2016	**2017**	2016	**2017**	2016	**2017**	2016	**2017**	2016	**2017**	2016
3,623	3,668	4,921	4,736	1,583	1,356	1,232	1,136	608	559	15,327	15,024
3,672	3,691	4,685	4,450	1,416	1,041	1,196	1,099	382	154	15,327	15,024
14,675	17,137	665	803	39	46	2	2	–	6	21,899	24,995
923	1,014	531	504	214	172	114	110	45	49	4,512	4,231
–166	–184	–75	–61	–26	–25	–21	–21	–13	–12	–2,140	–1,976
10,339	9,874	11,294	10,754	3,324	3,080	4,027	4,112	1,060	1,008	52,880	50,348

(33) Information on Segment Reporting

Segmentation was performed in accordance with the organizational and reporting structure of the Group that applied during 2017. The combination into segments is based on the business models of the business sectors and led to homogeneous risk structures within the segments. Resource allocation and the assessment of the earning power of the business sectors was performed by the Executive Board as the main decision-maker.

The Healthcare business sector comprises the businesses with prescription and over-the-counter pharmaceuticals and biopharmaceuticals as well as allergy products and medical devices. The customers of this business sector mainly comprise wholesalers, hospitals and pharmacies. The Life Science business sector offers solutions to research and analytical laboratories in the pharmaceutical/biotechnology industry or in academic institutions, and customers manufacturing large- and small-molecule drugs. In accordance with the field of activity, the customers of this business sector largely include companies of the pharmaceuticals and biotech sector as well as retailers, corporate customers and universities. The Performance Materials business sector consists of the entire specialty chemicals business and primarily services industrial companies. The fields of activity of the individual segments are described in detail in the sections about the business sectors in the combined management report.

Corporate and Other included income and expenses, assets and liabilities as well as cash flows that could not be directly allocated to the reportable segments presented. This related mainly to central Group functions. Moreover, the column served the reconciliation to the Group numbers. As these are steered at Group level, the expenses and income as well as cash flows attributable to the financial result and income taxes were also presented under Corporate and Other.

Apart from sales, the success of a segment is mainly determined by EBITDA pre (segment result) and business free cash flow. EBITDA pre and business free cash flow are performance indicators not defined by International Financial Reporting Standards. However, they represent important variables used to steer the Group. To permit a better understanding of operational performance, EBITDA pre excludes depreciation and amortization, impairment losses, and reversals of impairment losses as well as adjustments presented in the following. Among other things, business free cash flow is also used for internal target agreements.

In 2017, only the Life Science business sector generated intragroup sales between business sectors. These resulted mainly from transactions with the Healthcare business sector in an amount of € 55 million (2016: € 46 million) and with the Performance Materials business sector in an amount of € 2 million (2016: € 2 million). Transfer prices for intragroup sales are determined on an arm's length basis.

Neither in 2017 nor in 2016 did any single customer account for more than 10% of Group sales.

The following table presents the reconciliation of EBITDA pre of all operating businesses to the profit before income tax of the Group:

€ million	2017	2016
EBITDA pre of the operating businesses[1]	**4,715**	**4,887**
Corporate and Other	–301	–396
EBITDA pre of the Group[1]	**4,414**	**4,490**
Depreciation/amortization/impairment losses/reversals of impairment losses	–1,758	–1,934
Adjustments[1]	–132	–75
Operating result (EBIT)[1]	**2,525**	**2,481**
Financial result	–300	–326
Profit before income tax	**2,224**	**2,154**

[1] Not defined by International Financial Reporting Standards (IFRS).

The adjustments made comprised the following:

€ million	**2017**	2016
Restructuring costs	–84	–22
Integration costs/IT costs	–189	–193
Gains (+)/losses (–) on the divestment of businesses	310	304
Acquisition-related adjustments	–63	–153
Other adjustments	–106	–11
Adjustments before impairment losses/reversals of impairment losses[1]	**–132**	**–75**
Impairment losses	–68	–115
Reversals of impairment losses	87	–
Adjustments (total)[1]	**–114**	**–191**

[1] Not defined by International Financial Reporting Standards (IFRS).

The adjustments of € 189 million recorded under integration costs/IT costs (2016: € 193 million) were largely incurred in connection with the integration of the Sigma-Aldrich Corporation, USA, (€ 95 million) as well as expenses for ERP systems (€ 64 million). These amounts were recorded under other operating expenses.

The gains from the divestment of businesses amounting to € 310 million (2016: € 304 million) resulted mainly from the divestment of the Biosimilars business and were included in other operating income.

Other adjustments amounting to € 106 million (2016: € 11 million) were largely attributable to the promise of a one-time bonus for employees on the occasion of the company's 350th anniversary (€ 53 million) as well as to expenses in connection with the analysis of strategic options for the Consumer Health business (€ 24 million).

The adjustments were included in the consolidated income statement under cost of sales as well as under other operating expenses and income and were allocable to functional costs as follows:

€ million 2017	thereof: cost of sales	thereof: marketing and selling	thereof: administration costs	thereof: research and development	thereof: other operating income and expense	**Total**
Restructuring costs	–13	–25	–43	–	–3	–84
Integration costs/IT costs	–31	–21	–132	–1	–3	–189
Gains (+)/losses (–) on the divestment of businesses	–	–	–	–	310	310
Acquisition-related adjustments	–1	–	–5	–	–56	–63
Other adjustments	–13	–11	–66	–5	–11	–106
Adjustments before impairment losses/ reversals of impairment losses[1]	**–59**	**–57**	**–246**	**–5**	**235**	**–132**
Impairment losses	–6	–33	–	–16	–14	–68
Reversals of impairment losses	87	–	–	–	–	87
Adjustments (total)[1]	**23**	**–90**	**–246**	**–21**	**222**	**–114**

[1] Not defined by International Financial Reporting Standards (IFRS).

€ million 2016	thereof: cost of sales	thereof: marketing and selling	thereof: administration costs	thereof: research and development	thereof: other operating income and expense	**Total**
Restructuring costs	–	–3	–19	–	–	–22
Integration costs/IT costs	–12	–45	–133	–2	–	–193
Gains (+)/losses (–) on the divestment of businesses	–	–	–	–	304	304
Acquisition-related adjustments	–	–	–	–	–153	–153
Other adjustments	–	–	–9	–	–2	–11
Adjustments before impairment losses/ reversals of impairment losses[1]	**–12**	**–48**	**–162**	**–2**	**149**	**–75**
Impairment losses	–19	–88	–2	–3	–4	–115
Reversals of impairment losses	–	–	–	–	–	–
Adjustments (total)[1]	**–31**	**–136**	**–163**	**–5**	**145**	**–191**

[1] Not defined by International Financial Reporting Standards (IFRS).

Business free cash flow was determined as follows:

€ million	**2017**	2016
EBITDA pre[1]	**4,414**	**4,490**
Investments in property, plant and equipment, software as well as advance payments for intangible assets	–1,047	–859
Changes in inventories according to the consolidated balance sheet[2]	–23	1
Changes in trade accounts receivable as well as receivables from royalties and licenses according to the consolidated balance sheet	–24	–177
Elimination first-time consolidation of Sigma-Aldrich	–	–149
Elimination first-time consolidation of BioControl Systems[2]	–2	12
Business free cash flow[1]	**3,318**	**3,318**

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

The reconciliation of operating assets presented in the Segment Reporting from the total assets of the Group was as follows:

€ million	**Dec. 31, 2017**	Dec. 31, 2016[1]
Assets	35,621	38,258
Monetary assets (cash and cash equivalents, current financial assets, loans, securities)	–749	–1,123
Non-operating receivables, income tax receivables, deferred taxes and net defined benefit assets	–1,739	–1,542
Assets held for sale	–	–12
Operating assets (gross)[2]	**33,133**	**35,582**
Trade accounts payable	–2,195	–2,048
Other operating liabilities	–1,806	–1,729
Segment liabilities	**–4,002**	**–3,777**
Operating assets (net)[2]	**29,131**	**31,805**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".
[2] Not defined by International Financial Reporting Standards (IFRS).

Notes to the Consolidated Cash Flow Statement

The consolidated cash flow statement presents the changes in cash and cash equivalents as a result of cash inflows and outflows from operating, investing and financing activities. Further information on cash flows can be found in the explanation of cash and cash equivalents (see Note (24) "Cash and cash equivalents"). The amount of undrawn borrowing facilities that could be tapped for future operating activities and to meet obligations is disclosed in Note (28) "Financial liabilities/Capital management".

The cash flows reported by Group companies in non-functional currencies are in principle translated at average exchange rates. Cash and cash equivalents are translated at the closing rates. The impact of foreign exchange rate changes is disclosed separately under changes in cash and cash equivalents.

(34) Net cash flows from operating activities

In 2017, tax payments totaled € 702 million (2016: € 841 million). Tax refunds totaled € 73 million (2016: € 63 million). Interest paid totaled € 297 million (2016: € 327 million). Interest received amounted to € 28 million (2016: € 22 million).

The changes of other assets and liabilities include the adjustment of deferred taxes as a result of the U.S. tax reform.

The neutralization of the profits/losses from the disposal of assets and other disposals mainly comprises the gain on the sale of the Biosimilars business. In 2016, this item mainly comprised the gain on the sale of the rights to Kuvan®.

(35) Net cash flows from investing activities

The payments for investments in intangible assets primarily included payments for a license agreement with Vertex Pharmaceuticals Inc., USA, for the acquisition of two clinical and additional novel pre-clinical research programs in the area of oncology and immuno-oncology.

Payments for acquisitions comprised the acquisitions of Grzybowski Scientific Inventions Ltd., USA, (€ 7 million) and Natrix Separations, Inc., Canada (€ 8 million). In 2016, this item mainly included the acquisition of BioControl Systems, Inc., USA, amounting to € 156 million.

Net cash outflows from investments in current and non-current financial assets amounting to € 219 million (2016: € 344 million) mainly resulted from the purchase of short-term investments in securities not classified as cash and cash equivalents. Additionally, this item included payments for the purchase of an equity instrument option.

Cash inflows from the divestment of assets held for sale included the upfront payment amounting to € 156 million for the divestment of the Biosimilars business. In 2016, cash inflows of € 340 million resulted from the sale of the rights to Kuvan®.

(36) Net cash flows from financing activities

Net cash flows from financing activities contained the repayment of two bonds amounting to € 932 million (2016: € 272 million). In 2016, the repayment of other current and non-current financial debt mainly related to the repayment of bank loans to finance the acquisition of the Sigma-Aldrich Corporation, USA.

The change in financial debt was as follows:

€ million	Jan. 1, 2017	Payments	Repayments	Changes in scope of consolidation	Foreign exchange movement	Fair Value changes	Other changes	Dec. 31, 2017
Bonds	8,731	–	–932	–	–425	–	–	7,375
thereof: current	937	–	–932	–	–25	–	354	335
thereof: non-current	7,794	–	–	–	–400	–	–354	7,040
Financial liabilities to E. Merck KG, Darmstadt, Germany	729	349	–314	–	–	–	–	765
Other current and non-current financial liabilities	3,136	147	–546	–	–38	–16	–	2,683
Financial liabilities	**12,597**	**497**	**–1,792**	**–**	**–463**	**–16**	**–**	**10,823**
Derivative assets (current and non-current)	62	–	–50	–	–	–	–	12

"Other changes" relate mainly to the reclassification of bonds owing to a change from long-term to short-term. The changes reported for derivative assets (current and non-current) under repayments correspond to the repayment of other current and non-current financial liabilities in the amount of € 496 million reported under cash outflows from financing activities.

Other Disclosures

(37) Derivative financial instruments

The following derivatives were held by the Group as of the balance sheet date:

	Nominal volume		Fair value	
€ million	**Dec. 31, 2017**	Dec. 31, 2016	**Dec. 31, 2017**	Dec. 31, 2016
Cash flow hedge	3,258	2,741	3	–91
Interest	–	–	–	–
Currency	3,258	2,741	3	–91
Fair value hedge	–	–	–	–
Interest	–	–	–	–
Currency	–	–	–	–
No hedge accounting	5,477	8,012	–45	–55
Interest	1,100	1,100	–73	–87
Currency	4,376	6,912	–18	32
Equity			46	–
	8,735	**10,753**	**–42**	**–146**

Cash flow hedges included currency hedges in a nominal volume of € 1,898 million (December 31, 2016: € 1,795 million) with a remaining term of up to one year and hedges in a nominal volume of € 1,360 million (December 31, 2016: € 946 million) with a remaining term of more than one year.

The maturities of the derivatives (nominal volume) were as follows as of the balance sheet date:

€ million	**Remaining maturity less than 1 year**	**Remaining maturity more than 1 year**	**Total Dec. 31, 2017**	Remaining maturity less than 1 year	Remaining maturity more than 1 year	Total Dec. 31, 2016
Forward exchange contracts	6,035	1,311	7,347	8,555	784	9,339
Currency options	239	49	288	153	162	314
Interest rate swaps	–	1,100	1,100	–	1,100	1,100
	6,274	**2,460**	**8,735**	**8,707**	**2,046**	**10,753**

Currency hedging served to economically protect the company from the foreign exchange risks of the following types of transaction:

- Forecast transactions in non-functional currency, the expected probability of which is very high for the next 36 months,
- Off-balance sheet firm purchase commitments of the next 36 months in non-functional currency,
- Intragroup financing in non-functional currency as well as
- Receivables and liabilities in non-functional currency

Exchange rate fluctuations of mainly the following currencies against the euro were hedged:

Nominal volume € million	**Dec. 31, 2017**	Dec. 31, 2016
USD	4,046	5,031
CHF	903	1,211
CNY	701	717
TWD	444	406
JPY	411	800
KRW	266	158
GBP	214	576

Forecast transactions and firm purchase commitments in nonfunctional currency are hedged using forward exchange contracts and currency options which are due within the next 36 months. Overall, forecast transactions and firm purchase commitments in non-functional currency were hedged in the amount of € 3,258 million (December 31, 2016: € 2,741 million).

Intragroup financing as well as receivables and payables in nonfunctional currency were hedged exclusively using forward exchange contracts. Overall, balance sheet items amounting to € 4,376 million (December 31, 2016: € 6,912 million) were hedged. In this context, the hedging transactions in 2017 were exclusively purely economic hedges for which hedge accounting is not applied.

Forward starting payer interest rate swaps for which the hedging relationship was terminated voluntarily were entered into in 2015 with a nominal volume of € 550 million. In line with the hedged item running until 2022, in 2017 an amount of € 13 million (2016: € 13 million) was reclassified from Other Comprehensive Income under the line item “Reclassification to profit or loss” within “Derivative financial instruments” to the financial result. The original transactions as well as the offsetting transactions are now classified as “held for trading”. The changes in fair value are reflected in the consolidated income statement.

(38) Management of financial risks

Market fluctuations with respect to foreign exchange and interest rates represent significant profit and cash flow risks for the Group. The Group aggregates these Group-wide risks and steers them centrally, also by using derivatives. The Group uses scenario analyses to estimate existing risks of foreign exchange and interest rate fluctuations. The Group is not subject to any material risk concentration from financial transactions.

The Group uses derivative financial instruments (hereinafter "derivatives") to hedge risks from currency and interest rate positions. The group uses marketable forward exchange contracts, options and interest rate swaps as hedging instruments. Depending on the nature of the hedged item, changes in the fair values of derivatives are recorded in the consolidated income statement either in the operating result or in the financial result. The strategy to hedge interest rate and foreign exchange rate fluctuations arising from forecast transactions and transactions already recognized in the balance sheet is set by a risk committee, which meets on a regular basis. Extensive guidelines regulate the use of derivatives. There is a ban on speculation. Derivative transactions are subject to continuous risk management procedures. Trading, settlement and control functions are strictly separated. Derivatives are only entered into with banks that have a good credit rating. Related default risks are continuously monitored.

The Report on Risks and Opportunities included in the combined management report provides further information on the management of financial risks.

FOREIGN EXCHANGE RISKS

Owing to its international business focus, the Group is exposed to foreign-exchange-related transaction risks within the scope of both its business activities and financing activities. Different strategies are used to limit or eliminate these risks. Foreign exchange risks from transactions already recognized on the balance sheet are eliminated as far as possible through the use of forward exchange contracts. Foreign exchange risks arising from forecast transactions are analyzed regularly and reduced if necessary through forward exchange contracts or currency options by applying the hedge accounting rules. The Group is exposed to currency translation risks since the majority of the Group's subsidiaries are located outside the eurozone and have functional currencies other than the reporting currency. The financial statements of these companies are translated into euros. Exchange differences resulting from currency translation of the assets and liabilities of these companies are recognized in equity. These effects are not taken into consideration in the following tables.

The following table presents the net exposure of the Group in relation to exchange rate fluctuations of the major currencies against the euro:

€ million	CHF	CNY	JPY	KRW	TWD	USD
Net exposure Dec. 31, 2017	–184	449	75	115	135	1,215
Net exposure Dec. 31, 2016	–267	412	154	217	165	1,009

The net exposure of each of the aforementioned currencies consists of the following components:

- Planned cash flows in the next 12 months in the respective currency as well as
- Derivatives to hedge these planned cash flows. Usually, the hedging ratio is 30% – 70%.

Balance sheet items in the aforementioned currencies were economically hedged in full in both 2017 and 2016 by derivatives if they did not correspond to the functional currency of the respective company. Accordingly, they do not affect the net exposure presented above.

The following table shows the effects of exchange rate movements of the key currencies against the euro in relation to the net income and equity of the Group on the balance sheet date. The effects of planned cash flows of the next 12 months are not taken into consideration here. By contrast, the effects of cash flow hedges are taken into consideration in the equity of the Group and are included in the following table.

€ million Dec. 31, 2017		CHF	CNY	JPY	KRW	TWD	USD
Exchange rate –10% (EUR depreciation)	Consolidated income statement	–	–	–	–	–	–
	Equity	39	–44	–19	–18	–38	–172
Exchange rate +10% (EUR appreciation)	Consolidated income statement	–	–	–	–	–	–
	Equity	–31	36	17	15	31	147

€ million Dec. 31, 2016		CHF	CNY	JPY	KRW	TWD	USD
Exchange rate –10% (EUR depreciation)	Consolidated income statement	–	–	–	–	–	–
	Equity	17	–31	–26	–	–26	–148
Exchange rate +10% (EUR appreciation)	Consolidated income statement	–	–	–	–	–	–
	Equity	–20	38	25	–	32	159

INTEREST RATE RISKS

The Group's exposure to interest rate changes comprises the following:

€ million	Dec. 31, 2017	Dec. 31, 2016
Short-term or variable interest rate monetary deposits	684	1,085
Short-term or variable interest rate monetary borrowings	–3,641	–4,587
Net interest rate exposure	**–2,957**	**–3,502**

The effects of a parallel shift in the yield curve by +100 or –100 basis points on the consolidated income statement as well as on equity relative to all short-term or variable monetary deposits and monetary borrowings, all debt instruments classified as "available for sale", except contingent consideration, as well as all derivatives are presented in the following table.

€ million	2017		2016	
Change in market interest rate	**+100 basis points**	**–100 basis points**	**+100 basis points**	**–100 basis points**
Effects on consolidated income statement	–26	16	–36	22
Effects on equity	–	–	–	–

The scenario calculations here assumed that for material variable interest-bearing loan agreements, the risk-free interest rate component (EURIBOR) cannot fall below 0%.

SHARE PRICE RISKS

The shares in publicly listed companies amounting to € 16 million (December 31, 2016: € 8 million) are generally exposed to a risk of fluctuations in fair value. A 10% change in the value of the stock market would impact equity by € 2 million (December 31, 2016: € 1 million). This change in value would initially be recognized in equity and then in profit or loss at the time of disposal.

LIQUIDITY RISKS

The liquidity risk, meaning the risk that the Group cannot meet its payment obligations resulting from financial liabilities, is limited by establishing the required financial flexibility and by effective cash management. Information on bonds issued by the Group and other sources of financing can be found in Note (28) "Financial liabilities/ Capital management".

Liquidity risks are monitored and reported to management on a regular basis.

The following tables present the contractual cash flows such as repayments and interest on financial liabilities and derivative financial instruments with a negative fair value as well as the settlement amount of trade accounts payable:

		Cash flows <1 year		Cash flows 1–5 years		Cash flows >5 years	
€ million Dec. 31, 2017	**Carrying amount**	**Interest**	**Repayment**	**Interest**	**Repayment**	**Interest**	**Repayment**
Bonds and commercial paper	8,213	210	1,171	590	5,234	143	1,839
Bank loans	1,653	18	803	4	850	–	–
Trade accounts payable	2,195	–	2,195	–	–	–	–
Liabilities to related parties	1,352	–	1,352	–	–	–	–
Other financial liabilities	474	–	453	–	21	–	–
Loans from third parties and other financial liabilities	73	1	19	4	54	–	–
Liabilities from derivatives	155	15	52	59	18	–	–
Financing lease liabilities	4	–	1	–	2	–	–
	14,120	**243**	**6,046**	**657**	**6,179**	**143**	**1,839**

		Cash flows <1 year		Cash flows 1–5 years		Cash flows >5 years	
€ million Dec. 31, 2016	**Carrying amount**	**Interest**	**Repayment**	**Interest**	**Repayment**	**Interest**	**Repayment**
Bonds and commercial paper	9,650	224	1,855	759	4,314	245	3,523
Bank loans	1,978	11	1,128	5	600	1	250
Trade accounts payable	2,048	–	2,048	–	–	–	–
Liabilities to related parties	1,215	–	1,215	–	–	–	–
Other financial liabilities[1]	481	–	467	–	14	–	–
Loans from third parties and other financial liabilities	80	6	22	10	55	–	2
Liabilities from derivatives	233	18	95	70	34	17	–
Financing lease liabilities	4	–	1	–	2	–	–
	15,689	**259**	**6,832**	**845**	**5,019**	**263**	**3,775**

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".

CREDIT RISKS

The Group limits credit risk by only entering into financial contracts with banks and industrial companies with good credit ratings. Moreover, the broad-based business structure with a large number of different customers results in a diversification of credit risks within the Group. The credit risk from financial contracts is monitored daily on the basis of rating information as well as market information on credit default swap rates.

The credit risk of customers is monitored using established credit management processes that take the individual customer risks into account. This is done in particular by continuously analyzing the age structure of trade accounts receivable. The Group continuously reviews and monitors open positions of all trading partners in the affected countries and takes risk-mitigating measures if necessary. If there is objective evidence that particular accounts receivable are fully or partially impaired, respective impairment losses are recognized to

provide for credit defaults. On the balance sheet date, the theoretically maximum default risk corresponded to the net carrying amounts less any compensation from credit insurance.

There were no indications of impairment for financial assets neither past due nor impaired on the balance sheet date.

(39) Other disclosures on financial instruments

The following table presents the reconciliation of the balance sheet items to categories of financial instruments pursuant to the disclosures required by IFRS 7 and provides information on the measurement of fair value:

		Subsequent measurement according to IAS 39				
€ million	**Carrying amount Dec. 31, 2017**	Amortized cost	At cost	Fair value	Carrying amount according to IAS 17	Non-financial items
Assets						
Cash and cash equivalents	589	589	–	–	–	–
Current financial assets	90	47	–	44	–	–
Held for trading (non-derivatives)	–	–	–	–	–	–
Derivatives without a hedging relationship	9	–	–	9	–	–
Held to maturity	–	–	–	–	–	–
Loans and receivables	47	47	–	–	–	–
Available for sale	35	–	–	35	–	–
Derivatives with a hedging relationship	–	–	–	–	–	–
Trade accounts receivable	2,923	2,923	–	–	–	–
Loans and receivables	2,923	2,923	–	–	–	–
Remaining current and non-current assets[1]	936	276	–	92	–	568
Derivatives without a hedging relationship	46	–	–	46	–	–
Loans and receivables	276	276	–	–	–	–
Derivatives with a hedging relationship	45	–	–	45	–	–
Non-financial items[1]	568	–	–	–	–	568
Non-current financial assets	444	12	4	429	–	–
Derivatives without a hedging relationship	13	–	–	13	–	–
Held to maturity	–	–	–	–	–	–
Loans and receivables	12	12	–	–	–	–
Available for sale	420	–	4	416	–	–
Derivatives with a hedging relationship	–	–	–	–	–	–
Liabilities						
Current and non-current financial liabilities	10,823	10,707	–	113	4	–
Derivatives without a hedging relationship	113	–	–	113	–	–
Other financial liabilities	10,707	10,707	–	–	–	–
Derivatives with a hedging relationship	–	–	–	–	–	–
Finance lease liabilities	4	–	–	–	4	–
Trade accounts payable	2,195	2,195	–	–	–	–
Other financial liabilities	2,195	2,195	–	–	–	–
Remaining current and non-current liabilities[1]	2,529	1,059	–	43	–	1,427
Derivatives without a hedging relationship	–	–	–	–	–	–
Other financial liabilities[1]	1,059	1,059	–	–	–	–
Derivatives with a hedging relationship	43	–	–	43	–	–
Non-financial items	1,427	–	–	–	–	1,427

[1] Previous year's figures have been adjusted, see Note (4) "Acquisitions and divestments".
[2] The exemption provisions under IFRS 7.29a were applied for information on specific fair values.

		Subsequent measurement according to IAS 39					
Fair value, Dec. 31, 2017[2]	Carrying amount Dec. 31, 2016	Amortized cost	At cost	Fair value	Carrying amount according to IAS 17	Non-financial items	Fair value Dec. 31, 2016[2]
	939	939	–	–	–	–	
	145	44	–	101	–	–	
–	–	–	–	–	–	–	–
9	59	–	–	59	–	–	59
	–	–	–	–	–	–	
	44	44	–	–	–	–	
35	43	–	–	43	–	–	43
–	–	–	–	–	–	–	–
	2,889	2,889	–	–	–	–	
	2,889	2,889	–	–	–	–	
	803	277	–	12	–	514	
46	1	–	–	1	–	–	1
	277	277	–	–	–	–	
45	11	–	–	11	–	–	11
	514	–	–	–	–	514	
	218	10	59	149	–	–	
13	17	–	–	17	–	–	17
	–	–	–	–	–	–	
	10	10	–	–	–	–	
416	191	–	59	132	–	–	132
–	–	–	–	–	–	–	–
	12,597	12,465	–	128	4	–	
113	128	–	–	128	–	–	128
11,074	12,465	12,465	–	–	–	–	12,802
–	–	–	–	–	–	–	–
	4	–	–	–	4	–	
	2,048	2,048	–	–	–	–	
	2,048	2,048	–	–	–	–	
	2,389	939	–	105	–	1,345	
–	3	–	–	3	–	–	3
	939	939	–	–	–	–	
43	102	–	–	102	–	–	102
	1,345	–	–	–	–	1,345	

Net gains and losses on financial instruments included measurement results from fair value adjustments recognized in profit or loss, impairments and reversals of impairments, disposal gains/losses as well as the recognition of premiums and discounts. In the following table, the financial instruments of the held-for-trading category include interest as a component of fair value adjustments. At the Group, this category only included derivatives that were not in a hedging relationship. Dividends were not allocated to net gains and losses on financial instruments.

The net gains and losses on financial instruments by category (excluding amounts recognized in other comprehensive income) were as follows:

		Net gains or losses			
€ million 2017	**Interest result**	**Impairments**	**Reversals of impairment**	**Fair value adjustments**	**Disposal gains/losses**
Financial instruments of the category					
Held for trading				–203	
Held to maturity	–	–	–		–
Loans and receivables	21	–39	97		–
Available for sale	5	–14	–		–1
Other liabilities	–294				–

		Net gains or losses			
€ million 2016	Interest result	Impairments	Reversals of impairment	Fair value adjustments	Disposal gains/losses
Financial instruments of the category					
Held for trading				69	
Held to maturity	–	–	–		–
Loans and receivables	18	–52	59		–
Available for sale	2	–5	–		34
Other liabilities	–287				–

In 2017, foreign exchange losses of € –3 million resulting from receivables and payables in operating business, their economic hedging, as well as hedging of forecast transactions in operating business were recorded (2016: foreign exchange losses of € –57 million). Foreign exchange gains of € 22 million resulting from financial balance sheet items and their economic hedging were recorded (2016: foreign exchange losses of € –4 million).

The fair value of financial assets and liabilities was based on the official market prices and market values quoted on the balance sheet date (Level 1 assets and liabilities) as well as mathematical calculation models with inputs observable in the market on the balance sheet date (Level 2 assets and liabilities) as well as measurement models and refinancing tranches (Level 3 assets and liabilities). Level 1 assets comprised stocks and bonds and were classified as available for sale, Level 1 liabilities comprised issued bonds and were classified as other liabilities. Level 2 assets and liabilities were primarily liabilities to banks classified as other liabilities as well as derivatives with and without hedging relationships.

The fair value of the liabilities classified as other liabilities was determined by discounting future cash flows using market interest rates. The calculation of the fair value of forward exchange contracts and currency options used spot and forward rates observable in the market as well as foreign exchange volatilities applying recognized mathematical principles. The fair value of interest rate swaps is determined with standard market valuation models using interest rate curves available in the market.

Level 3 assets were classified as "available for sale" and as a derivative without hedge accounting relationship, respectively. They included unlisted equity instruments, an interest in a partnership, contingent consideration from the sale of business activities and a corporation, equity investments in unlisted funds as well as an option on equity instruments. The fair values of unlisted equity instruments were derived from observable prices taken from equity refinancing transactions that occurred sufficiently close to the reporting date.

The fair value of the interest in one partnership was determined through an internally performed valuation using the discounted cash flow method. Expected future cash flows based on the company's latest medium-term planning were taken into account. The planning relates to a period of five years. Cash flows for periods beyond this were included in the terminal value calculation by applying a long-term growth rate of 0.5% (December 31, 2016: 0.5%). The after-tax discount rate used was 7.0% (December 31, 2016: 7.0%). To calculate the fair values of the contingent consideration components, the expected future milestone events and revenues were weighted using the probability of occurrence and discounted using after-tax discount rates of between 6.5% and 7.6% (December 31, 2016: 7.1%). The determination of the fair values of the fund investments was based on the fair values of companies in which the funds were invested. The fair value of the option on equity instruments was determined on the basis of the last available transaction price.

A sensitivity analysis of the measurement of the contingent consideration components from the disposal of the Biosimilars business is set out in Note (6) "Management judgments and sources of estimation uncertainty". An increase or decrease in the discount rates used to calculate the fair values of the other contingent consideration components would not have had a material impact on profit before tax or on other comprehensive income since the corresponding calculations assume a limited planning horizon and the determination of the fair values does not include a calculation of a terminal value. If the discount rate used for the determination of the fair value of the interest in the partnership had been one percentage point higher, other comprehensive income would have decreased by € 2 million. By contrast, a decline in the discount rate by one percentage point would have increased other comprehensive income by € 2 million.

Level 3 liabilities consisted of contingent consideration from acquisitions of corporations. These were reported as other liabilities and amounted to € 3 million as of the balance sheet date.

Counterparty credit risk was taken into consideration for all valuations. In the case of non-derivative financial instruments, such as other liabilities or interest-bearing securities, this was reflected using risk-adequate premiums on the discount rate, while discounts on market value (so-called credit valuation adjustments and debit valuation adjustments) were used for derivatives.

The fair values of investments in equity instruments classified as available for sale with a carrying amount of € 4 million (December 31, 2016: € 59 million) could not be reliably determined since there was no quoted price for an identical instrument in an active market and it was not possible to make a reliable estimate of fair value. They were measured at cost. Financial investments primarily included investments in equity instruments in various non-operating subsidiaries. There is currently no intention to sell these financial instruments.

The amounts of the financial instruments recognized at fair value in the balance sheet and the disclosed fair values for financial instruments were determined as follows:

€ million Dec. 31, 2017	Assets	Liabilities
Fair value determined by official prices and quoted market values (Level 1)	**53**	**7,719**
thereof: available for sale	53	–
thereof: other liabilities	–	7,719
Fair value determined using inputs observable in the market (Level 2)	**67**	**3,511**
thereof: available for sale	–	–
thereof: derivatives with a hedging relationship	45	43
thereof: derivatives without a hedging relationship	22	113
thereof: other liabilities	–	3,355
Fair value determined using inputs unobservable in the market (Level 3)	**443**	**3**
thereof: available for sale	397	–
thereof: derivatives without a hedging relationship	46	–
thereof: other liabilities	–	3

€ million Dec. 31, 2016	Assets	Liabilities
Fair value determined by official prices and quoted market values (Level 1)	**54**	**9,058**
thereof: available for sale	54	–
thereof: other liabilities	–	9,058
Fair value determined using inputs observable in the market (Level 2)	**134**	**3,978**
thereof: available for sale	46	–
thereof: derivatives with a hedging relationship	11	102
thereof: derivatives without a hedging relationship	77	131
thereof: other liabilities	–	3,744
Fair value determined using inputs unobservable in the market (Level 3)	**75**	**1**
thereof: available for sale	75	–
thereof: other liabilities	–	1

The changes in financial assets and liabilities assigned to Level 3 and measured at fair value were as follows:

€ million	**2017**	2016
Net book values as of January 1	**74**	**11**
Additions due to acquisitions/disposals	302	46
Transfers to Level 3 from previous measurement at cost/Level 1/Level 2	68	16
Fair value changes		
Gains (+)/losses (–) recognized in consolidated income statement	–6	4
Gains (+)/losses (–) recognized in consolidated statement of comprehensive income	5	–3
Currency translation	–2	–
Disposals	–1	–
Transfers from Level 3 to Level 1/Level 2	–	–
Net book values as of December 31	**440**	**74**

Additions to Level 3 particularly comprised contingent consideration from the disposal of the Biosimilars business (see Note (4) “Acquisitions and divestments”). The transfer to Level 3 mainly referred to investments in unlisted equity instruments where equity refinancing transactions at customary terms occurred sufficiently close to the reporting date. The gains and losses from Level 3 assets recognized in other comprehensive income were reported in the consolidated statement of comprehensive income under the item “fair value adjustments” related to “available-for-sale financial assets”.

Balance sheet netting of financial instruments is not possible. From an economic perspective, netting is only possible for derivatives. This possibility results from the framework agreements on derivatives trading which the Group enters into with commercial banks. The Group does not offset financial assets and financial liabilities in its balance sheet.

The following table presents the potential netting volume of the reported derivative financial assets and liabilities:

€ million Dec. 31, 2017	**Gross presentation**	**Netting**	**Net presentation**	Potential netting volume **due to master netting agreements**	**due to financial collateral**	**Potential net amount**
Derivative financial assets	113	–	113	60	–	54
Derivative financial liabilities	–155	–	–155	–60	–	–96

€ million Dec. 31, 2016	Gross presentation	Netting	Net presentation	Potential netting volume due to master netting agreements	due to financial collateral	Potential net amount
Derivative financial assets	88	–	88	64	–	24
Derivative financial liabilities	–233	–	–233	–64	–	–170

(40) Contingent liabilities

€ million	**Dec. 31, 2017**	Dec. 31, 2016
Contingent liabilities from legal disputes and tax matters	66	73
Other contingent liabilities	1	2

Contingent liabilities from legal disputes included potential obligations, for which the probability of an outflow of resources did not suffice to recognize a provision as of the balance sheet date. These mainly related to obligations under civil law and antitrust law. The potential civil law obligations primarily related to potential liabilities to pay damages due to a legal dispute under antitrust law. It was possible that the Group would be subject to claims for compensation for damages asserted by health insurance companies due to excessively high drug prices in case of a valid judgment under antitrust law.

In addition, Bristol-Myers Squibb Co., USA, E.R. Squibb & Sons L.L.C., USA, Ono Pharmaceutical Co., Ltd., Japan, and a private individual filed suit in the United States District Court of Delaware against the Group and Pfizer Inc., USA, (Pfizer) based on the allegation that Bavencio® infringes a U.S. patent relating to methods of treating tumors with anti-PD-L1 antibodies. Both the Group and Pfizer Inc. have initiated legal steps to defend themselves. The criteria for the recognition of a provision were not satisfied since utilization is currently not considered probable.

In addition, there were contingent liabilities from various legal disputes with Merck & Co. Inc., Kenilworth, NJ, USA (outside the United States and Canada: Merck Sharp & Dohme (MSD)), among other things due to breach of the co-existence agreement between the two companies and/or trademark/name right infringement regarding the use of the designation “Merck.” An outflow of resources – except costs for legal defense – was not deemed sufficiently probable as of the balance sheet date to justify the recognition of a provision. Since the contingent liability from these legal disputes could not be reliably quantified as of the balance sheet date, this matter was not taken into account in the table presented above.

Contingent liabilities pertaining to tax matters included various non-German income and non-income-related tax matters that mainly related to intragroup business transfers as well as legal disputes attributable to the determination of earnings under tax law, customs regulations, excise tax matters, and transfer pricing adjustments.

(41) Other financial obligations

Other financial obligations comprised the following:

€ million	Dec. 31, 2017	Dec. 31, 2016
Obligations to acquire intangible assets and payment obligations from collaboration agreements	3,328	2,826
Obligations to acquire property, plant and equipment	151	187
Future operating lease payments	530	362
Long-term purchase commitments	236	309
Remaining other financial obligations	63	208
Other financial obligations	**4,308**	**3,891**

Obligations to acquire intangible assets existed in particular owing to contingent consideration and within the scope of research and development collaborations. Here the Group has obligations to make milestone payments when certain objectives are reached. In the unlikely event that all contract partners achieve all milestones, the Group would be obligated to pay up to € 1,968 million (December 31, 2016: € 1,456 million) for the acquisition of intangible assets.

Moreover, within the scope of collaboration agreements, individual research and development or commercialization budgets were contractually set, upon the basis of which collaboration partners can commit the Group to make payments in the amount of up to € 1,360 million (2016: € 1,370 million).

The expected maturities of these obligations were as follows:

€ million	Dec. 31, 2017	Dec. 31, 2016
Obligations to acquire intangible assets and payment obligations from collaboration agreements		
within one year	247	263
in 1–5 years	1,572	1,176
more than 5 years	1,509	1,387
	3,328	**2,826**

Other financial obligations were recognized at nominal value.

The maturities of liabilities from lease agreements were as follows:

€ million Dec. 31, 2017	within 1 year	1–5 years	more than 5 years	Total
Present value of future payments from finance leases	1	2	–	4
Interest component of finance leases	–	–	–	–
Future finance lease payments	**1**	**3**	**–**	**4**
Future operating lease payments	**137**	**287**	**106**	**530**

€ million Dec. 31, 2016	within 1 year	1–5 years	more than 5 years	Total
Present value of future payments from finance lease	1	2	–	4
Interest component of finance leases	–	–	–	–
Future finance lease payments	**2**	**2**	**–**	**4**
Future operating lease payments	**112**	**221**	**29**	**362**

Operating leasing agreements related mainly to leasing arrangements to lease real estate, company fleet vehicles as well as operating and office equipment. The payments resulting from operating leasing agreements amounted to € 146 million (2016: € 132 million) and were recorded as an expense in the reporting period.

(42) Personnel expenses/Headcount

Personnel expenses comprised the following:

€ million	**2017**	2016
Wages and salaries	3,953	3,575
Compulsory social security contributions and special financial assistance	586	555
Pension expenses	304	226
Personnel expenses	**4,843**	**4,356**

As of December 31, 2017, the Group had 52,880 employees (December 31, 2016: 50,348). The average number of employees during the year was 51,990 (2016: 50,242).

The breakdown of personnel by function was as follows:

	2017	2016
Production	15,570	14,790
Administration	9,272	8,878
Research and Development	6,786	6,240
Supply Chain	3,726	3,873
Marketing and Sales	15,073	15,109
Other	1,563	1,352
Average number of employees	**51,990**	**50,242**

(43) Material costs

Material costs in 2017 amounted to € 2,463 million (2016: € 2,358 million) and were largely reported under cost of sales.

(44) Auditor's fees

The costs of the auditors (KPMG) of the financial statements of the Group consisted of the following:

	2017		2016	
€ million	Group	thereof: KPMG Germany	Group	thereof: KPMG Germany
Audits of financial statements	8.5	2.4	8.2	2.2
Other audit-related services	0.3	0.2	0.3	0.2
Tax consultancy services	0.6	0.4	0.7	0.5
Other services	1.0	0.9	1.4	1.3
	10.4	**3.9**	**10.6**	**4.2**

Other audit-related services pertain to various statutory or contractually agreed audits. Tax consultancy services encompass services in connection with the preparation of tax returns, also for employees delegated abroad. Other services comprises particularly advisory services for employees delegated abroad.

(45) Corporate governance

The Statement of Compliance in accordance with section 161 of the German Stock Corporation Act (Aktiengesetz) was published in the corporate governance section of the website www.emdgroup.com/investors → corporate governance in March 2017 and thus made permanently available.

(46) Companies opting for exemption under section 264 (3) HGB or section 264b HGB

The following companies, which have been consolidated in these financial statements, opted for exemption:

- Allergopharma GmbH & Co. KG, Reinbek
- Allergopharma Verwaltungs GmbH, Darmstadt
- Biochrom GmbH, Berlin
- Chemitra GmbH, Darmstadt
- Litec-LLL GmbH, Greifswald
- Merck Accounting Solutions & Services Europe GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany
- Merck Chemicals GmbH, Darmstadt, Germany, an indirect subsidiary of Merck KGaA, Darmstadt, Germany
- Merck Consumer Health Holding GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany
- Merck Export GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany
- Merck Life Science GmbH, Eppelheim, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany
- Merck Patent GmbH, Darmstadt, Germany, an indirect subsidiary of Merck KGaA, Darmstadt, Germany
- Merck Selbstmedikation GmbH, Darmstadt, Germany, an indirect subsidiary of Merck KGaA, Darmstadt, Germany
- Merck Serono GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany
- Merck Versicherungsvermittlung GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany

(47) Related-party disclosures

Related parties in respect of the Group are E. Merck KG, Darmstadt, Germany, Emanuel-Merck-Vermögens-KG, Darmstadt, Germany, and E. Merck Beteiligungen KG, Darmstadt, Germany a related party of Merck KGaA, Darmstadt, Germany. In principle, direct or indirect subsidiaries of Merck KGaA, Darmstadt, Germany, associates of the Group, jointly controlled companies where the Group is involved, as well as pension funds that are classified as defined benefit plans in accordance with IAS 19 are also related parties within the meaning of IAS 24. This also includes the companies Merck Capital Asset Management Ltd., Malta, and Merck Pensionstreuhandverein e.V., Darmstadt, Germany, Members of the Executive Board and the Supervisory Board of Merck KGaA, Darmstadt, Germany, the Executive Board and the Board of Partners of E. Merck KG, Darmstadt, Germany, as well as close members of their families are also related parties.

As of December 31, 2017, there were liabilities by Merck Financial Services GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, Merck KGaA, Darmstadt, Germany, and Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany, to E. Merck KG, Darmstadt, Germany, in the amount of € 1,349.2 million (December 31, 2016: € 1,186.3 million). The balances result mainly from mutual profit transfers between Merck KGaA, Darmstadt, Germany, and E. Merck KG, Darmstadt, Germany, as well as the profit transfer by Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany, to E. Merck KG, Darmstadt, Germany. They included financial liabilities of € 764.8 million (December 31, 2016: € 729.2 million) which were subject to standard market

interest rates. In addition, as of December 31, 2017, Merck KGaA, Darmstadt, Germany, had receivables from E. Merck Beteiligungen KG, Darmstadt, Germany a related party of Merck KGaA, Darmstadt, Germany, in the amount of € 140.9 million (December 31, 2016: € 123.7 million). Merck Financial Services GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, had receivables from Merck Pensionstreuhandverein e.V., Darmstadt, Germany, in the amount of € 0.1 million (December 31, 2016: € 0.1 million) and from Merck Capital Asset Management Ltd., Malta, in the amount of € 0.0 million (December 31, 2016: € 2.5 million). These included financial receivables of € 0.1 million (December 31, 2016: € 2.5 million), which were subject to standard market interest rates. Neither collateral nor guarantees existed for any of the balances either in favor or to the disadvantage of the Group.

From January to December 2017, Merck KGaA, Darmstadt, Germany, performed services for E. Merck KG, Darmstadt, Germany, with a value of € 0.9 million (2016: € 1.0 million), for Emanuel-Merck-Vermögens-KG, Darmstadt, Germany, with a value of € 0.2 million (2016: € 0.2 million) and for E. Merck Beteiligungen KG, Darmstadt, Germany a related party of Merck KGaA, Darmstadt, Germany, with a value of € 0.1 million (2016: € 0.1 million). During the same period, E. Merck KG, Darmstadt, Germany, performed services for Merck KGaA, Darmstadt, Germany, with a value of € 0.5 million (2016: € 0.5 million).

As of December 31, 2017, there were receivables from the Venezuelan entities deconsolidated as of February 29, 2016 with a carrying amount of € 22.7 million (December 31, 2016: € 25.7 million) after impairment losses and liabilities with a carrying amount of € 21.5 million (December 31, 2016: € 24.2 million). The Group no longer makes any deliveries to Venezuelan entities. From March to December 2016, essential drugs to treat cancer and multiple sclerosis were provided to patients to a certain extent. Revenues are recognized when payment is received and were consequently not included in the stated receivables. From January to December 2017, the Group did not generate any revenues from these deliveries (March to December 2016: € 0.4 million). During the prior-year period, the cost of sales of these deliveries totaled € 13.7 million.

As of December 31, 2017, there were receivables of € 8.3 million (December 31, 2016: € 18.8 million) and liabilities of € 9.1 million (December 31, 2016: € 12.1 million) vis-à-vis non-consolidated subsidiaries. From January to December 2017, the Group generated revenues of € 0.1 million (December 31, 2016: € 0.9 million) with these companies. During the same period, expenses amounting to € 0.8 million (December 31, 2016: € 6.1 million) were incurred as a result of transactions with these companies.

Information on pension funds that are classified as defined benefit plans in accordance with IAS 19 can be found in Note (26) "Provisions for pensions and other post-employment benefits".

Information on Executive Board and Supervisory Board compensation can be found in Note (48) "Executive Board and Supervisory Board compensation". Activities above and beyond those set forth in Note (48) such as, for example, the provision of services or the granting of loans, between companies of the Group and members of the Executive Board or the Supervisory Board of Merck KGaA, Darmstadt, Germany, the Executive Board or the Board of Partners of E. Merck KG, Darmstadt, Germany, or members of their immediate families took place neither in 2017 nor 2016.

(48) Executive Board and Supervisory Board compensation

The compensation of the Executive Board of Merck KGaA, Darmstadt, Germany, is paid by the general partner, E. Merck KG, Darmstadt, Germany. Furthermore, companies included in these consolidated financial statements recorded expenses for the period from January to December 2017 in the amount of € 3.5 million (2016: € 3.0 million) for services provided by members of the Executive Board of Merck KGaA, Darmstadt, Germany, at those companies.

For the period from January to December 2017, fixed salaries of € 6.0 million (2016: € 6.6 million), variable compensation of € 16.3 million (2016: € 16.8 million), and additional benefits of € 0.3 million (2016: € 0.2 million) were recorded for members of the Executive Board of Merck KGaA, Darmstadt, Germany, by E. Merck KG, Darmstadt, Germany, and by companies included in these consolidated financial statements. Furthermore, releases of provisions for the Long-Term Incentive Plan for members of the Executive Board of Merck KGaA, Darmstadt, Germany, resulted in income of € 1.8 million (2016: expense of € 12.5 million from additions to provisions), and additions to the pension provisions for members of the Executive Board of Merck KGaA, Darmstadt, Germany, included current service costs of € 3.2 million (2016: € 2.8 million) and past service costs of € 0.9 million (2016: € 3.5 million).

The compensation of the Supervisory Board amounting to € 868.3 thousand (2016: € 869.0 thousand) consisted of a fixed portion of € 822.5 thousand (2016: € 822.5 thousand) and meeting attendance compensation of € 45.8 thousand (2016: € 46.5 thousand).

Further individualized information and details can be found in the Compensation Report on pages 172 et seq.

(49) Information on preparation and approval

The Executive Board of Merck KGaA, Darmstadt, Germany, prepared the consolidated financial statements on February 14, 2018 and approved them for forwarding to the Supervisory Board. The Supervisory Board has the responsibility to examine the consolidated financial statements and to declare whether it approves them.

(50) Subsequent events

In connection with the antitrust review proceedings for the Sigma-Aldrich acquisition, on July 6, 2017, the Group received notice from the European Commission (EU Commission), in which the EU Commission informed the Group of its preliminary conclusion that the Group and Sigma-Aldrich allegedly transmitted incorrect and/or misleading information within the scope of the acquisition of Sigma-Aldrich. The EU Commission received registration of the merger on April 21, 2015 and granted clearance on June 15, 2015 subject to the condition that the Group and Sigma-Aldrich divest parts of the European solvents and inorganic chemicals businesses of Sigma-Aldrich in order to resolve antitrust concerns. According to the preliminary viewpoint of the EU Commission communicated in the letter dated July 6, 2017, the Group and Sigma-Aldrich withheld in this connection important information about an innovation project allegedly relevant for certain laboratory chemicals of significance to the analysis by the EU Commission. According to the EU Commission, the innovation project should have been included in the remedies package. A meeting of the cooperation procedure between the EU Commission and the Group took place on February 5, 2018.

Based on management's updated assessment, the existing provision was increased to a mid double-digit million amount. The expense was recorded under other operating expenses and allocated to the Life Science business sector.

The ongoing investigations are limited to the examination of violations of EU merger control procedures and do not affect the validity of the EU Commission's decision to approve the merger.

Subsequent to the balance sheet date, no further events of special importance occurred that could have a material impact on the net assets, financial position and results of operations.

Accounting and Measurement Policies

(51) Measurement policies

The main assets and liabilities disclosed in the consolidated balance sheet are measured as follows:

Balance sheet item	Measurement principle
Assets	
Goodwill	Acquisition cost (subsequent measurement: impairment-only approach)
Other intangible assets	
With finite useful life	Amortized cost
With indefinite useful life or not yet available for use	Amortized cost (subsequent measurement: impairment-only approach)
Property, plant and equipment	Amortized cost
Financial assets (current/non-current)	
Held-to-maturity investments	Amortized cost
Available-for-sale financial assets	Fair value
Loans and receivables	Amortized cost
Derivative assets (financial transactions)	Fair value
Other assets	
Derivative assets (operational)	Fair value
Receivables from non-income related taxes	Amortized cost
Other receivables	Amortized cost
Deferred tax assets	Undiscounted measurement based on tax rates that are expected to apply to the period when the asset is realized or the liability is settled
Inventories	Lower of cost and net realizable value
Trade accounts receivable	Amortized cost
Income tax receivables	Expected tax refunds based on tax rates that have been enacted or substantively enacted by the end of the reporting period
Cash and cash equivalents	Nominal value
Assets held for sale	Lower of carrying amount and fair value less costs to sell

Balance sheet item	Measurement principle
Equity and liabilities	
Provisions for pensions and other post-employment benefits	Projected unit credit method
Other provisions (current/non-current)	Present value of the expenditures expected to be required to settle the obligation
Financial liabilities (current/non-current)	
Bonds and commercial paper	Amortized cost
Bank loans	Amortized cost
Liabilities to related parties	Amortized cost
Loans from third parties and other financial liabilities	Amortized cost
Liabilities from derivatives (financial transactions)	Fair value
Finance lease liabilities	Amortized cost
Other liabilities (current/non-current)	
Liabilities from derivatives (operational)	Fair value
Liabilities from non-income-related taxes	Settlement amount
Other liabilities	Settlement amount
Deferred tax liabilities	Undiscounted measurement based on tax rates that are expected to apply to the period when the asset is realized or the liability is settled
Trade accounts payable	Amortized cost
Income tax liabilities	Expected tax payments based on tax rates that have been enacted or substantively enacted by the end of the reporting period
Liabilities directly related to assets held for sale	Fair value

(52) Consolidation methods

The consolidated financial statements are based on the single-entity financial statements of the consolidated companies as of the balance sheet date, which were prepared applying consistent accounting policies in accordance with IFRS.

Acquisitions are accounted for using the purchase method in accordance with IFRS 3. Subsidiaries acquired and consolidated for the first time were measured at the carrying values at the time of acquisition. Differences resulting in this context are recognized as assets and liabilities to the extent that their fair values differ from the values carried in the financial statements. Any remaining positive difference is recognized as goodwill within intangible assets.

In cases where a company was not acquired in full, non-controlling interests are measured using the fair value of the proportionate share of net assets. The option to measure non-controlling interests at fair value on the date of their acquisition (full goodwill method) was not utilized.

When additional shares in non-controlling interests are acquired, the purchase price amount that exceeds the carrying amount of this interest is recognized immediately in equity.

IFRS 11 is applied for joint arrangements. A joint arrangement exists when, on the basis of a contractual arrangement, the Group and third parties jointly control business activities. Joint control means that decisions about the relevant activities require unanimous consent. Joint arrangements are either joint operations or joint ventures. Revenues and expenses as well as assets and liabilities from joint operations are included in the consolidated financial statements on a pro rata basis in accordance with the Group's rights and obligations. By contrast, interests in joint ventures as well as in material associates over which the Group has significant influence are included in accordance with IAS 28 using the equity method of accounting.

Intragroup sales, expenses and income, as well as all receivables and payables between the consolidated companies, are eliminated. The effects of intragroup deliveries reported under non-current assets and inventories are adjusted by eliminating any intragroup profits. In accordance with IAS 12, deferred taxes are applied to these consolidation measures.

(53) Currency translation

The functional currency concept applies to the translation of financial statements of consolidated companies prepared in foreign currencies. The subsidiaries of the Group generally conduct their operations independently. The functional currency of these companies is normally the respective local currency. Assets and liabilities are measured at the closing rate, and income and expenses are measured at weighted average annual rates in euros, the reporting currency. Any currency translation differences arising during consolidation of Group companies are recognized in equity. If Group companies are deconsolidated, existing currency differences are reversed and reclassified to profit or loss.

When the financial statements of consolidated companies are prepared, business transactions that are conducted in currencies other than the functional currency are recorded using the current exchange rate on the date of the transaction. Foreign currency monetary items (cash and cash equivalents, receivables and payables) in the year-end financial statements of the consolidated companies prepared in the functional currency are translated at the respective closing rates. Exchange differences from the translation of monetary items are recognized in the income statement with the exception of net investments in a foreign operation. Hedged items are likewise carried at the closing rate. The resulting gains or losses are eliminated in the consolidated income statement against offsetting amounts from the fair value measurement of derivatives.

Currency translation was based on the following key exchange rates:

	Average annual rate		Closing rate	
1 € =	**2017**	2016	**Dec. 31, 2017**	Dec. 31, 2016
British pound (GBP)	0.874	0.816	0.887	0.857
Chinese renminbi (CNY)	7.621	7.343	7.791	7.343
Japanese yen (JPY)	126.921	121.127	134.669	123.070
Swiss franc (CHF)	1.112	1.090	1.168	1.075
South Korean won (KRW)	1,275.143	1,279.345	1,275.923	1,265.450
Taiwan dollar (TWD)	34.398	35.571	35.538	34.004
U.S. dollar (USD)	1.130	1.102	1.195	1.051

(54) Recognition of net sales and other income

Net sales and other income are recognized when the amount of revenue can be measured reliably, it is probable that the economic benefits will flow to the entity and when the following preconditions have been met.

Net sales are deemed realized once the goods are delivered or the services have been rendered and the significant risks and rewards of ownership have been transferred to the purchaser. In the case of sales of equipment in the Life Science business sector, these preconditions are only met after installation has been successfully completed to the extent that the installation requires specialized knowledge, does not represent a clear ancillary service and the relevant equipment can only be used by the customer once successfully set up.

Net sales are recognized net of sales-related taxes and sales deductions. When sales are recognized, estimated amounts are taken into account for expected sales deductions, for example rebates, discounts and returns. The vast majority of Group sales are generated by the sale of goods.

In the Healthcare business sector, products are often sold to pharmaceutical wholesalers and to a lesser extent directly to pharmacies or hospitals. In the Life Science and Performance Materials business sectors, products are largely sold to business customers, and to a lesser extent to distributors.

In addition to revenue from the sale of goods, net sales also include commission income, profit-sharing and in the Life Science business sector revenue from services, but the volume involved is insignificant. In the case of long-term service agreements, the Group records revenues on a pro rata basis over the term of the agreement or in accordance with the services rendered.

Revenues from multiple-element arrangements (e.g. sales of goods in combination with services) are recognized when the respective contract element is delivered or rendered.

Royalty and license income is recognized when the contractual obligation has been met.

Dividend income is recognized when the shareholders' right to receive the dividend is established. This is normally the date of the dividend resolution.

Interest income is recognized in the period in which it is earned.

(55) Research and development costs

Research and development costs comprise the costs of research departments and process development, the expenses incurred as a result of research and development collaborations as well as the costs of clinical trials (both before and after approval is granted).

The costs of research cannot be capitalized and are expensed in full in the period in which they are incurred. As internally generated intangible assets, it is necessary to capitalize development expenses if the cost of the internally generated intangible asset can be reliably determined and the asset can be expected to lead to future economic benefits. The condition for this is that the necessary resources are available for the development of the asset, technical feasibility of the asset is given, its completion and use are intended, and marketability is given. Owing to the high risks up to the time that pharmaceutical products are approved, these criteria are not met in the Healthcare business sector. Costs incurred after regulatory approval are usually insignificant and are therefore not recognized as intangible assets. In the Life Science and Performance Materials business sectors, development expenses are capitalized as soon as the aforementioned criteria have been met.

Reimbursements for R&D are offset against research and development costs.

(56) Goodwill

Goodwill is allocated to cash-generating units or groups of cash-generating units and tested for impairment either annually or if there are indications of impairment. The carrying amounts of the cash-generating units or groups of cash-generating units are compared with their recoverable amounts and impairment losses are recognized where the recoverable amount is lower than the carrying amount. The recoverable amount of a cash-generating unit is determined as the higher of fair value less costs of disposal and value in use estimated using the discounted cash flow method.

(57) Other intangible assets

Acquired intangible assets are recognized at cost and are classified as assets with finite and indefinite useful lives. Self-developed intangible assets are only capitalized if the requirements specified by IAS 38 have been met. Intangible assets acquired in the course of business combinations are recognized at fair value on the acquisition date. If the development of intangible assets takes a substantial period of time, the directly attributable borrowing costs incurred up until completion are capitalized as part of the costs.

INTANGIBLE ASSETS WITH INDEFINITE USEFUL LIVES AND INTANGIBLE ASSETS NOT YET AVAILABLE FOR USE

Intangible assets with indefinite useful lives and intangible assets not yet available for use are not amortized; however they are tested for impairment when a triggering event arises or at least once a year. Here, the respective carrying amounts are compared with the recoverable amount and impairments are recognized as required. Impairment losses other than goodwill recognized on indefinite-life intangible assets and intangible assets not yet available for use are reversed if the original reasons for impairment no longer apply.

The marketing authorizations, patents, licenses and similar rights, and other not yet available for use primarily relates to rights that the Group acquired for active ingredients, products or technologies that are still in development stages. Owing to the uncertainty as to the extent to which these projects will ultimately lead to the marketing of marketable products, the period for which the resulting capitalized assets would generate an economic benefit for the company cannot yet be determined.

INTANGIBLE ASSETS WITH FINITE USEFUL LIVES

Intangible assets with a finite useful life are amortized using the straight-line method. The useful lives of customer relationships, brand names and trademarks as well as marketing authorizations, acquired patents, licenses and similar rights, and software are between three and 24 years. Amortization of intangible assets and software is allocated to the functional costs in the consolidated income statement. An impairment test is performed if there are indications of impairment. Impairment losses are determined using the same methodology as for indefinite-life intangible assets. Impairment losses are reversed if the original reasons for impairment no longer apply.

(58) Property, plant and equipment

Property, plant and equipment is measured at cost less depreciation and impairments plus reversals of impairments. The component approach is applied here in accordance with IAS 16. Subsequent costs are only capitalized if it is probable that future economic benefits will arise for the Group and the cost of the asset can be measured reliably. The cost of self-constructed property, plant and equipment is calculated on the basis of the directly attributable unit costs and an appropriate share of overheads. If the construction of property, plant and equipment takes a substantial period of time, the attributable borrowing costs incurred up until completion are capitalized as part of the costs. In accordance with IAS 20, costs are reduced by the amount of government grants in those cases where government grants or subsidies have been paid for the acquisition or manufacture of assets (grants related to assets). Grants related to expenses which no longer offset future expenses are recognized in profit or loss. Property, plant and equipment is depreciated by the straight-line method over the useful life of the asset concerned. Depreciation of property, plant and equipment is based on the following useful lives:

USEFUL LIFE OF PROPERTY, PLANT AND EQUIPMENT

	Useful life
Production buildings	maximum of 33 years
Administration buildings	maximum of 40 years
Plant and machinery	6 to 25 years
Operating and office equipment; other facilities	3 to 10 years

The useful lives of the assets are reviewed regularly and adjusted if necessary. If indications of a decline in value exist, an impairment test is performed. If the reasons for an impairment loss no longer exist, a reversal of the impairment loss recognized in prior periods is recorded.

(59) Leasing

Where non-current assets are leased and economic ownership lies with the Group (finance lease), the asset is recognized at the present value of the minimum lease payments or the lower fair value in accordance with IAS 17 and depreciated over its useful life. The corresponding payment obligations from future lease payments are recorded as liabilities. If an operating lease is concerned, the associated expenses are recognized in the period in which they are incurred.

(60) Financial instruments: Principles

A financial instrument is a contractual agreement that gives rise to a financial asset of one entity and a financial liability or an equity instrument of another entity. A distinction is made between nonderivative and derivative financial instruments.

The Group accounts for regular way purchases or sales of nonderivative financial instruments at the settlement date and of derivatives at the trade date. Financial assets and liabilities are recorded when a Group company becomes contract party to the financial instrument. Upon initial recognition, financial assets and financial liabilities are measured at fair value, taking into account any transaction costs, if necessary.

Financial assets are derecognized in part or in full if the contractual rights to the cash flows from the financial asset have expired or have been fulfilled or if control and substantially all the risks and rewards of ownership of the financial asset have been transferred to a third party. Financial liabilities are derecognized if the contractual obligations have been discharged, cancelled, or expired. Cash and cash equivalents are carried at nominal value.

(61) Financial instruments: Categories and classes of financial instruments

Financial assets and liabilities are classified into the following IAS 39 measurement categories and IFRS 7 classes. The classes required to be disclosed in accordance with IFRS 7 consist of the measurement categories set out here. Additionally, cash and cash equivalents with an original maturity of up to 90 days, finance lease liabilities, and derivatives designated as hedging instruments are also classes in accordance with IFRS 7.

FINANCIAL ASSETS AND FINANCIAL LIABILITIES AT FAIR VALUE THROUGH PROFIT OR LOSS

"Financial assets and financial liabilities at fair value through profit or loss" can be both non-derivative and derivative financial instruments. Financial instruments in this category are subsequently measured at fair value. Gains and losses on financial instruments in this measurement category are recognized directly in the consolidated income statement. This measurement category includes an option to designate non-derivative financial instruments as "at fair value through profit or loss" on initial recognition (fair value option) or as "financial instruments held for trading". The fair value option was applied neither during the fiscal year nor the previous year. The Group only assigns derivatives to the "held for trading" measurement category. Special accounting rules apply to derivatives that are designated as hedging instruments in a hedging relationship.

HELD-TO-MATURITY INVESTMENTS

"Held-to-maturity investments" are non-derivative financial assets with fixed or determinable payments and a fixed maturity that are quoted in an active market. To be able to assign a financial asset to this measurement category, the entity must have the positive intention and ability to hold it to maturity. These investments are subsequently measured at amortized cost using the effective rate method. If there is objective evidence that such an asset is impaired, an impairment loss is recognized in profit or loss. Subsequent reversals of impairment losses are also recognized in profit or loss up to the amount of the amortized cost. At the Group, this measurement category is used for current financial assets.

LOANS AND RECEIVABLES

"Loans and receivables" are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. They are subsequently measured at amortized cost using the effective rate method. If there is objective evidence that such assets are impaired, an impairment loss is recognized in profit or loss. Subsequent reversals of impairment losses are also recognized in profit or loss up to the amount of amortized cost. Long-term non-interest-bearing and low-interest receivables are measured at their present value. The Group primarily assigns trade receivables, loans, and miscellaneous other current and non-current receivables to this measurement category. The Group always uses a separate allowance account for impairment losses on trade and other receivables. Amounts from the allowance account are recognized in the carrying amount of the corresponding receivable as soon as this is derecognized due to irrecoverability.

AVAILABLE-FOR-SALE FINANCIAL ASSETS

"Available-for-sale financial assets" are those non-derivative financial assets that are not assigned to the measurement categories "financial assets and financial liabilities at fair value through profit or loss", "held-to-maturity investments" or "loans and receivables". Financial assets in this category are subsequently measured at fair value. Generally, changes in fair value are recognized immediately in equity and are only transferred to the consolidated income statement when the financial asset is derecognized. Changes in the fair values of contingent consideration resulting from adjustments to cash flow estimated are recognized in profit or loss. Further explanations on the accounting treatment of contingent consideration can be found in Note (63) "Contingent consideration". If there is substantial evidence of an asset impairment, the accumulated loss recognized immediately in equity is to be reclassified to the consolidated income statement, even if the financial asset has not been derecognized. Reversals of impairment losses on previously impaired equity instruments are recognized immediately in equity.

Reversals of impairment losses on previously impaired debt instruments are recognized in profit or loss up to the amount of the impairment loss. Any amount in excess of this is recognized directly in equity. Financial assets in this category for which no fair value is available or fair value cannot be reliably determined are measured at cost less any accumulated impairment losses. Impairment losses on financial assets carried at cost may not be reversed. At the Group, this measurement category is used in particular for interest-bearing securities, financial assets, contingent consideration, and financial investments in equity instruments as well as interests in subsidiaries that are not consolidated due to secondary importance (affiliates). Both interests in non-consolidated subsidiaries as well as to some extent financial investments in equity instruments are measured at cost.

OTHER LIABILITIES

Other liabilities are non-derivative financial liabilities that are subsequently measured at amortized cost except for cases of contingent consideration. Differences between the amount received and the amount to be repaid are amortized to profit or loss over the maturity of the instrument. The Group primarily assigns financial liabilities such as issued bonds and bank loans, trade payables, and miscellaneous other non-derivative current and non-current liabilities to this category.

(62) Financial instruments: Derivatives and hedge accounting

The Group uses derivatives solely to economically hedge recognized assets or liabilities and forecast transactions. The hedge accounting rules in accordance with IFRS are applied to some of these hedges. A distinction is made between fair value hedge accounting and cash flow hedge accounting. Designation of a hedging relationship requires a hedged item and a hedging instrument. The Group currently only uses derivatives as hedging instruments.

The hedging relationship must be effective at all times, i.e. the change in fair value of the hedging instrument almost fully offsets changes in the fair value of the hedged item. The Group uses the dollar offset method as well as regression analyses to measure hedge effectiveness. Derivatives that do not or no longer meet the documentation or effectiveness requirements for hedge accounting, whose hedged item no longer exists, or for which hedge accounting rules are not applied are classified as "financial assets and liabilities at fair value through profit or loss". Changes in fair value are then recognized in profit or loss.

At the Group, cash flow hedges normally relate to highly probable forecast transactions in foreign currency and to future interest payments. In cash flow hedges, the effective portion of the gains and losses on the hedging instrument taking deferred taxes into consideration is recognized in equity until the hedged expected cash flows affect profit or loss. This is also the case if the hedging relationship expires or is terminated before the hedged transaction occurs and the occurrence of the hedged item remains likely. The ineffective portion of a cash flow hedge is recognized directly in profit or loss.

(63) Contingent consideration

For contingent consideration that was contractually agreed with the acquirer or seller within the context of the disposal or the acquisition of businesses within the meaning of IFRS 3, the fair value of the claims or obligations at the transaction date is recognized in the balance sheet as financial assets available for sale or financial liabilities.

Contingent consideration in connection with the purchase of individual assets outside of business combinations is recorded as a financial liability only when the consideration is contingent upon future events that are beyond the Group's control.

In cases where the payment of contingent consideration is within the Group's control, the liability is recognized only as from the date when a non-contingent obligation arises.

Contingent consideration upon the purchase of individual assets primarily relates to future milestone payments in connection with in-licensed intellectual property in the Healthcare business sector.

Changes in the fair value of financial assets from contingent consideration are recorded as other operating income or other operating expenses, except for changes due to interest rate fluctuations and the effect from the unwinding of the discount.

The effect from the unwinding of the discount is reported as part of the interest result; changes due to interest rate fluctuations are reported in the consolidated statement of comprehensive income as "fair value adjustments".

(64) Other non-financial assets and liabilities

Other non-financial assets are carried at amortized cost. Allowances are recognized for any credit risks. Long-term non-interest bearing and low-interest receivables and liabilities are carried at their present value. Other non-financial liabilities are carried at the amount to be repaid.

(65) Deferred taxes

Deferred tax assets and liabilities result from temporary differences between the carrying amount of an asset or liability in the IFRS and tax balance sheets of consolidated companies as well as from consolidation activities, insofar as the reversal of these differences will occur in the future. In addition, deferred tax assets are recorded insofar as their utilization is probable in the foreseeable future.

Deferred taxes are not recorded for temporary differences from the initial recognition of assets or liabilities to the extent that the transaction affects neither the profit (before income tax) under IFRS nor the taxable profit and the transaction is not a business combination.

In addition, deferred tax liabilities are not recognized for temporary differences that arise in connection with the initial recognition of goodwill.

Deferred tax liabilities are recognized for temporary differences arising from interests in subsidiaries or associates, unless the Group is able to control the reversal of the temporary differences and it is probable that the temporary differences will not reverse in the foreseeable future.

Deferred tax assets and liabilities are calculated based on the expected tax rates and tax laws applicable during the period in which the asset is realized or a liability settled. The carrying amount of deferred tax assets is reviewed each year on the balance sheet date and its value is lowered if it is no longer probable that sufficient taxable income is available in order to realize the asset either in full or in part. Deferred tax assets and liabilities are only offset on the balance sheet date if they meet the requirements of IAS 12.

(66) Inventories

Inventories are carried at the lower of cost or net realizable value. When determining cost, the "first-in, first-out" (FIFO) and weighted average cost formulas are used. In addition to directly attributable unit costs, manufacturing costs also include overheads attributable to the production process, which are determined on the basis of normal capacity utilization of the production facilities.

Inventories are written down if the net realizable value is lower than the acquisition or manufacturing cost carried in the balance sheet. Since the inventories are for the most part not manufactured within the scope of long-term production processes, the manufacturing costs do not include any borrowing costs.

Inventory prepayments are recorded under other current assets.

(67) Provisions for pensions and other post-employment benefits

Provisions for pensions and other post-employment benefits are recorded in the balance sheet in accordance with IAS 19. The obligations under defined benefit plans are measured using the projected unit credit method. Under the projected unit credit method, dynamic parameters are taken into account in calculating the expected benefit payments after an insured event occurs; these payments are spread over the entire period of service of the participating employees. Annual actuarial opinions are prepared for this purpose. Actuarial gains and losses resulting from changes in actuarial assumptions and/or experience adjustments (the effects of differences between the previous actuarial assumptions and what has actually occurred) are recognized immediately in equity as soon as they are incurred, taking deferred taxes into account. Consequently, the consolidated balance sheet discloses – after deduction of the plan assets – the full scope of the obligations while avoiding the fluctuations in expenses that can result especially when the calculation parameters change. The actuarial gains and losses recorded in the respective reporting period are presented separately in the Statement of Comprehensive Income.

(68) Other provisions and contingent liabilities

Provisions are recognized in the balance sheet if it is more likely than not that a cash outflow will be required to settle the obligation and the amount of the obligation can be measured reliably. The carrying amount of other provisions takes into account the amounts required to cover future payment obligations, recognizable risks and uncertain obligations of the Group to third parties.

Measurement of other provisions is based on the settlement amount with the highest probability or, if a large number of similar cases exist with respect to the provision being measured, it is based on the expected value of the settlement amounts. Long-term provisions are discounted and carried at their present value as of the balance sheet date if the discount rate effect is material. To the extent that reimbursement claims exist as defined in IAS 37, they are recognized separately as an asset if their realization is virtually certain and the asset recognition criteria have been met.

Contingent liabilities comprise not only possible obligations arising from past events and whose existence is subject to the occurrence of uncertain future events, but also present obligations arising from past events where an outflow of resources embodying economic benefits is not probable or where the amount of the obligation cannot be measured with reliability. Contingent liabilities that were not assumed within the context of a business combination are not recognized in the consolidated balance sheet. Unless the possibility of an outflow of resources embodying economic benefits is remote, information on the relevant contingent liabilities is disclosed in the notes.

In this context, the present value of the future settlement amount is used as the basis for measurement. The settlement amount is determined in accordance with the rules set out in IAS 37 and is based on the best estimate.

(69) Share-based compensation programs

Provisions have been set up for obligations from long-term variable compensation programs (Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany). These share-based compensation programs with cash settlement are aligned not only with target achievement based on key performance indicators, but above all also with the long-term performance of shares of Merck KGaA, Darmstadt, Germany. Certain executives and employees could be eligible to receive a certain number of virtual shares – Share Units of Merck KGaA, Darmstadt, Germany (MSUs) – at the end of a three-year performance cycle. The number of MSUs that could be received depends on the individual grant defined for the respective person and the average closing price of shares of Merck KGaA, Darmstadt, Germany, in Xetra® trading during the last 60 trading days prior to January 1 of the respective performance cycle (reference price). In order for members of top management to receive payment for the 2015 and 2016 tranches, they must personally own an investment in shares of Merck KGaA, Darmstadt, Germany, dependent on their respective fixed annual compensation. For the 2017 tranche, an obligatory personal investment is not a precondition for a payout. The personal investment for top management was defined in 2017 in a separate Share Ownership Guideline.

When the three-year performance cycle ends, the number of MSUs to then be granted is determined based on the development of defined key performance indicators (KPIs).

For the 2015 and 2016 tranches, these are on the one hand the performance of the share price of Merck KGaA, Darmstadt, Germany, compared to the performance of the DAX® with a weighting of 70%, and on the other hand the development of the EBITDA pre margin during the performance cycle as a proportion of a defined target value with a weighting of 30%.

As of fiscal 2017, the program conditions were modified. For the 2017 tranche, the performance of the the share price of Merck KGaA, Darmstadt, Germany, is compared with the performance of the DAX® with a weighting of 50%, and the development of the EBITDA pre margin during the performance cycle as a proportion of a defined target value with a weighting of 25%. The development of organic sales growth as a proportion of a defined target value with a weighting of 25% is a new key performance indicator now taken into account.

Depending on the development of the KPIs, at the end of the respective performance cycle the eligible participants are granted between 0% and 150% of the MSUs they could be eligible to receive. Based on the MSUs granted, the eligible participants receive a cash payment at a specified point in time in the year after the three-year performance cycle has ended. The value of a granted MSU, which is relevant for payment, corresponds to the average closing price of shares of Merck KGaA, Darmstadt, Germany, shares in Xetra® trading during the last 60 trading days prior to January 1 after the performance cycle. Whereas the payout for the 2015 tranche is limited to three times the reference price and the payout for the 2016 tranche is limited to twice the reference price, the payout for the 2017 tranche is limited to two and a half times the individual grant.

The fair value of the obligations is recalculated on each balance sheet date by an external expert using a Monte Carlo simulation based on the previously described KPIs. The expected volatilities are based on the implicit volatility of shares of Merck KGaA, Darmstadt, Germany, and the DAX® in accordance with the remaining term of the respective tranche. The dividend payments incorporated into the valuation model orient towards medium-term dividend expectations.

The Executive Board members have their own Long-Term Incentive Plan, the conditions of which largely correspond to the Long-Term Incentive Plan described here. A description of the plan for the Executive Board can be found in the compensation report, which is part of the Statement on Corporate Governance.

On the occasion of the 350th anniversary of the company in 2018, a promise was made to grant shares of Merck KGaA, Darmstadt, Germany, worth € 350 to every eligible employee of the Group. For the share grant of Merck KGaA, Darmstadt, Germany, in 2018, the required shares will be purchased on the stock market by a third party on behalf of the Group and then transferred to the eligible employees. In accordance with IFRS 2, the promise led to personnel expenses as well as to a corresponding increase in retained earnings in equity.

List of shareholdings

(70) List of shareholdings

The shareholdings of Merck KGaA, Darmstadt, Germany, as of December 31, 2017 are presented in the following table:

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
I. Fully consolidated companies				
Germany				
Germany	Merck KGaA, Darmstadt, Germany	Darmstadt	Parent Company	
Germany	AB Allgemeine Pensions GmbH & Co. KG	Zossen	100.00	100.00
Germany	Allergopharma GmbH & Co. KG	Reinbek	100.00	
Germany	Allergopharma Verwaltungs GmbH	Darmstadt	100.00	100.00
Germany	Biochrom GmbH	Berlin	100.00	
Germany	Chemitra GmbH	Darmstadt	100.00	100.00
Germany	Emedia Export Company mbH	Gernsheim	100.00	
Germany	IHS – Intelligent Healthcare Solutions GmbH	Darmstadt	100.00	
Germany	Litec-LLL GmbH	Greifswald	100.00	100.00
Germany	Merck 12. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 13. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck 15. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck 16. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck 20. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck 21. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck Accounting Solutions & Services Europe GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Chemicals GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck China Chemicals Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck Consumer Health GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck Consumer Health Holding Germany GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Consumer Health Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Export GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Germany	Merck Financial Services GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Financial Trading GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim	100.00	100.00
Germany	Merck Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim	100.00	100.00
Germany	Merck International GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Internationale Beteiligungen GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck Life Science GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Eppelheim	100.00	100.00
Germany	Merck Patent GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck Performance Materials GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Wiesbaden	100.00	
Germany	Merck Real Estate GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Schuchardt OHG, a subsidiary of Merck KGaA, Darmstadt, Germany	Hohenbrunn	100.00	100.00
Germany	Merck Selbstmedikation GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck Serono GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Versicherungsvermittlung GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Vierte Allgemeine Beteiligungsgesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim	100.00	
Germany	Merck Wohnungs- und Grundstücksverwaltungsgesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Sigma-Aldrich Biochemie GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Chemie GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Chemie Holding GmbH	Taufkirchen	100.00	
Germany	Sigma-Aldrich Grundstücks GmbH & Co. KG	Steinheim	100.00	
Germany	Sigma-Aldrich Logistik GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Produktions GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Verwaltungs GmbH	Steinheim	100.00	100.00
Other European Countries				
Austria	Allergopharma Vertriebsgesellschaft m.b.H.	Vienna	100.00	
Austria	Merck Chemicals and Life Science GesmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Vienna	100.00	
Austria	Merck Gesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Vienna	100.00	
Austria	Merck KGaA & Co. Werk Spittal, a subsidiary of Merck KGaA, Darmstadt, Germany	Spittal	100.00	99.00
Austria	Sigma-Aldrich Handels GmbH	Vienna	100.00	
Belgium	Merck Chemicals N.V./S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Overijse	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Belgium	Merck Consumer Healthcare N.V.-S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Overijse	100.00	
Belgium	Merck N.V.-S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Overijse	100.00	
Belgium	Sigma-Aldrich BVBA/SPRL	Overijse	100.00	
Bulgaria	Merck Bulgaria EAD, a subsidiary of Merck KGaA, Darmstadt, Germany	Sofia	100.00	
Croatia	Merck d.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany.	Zagreb	100.00	
Czech Republic	Merck spol.s.r.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Prague	100.00	
Czech Republic	Sigma-Aldrich spol.s.r.o.	Prague	100.00	
Denmark	Merck A / S, a subsidiary of Merck KGaA, Darmstadt, Germany	Soborg	100.00	
Denmark	Merck Life Science A / S, a subsidiary of Merck KGaA, Darmstadt, Germany	Soborg	100.00	
Denmark	Sigma-Aldrich Denmark ApS	Soborg	100.00	
Denmark	Survac ApS	Frederiksberg	100.00	100.00
Estonia	Merck Serono OÜ, a subsidiary of Merck KGaA, Darmstadt, Germany	Tallinn	100.00	
Finland	Merck Life Science OY, a subsidiary of Merck KGaA, Darmstadt, Germany	Espoo	100.00	
Finland	Merck OY, a subsidiary of Merck KGaA, Darmstadt, Germany	Espoo	100.00	
Finland	Sigma-Aldrich Finland OY	Helsinki	100.00	
France	BioControl Systems S.a.r.l.	Lyon	100.00	
France	Gonnon S.A.S.	Lyon	100.00	
France	Laboratoire Médiflor S.A.S.	Lyon	100.00	
France	Merck Biodevelopment S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	100.00	
France	Merck Chimie S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Fontenay s/Bois	100.00	
France	Merck Médication Familiale S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	100.00	
France	Merck Performance Materials S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Trosly-Breuil	100.00	
France	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	99.84	
France	Merck Santé S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	100.00	
France	Merck Serono S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	100.00	
France	Millipore S.A.S.	Molsheim	100.00	
France	Sigma-Aldrich Chimie S.a.r.l.	Saint Quentin Fallavier	100.00	
France	Sigma-Aldrich Chimie SNC	Saint Quentin Fallavier	100.00	
France	Sigma-Aldrich Holding S.a.r.l.	Saint Quentin Fallavier	100.00	
Greece	Merck A.E., a subsidiary of Merck KGaA, Darmstadt, Germany	Maroussi, Athens	100.00	
Hungary	Merck Kft., a subsidiary of Merck KGaA, Darmstadt, Germany	Budapest	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Hungary	Sigma-Aldrich Kft.	Budapest	100.00	
Ireland	Merck Millipore Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Carrigtwohill	100.00	
Ireland	Merck Serono (Ireland) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Dublin	100.00	
Ireland	Millipore Cork Unlimited Company	Carrigtwohill	100.00	
Ireland	Shrawdine Limited	Arklow	100.00	
Ireland	Sigma-Aldrich Ireland Ltd.	Arklow	100.00	
Ireland	Silverberry Limited	Arklow	100.00	
Italy	Allergopharma S.p.A.	Rome	100.00	
Italy	BioControl Italia S.r.l.	Rome	100.00	
Italy	Istituto di Ricerche Biomediche Antoine Marxer RBM S.p.A.	Colleretto Giacosa	100.00	
Italy	Merck S.p.A., a subsidiary of Merck KGaA, Darmstadt, Germany.	Vimodrone	100.00	
Italy	Merck Serono S.p.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Rome	99.74	
Italy	Sigma-Aldrich S.r.l.	Milan	100.00	
Latvia	Merck Serono SIA, a subsidiary of Merck KGaA, Darmstadt, Germany	Riga	100.00	
Lithuania	Merck Serono, UAB, a subsidiary of Merck KGaA, Darmstadt, Germany	Vilnius	100.00	
Luxembourg	AZ Electronic Materials (Luxembourg) S.a.r.l.	Luxembourg	100.00	
Luxembourg	AZ Electronic Materials S.a.r.l.	Luxembourg	100.00	
Luxembourg	Mats Finance S.a.r.l.	Luxembourg	100.00	
Luxembourg	Merck Chemicals Holding S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Finance S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Finanz S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Holding S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Invest SCS, a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Re S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Millilux S.a.r.l.	Luxembourg	100.00	
Luxembourg	Millipart S.a.r.l.	Luxembourg	100.00	
Luxembourg	Millipore International Holdings, S.a.r.l.	Luxembourg	100.00	
Luxembourg	Ridgefield Acquisition S.a.r.l.	Luxembourg	100.00	
Luxembourg	Sigma-Aldrich Global S.a.r.l.	Luxembourg	100.00	
Luxembourg	Sigma-Aldrich S.a.r.l.	Luxembourg	100.00	
Malta	Merck Capital Holding Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pietà	100.00	
Malta	Merck Capital Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pietà	100.00	
Netherlands	BioControl Systems B.V.	Nieuwerkerk Ad Ijssel	100.00	
Netherlands	Merck B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Schiphol-Rijk	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Netherlands	Merck Chemicals B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Amsterdam Zuidoost	100.00	
Netherlands	Merck Holding Netherlands B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Schiphol-Rijk	100.00	
Netherlands	Merck Ventures B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Amsterdam	100.00	
Netherlands	Merck Window Technologies B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Eindhoven	100.00	100.00
Netherlands	Serono Tri Holdings B.V.	Schiphol-Rijk	100.00	
Netherlands	Sigma-Aldrich B.V.	Zwijndrecht	100.00	
Netherlands	Sigma-Aldrich Chemie N.V.	Zwijndrecht	100.00	
Norway	Merck Life Science AS, a subsidiary of Merck KGaA, Darmstadt, Germany	Oslo	100.00	
Norway	Sigma-Aldrich Norway AS	Oslo	100.00	
Poland	Merck Business Solutions Europe Sp.z.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Wroclaw	100.00	
Poland	Merck Sp.z.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Warsaw	100.00	
Poland	Sigma-Aldrich Sp.z.o.o.	Poznan	100.00	
Portugal	Laquifa Laboratorios S.A.	Algés	100.00	
Portugal	Merck, S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Algés	100.00	
Romania	Merck Romania S.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Bucharest	100.00	
Russia	Merck LLC, a subsidiary of Merck KGaA, Darmstadt, Germany	Moscow	100.00	
Russia	Sigma-Aldrich Rus LLC	Moscow	100.00	
Serbia	Merck d.o.o. Beograd, a subsidiary of Merck KGaA, Darmstadt, Germany	Belgrade	100.00	
Slovakia	Merck spol.s.r.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Bratislava	100.00	
Slovenia	Merck d.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Ljubljana	100.00	
Spain	Merck Chemicals and Life Science S.A.U., a subsidiary of Merck KGaA, Darmstadt, Germany	Madrid	100.00	
Spain	Merck, S.L.U., a subsidiary of Merck KGaA, Darmstadt, Germany	Madrid	100.00	
Spain	Sigma-Aldrich Quimica S.L.	Madrid	100.00	
Sweden	Merck AB, a subsidiary of Merck KGaA, Darmstadt, Germany	Solna	100.00	
Sweden	Merck Chemicals and Life Science AB, a subsidiary of Merck KGaA, Darmstadt, Germany	Solna	100.00	
Sweden	Sigma-Aldrich Sweden AB	Stockholm	100.00	
Switzerland	Allergopharma AG	Therwil	100.00	
Switzerland	Ares Trading SA	Aubonne	100.00	
Switzerland	Merck & Cie, a subsidiary of Merck KGaA, Darmstadt, Germany	Altdorf	51.63	51.63
Switzerland	Merck (Schweiz) AG, a subsidiary of Merck KGaA, Darmstadt, Germany	Zug	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Switzerland	Merck Biosciences AG, a subsidiary of Merck KGaA, Darmstadt, Germany	Schaffhausen	100.00	
Switzerland	Merck Performance Materials (Suisse) SA, a subsidiary of Merck KGaA, Darmstadt, Germany	Coinsins	100.00	
Switzerland	Merck Serono SA, a subsidiary of Merck KGaA, Darmstadt, Germany	Coinsins	100.00	
Switzerland	SeroMer Holding SA	Coinsins	100.00	
Switzerland	Sigma-Aldrich (Switzerland) Holding AG	Buchs	100.00	
Switzerland	Sigma-Aldrich Chemie GmbH	Buchs	100.00	
Switzerland	Sigma-Aldrich International GmbH	St. Gallen	100.00	
Switzerland	Sigma-Aldrich Production GmbH	Buchs	100.00	
Turkey	Merck Ilac Ecza ve Kimya Ticaret AS, a subsidiary of Merck KGaA, Darmstadt, Germany	Istanbul	100.00	
United Kingdom	Aldrich Chemical Co. Ltd.	Gillingham	100.00	
United Kingdom	AZ Electronic Materials (UK) Ltd.	Feltham	100.00	
United Kingdom	BioControl Systems Limited	London	100.00	
United Kingdom	BioReliance Limited	Aberdeen	100.00	
United Kingdom	BioReliance U.K. Acquisition Limited	London	100.00	
United Kingdom	Epichem Group Limited	Gillingham	100.00	
United Kingdom	Lamberts Healthcare Ltd.	Tunbridge Wells	100.00	
United Kingdom	Merck Chemicals Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nottingham	100.00	
United Kingdom	Merck Consumer Health Care Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Holding Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Investments Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Performance Materials Services UK Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Serono Europe Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	London	100.00	
United Kingdom	Merck Serono Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Millipore (U.K.) Ltd.	Feltham	100.00	
United Kingdom	Millipore UK Holdings LLP	Feltham	100.00	
United Kingdom	SAFC Biosciences Limited	Gillingham	100.00	
United Kingdom	SAFC Hitech Limited	Gillingham	100.00	
United Kingdom	Seven Seas Limited	Feltham	100.00	
United Kingdom	Sigma-Aldrich Company Limited	Gillingham	100.00	
United Kingdom	Sigma-Aldrich Financial Services Limited	Gillingham	100.00	
United Kingdom	Sigma-Aldrich Holdings Ltd.	Gillingham	100.00	
United Kingdom	Sigma-Genosys Limited	Gillingham	100.00	
North America				
Canada	EMD Chemicals Canada Inc.	Toronto	100.00	
Canada	EMD Crop BioScience Canada Inc.	Toronto	100.00	
Canada	EMD Inc.	Mississauga	100.00	
Canada	Millipore (Canada) Ltd.	Toronto	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Canada	Natrix Separations, Inc.	Burlington	100.00	
Canada	Sigma-Aldrich Canada Co.	Oakville	100.00	
United States	Aldrich Chemical Co. LLC	Milwaukee	100.00	
United States	Aldrich Chemical Foreign Holding LLC	St. Louis	100.00	
United States	Aldrich-APL, LLC	Urbana	100.00	
United States	Amnis Corp.	Seattle	100.00	
United States	BioControl Systems, Inc.	Bellevue	100.00	
United States	BioReliance Corporation	Rockville	100.00	
United States	Cell Marque Corporation	Rocklin	100.00	
United States	Cerilliant Corporation	Round Rock	100.00	
United States	EMD Accounting Solutions & Services America, Inc.	Rockland	100.00	
United States	EMD Finance LLC	Wilmington	100.00	
United States	EMD Holding Corp.	Rockland	100.00	
United States	EMD Millipore Corporation	Burlington	100.00	
United States	EMD Performance Materials Corp.	Philadelphia	100.00	
United States	EMD Serono Holding, Inc.	Rockland	100.00	
United States	EMD Serono Research & Development Institute, Inc.	Billerica	100.00	
United States	EMD Serono, Inc.	Rockland	100.00	
United States	Grzybowski Scientific Inventions Ltd.	Evanston	100.00	
United States	KL Acquisition Corp.	St. Louis	100.00	
United States	Millipore Asia Ltd.	Wilmington	100.00	
United States	Millipore UK Holdings I, LLC	Wilmington	100.00	
United States	Millipore UK Holdings II, LLC	Wilmington	100.00	
United States	Ormet Circuits, Inc.	San Diego	100.00	
United States	Research Organics, LLC	Cleveland	100.00	
United States	SAFC Biosciences, Inc.	Lenexa	100.00	
United States	SAFC Carlsbad, Inc.	Carlsbad	100.00	
United States	SAFC Hitech, Inc.	Haverhill	100.00	
United States	SAFC, Inc.	Madison	100.00	
United States	Serono Laboratories, Inc.	Rockland	100.00	
United States	Sigma Chemical Foreign Holding LLC	St. Louis	100.00	
United States	Sigma Redevelopment Corporation	St. Louis	100.00	
United States	Sigma-Aldrich Co. LLC	St. Louis	100.00	
United States	Sigma-Aldrich Corporation	St. Louis	100.00	
United States	Sigma-Aldrich Finance Co.	St. Louis	100.00	
United States	Sigma-Aldrich Foreign Holding Co.	St. Louis	100.00	
United States	Sigma-Aldrich Lancaster, Inc.	St. Louis	100.00	
United States	Sigma-Aldrich Manufacturing LLC	St. Louis	100.00	
United States	Sigma-Aldrich Missouri Insurance Company	St. Louis	100.00	
United States	Sigma-Aldrich Research Biochemicals, Inc.	Natick	100.00	
United States	Sigma-Aldrich RTC, Inc.	Laramie	100.00	
United States	Sigma-Aldrich, Inc.	Milwaukee	100.00	
United States	Sigma-Genosys of Texas LLC	The Woodlands	100.00	
United States	Supelco, Inc.	Bellefonte	100.00	
Asia-Pacific (APAC)				
Australia	Merck Pty. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Bayswater	100.00	
Australia	Merck Serono Australia Pty. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Sydney	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Australia	Proligo Australia Pty. Ltd.	Castle Hill	100.00	
Australia	SAFC Biosciences Pty. Ltd.	Castle Hill	100.00	
Australia	Sigma-Aldrich Oceania Pty. Ltd.	Castle Hill	100.00	
Australia	Sigma-Aldrich Pty. Ltd.	Castle Hill	100.00	
China	Beijing Skywing Technology Co., Ltd.	Beijing	100.00	
China	Merck Chemicals (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai	100.00	
China	Merck Display Materials (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai	100.00	
China	Merck Electronic Materials (Suzhou) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Suzhou	100.00	
China	Merck Holding (China) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai	100.00	
China	Merck Life Science Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Life Science Technologies (Nantong) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nantong	100.00	
China	Merck Ltd. , a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Millipore Lab Equipment (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai	100.00	
China	Merck Performance Materials Hong Kong Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Performance Materials Hong Kong Services Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Pharmaceutical (HK) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Pharmaceutical Manufacturing (Jiangsu) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nantong	100.00	
China	Merck Serono (Beijing) Pharmaceutical Distribution Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing	100.00	
China	Merck Serono (Beijing) Pharmaceutical R&D Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing	100.00	
China	Merck Serono Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing	100.00	
China	SAFC Hitech (Shanghai) Co., Ltd.	Shanghai	100.00	
China	Sigma-Aldrich (Shanghai) Trading Co., Ltd.	Shanghai	100.00	
China	Sigma-Aldrich (Wuxi) Life Science & Technology Co., Ltd.	Wuxi	100.00	
India	Merck Life Science Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai	100.00	
India	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai	51.80	
India	Merck Performance Materials Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai	100.00	
India	Merck Specialities Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai	100.00	
India	Sigma-Aldrich Chemicals Private Limited	Bangalore	100.00	
Indonesia	P.T. Merck Chemicals and Life Sciences, a subsidiary of Merck KGaA, Darmstadt, Germany	Jakarta	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Indonesia	P.T. Merck Tbk., a subsidiary of Merck KGaA, Darmstadt, Germany	Jakarta	86.65	
Japan	BioReliance KK	Tokyo	100.00	
Japan	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo	100.00	
Japan	Merck Performance Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo	100.00	
Japan	Merck Serono Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo	100.00	
Japan	Sigma-Aldrich Japan G.K.	Tokyo	100.00	
Malaysia	Merck Sdn Bhd, a subsidiary of Merck KGaA, Darmstadt, Germany	Petaling Jaya	100.00	
Malaysia	Sigma-Aldrich (M) Sdn Bhd	Kuala Lumpur	100.00	
New Zealand	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Palmerston North	100.00	
New Zealand	Sigma-Aldrich New Zealand Co.	Christchurch	100.00	
Philippines	Merck Business Solutions Asia Inc., a subsidiary of Merck KGaA, Darmstadt, Germany	Bonifacio Global City	99.99	
Philippines	Merck Inc., a subsidiary of Merck KGaA, Darmstadt, Germany	Makati City	100.00	
Singapore	Merck Performance Materials Pte. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Singapore	100.00	
Singapore	Merck Pte. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Singapore	100.00	
Singapore	Sigma-Aldrich Pte. Ltd.	Singapore	100.00	
South Korea	Merck Electronic Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Seoul	100.00	
South Korea	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Seoul	100.00	
South Korea	Merck Performance Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pyeongtaek-shi	100.00	
South Korea	Sigma-Aldrich Korea Ltd.	Yongin City	100.00	
Taiwan	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Taipei	100.00	
Taiwan	Merck Performance Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Taipei	100.00	
Taiwan	SAFC Hitech Taiwan Co. Ltd.	Kaohsiung	100.00	
Thailand	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Bangkok	45.11	
Vietnam	Merck Vietnam Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Ho Chi Minh City	100.00	
Latin America				
Argentina	Merck S. A., a subsidiary of Merck KGaA, Darmstadt, Germany	Buenos Aires	100.00	
Argentina	Sigma-Aldrich de Argentina S.r.l.	Buenos Aires	100.00	
Brazil	Merck S. A., a subsidiary of Merck KGaA, Darmstadt, Germany	Rio de Janeiro	100.00	
Brazil	Sigma-Aldrich Brasil Ltda.	São Paulo	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Chile	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Santiago de Chile	100.00	
Chile	Sigma-Aldrich Quimica Ltda.	Santiago de Chile	100.00	
Colombia	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Bogota	100.00	
Ecuador	Merck C.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Quito	100.00	
Guatemala	Merck, S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Guatemala City	100.00	
Mexico	Merck, S.A. de C.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Mexico City	100.00	
Mexico	Sigma-Aldrich Quimica, S. de R.L. de C.V.	Toluca	100.00	
Panama	Mesofarma Corporation	Panama City	100.00	
Peru	Merck Peruana S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Lima	100.00	
Uruguay	ARES Trading Uruguay S.A.	Montevideo	100.00	
Middle East and Africa (MEA)				
Egypt	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Cairo	100.00	
Israel	Inter-Lab Ltd.	Yavne	100.00	
Israel	InterPharm Industries Ltd.	Yavne	100.00	
Israel	InterPharm Laboratories Ltd.	Yavne	100.00	
Israel	Merck Serono Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Herzliya Pituach	100.00	
Israel	QLight Nanotech Ltd.	Jerusalem	100.00	
Israel	Sigma-Aldrich Israel Ltd.	Rehovot	100.00	
Kenya	Merck Healthcare and Life Science Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Nairobi	100.00	
South Africa	Merck (Pty) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Halfway House	100.00	
South Africa	Merck Pharmaceutical Manufacturing (Pty) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Wadeville	100.00	
South Africa	Sigma-Aldrich (Pty) Ltd.	Kempton Park	100.00	
Tunisia	Merck Promotion SARL, a subsidiary of Merck KGaA, Darmstadt, Germany	Tunis	100.00	
Tunisia	Merck SARL, a subsidiary of Merck KGaA, Darmstadt, Germany	Tunis	100.00	
United Arab Emirates	Merck Serono Middle East FZ-LLC, a subsidiary of Merck KGaA, Darmstadt, Germany	Dubai	100.00	
II. Companies not consolidated due to secondary importance				
Germany				
Germany	AB Pensionsverwaltung GmbH	Zossen	100.00	100.00
Germany	Merck 18. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
Germany	Merck 19. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 23. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 24. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 25. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 26. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 27. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 28. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 29. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 30. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 31. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 33. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 36. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 38. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 40. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck 41. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Healthcare Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Life Science Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Other European Countries				
Greece	Sigma-Aldrich (OM) Ltd.	Athens	100.00	
Ireland	SAFC Arklow Ltd.	Arklow	100.00	
Italy	BioControl Systems S.r.l.	Rome	100.00	
Netherlands	Calypso Biotech B.V.	Amsterdam	75.00	
Russia	Chemical Trade Limited LLC	Moscow	100.00	
Russia	MedChem Limited	Moscow	100.00	
Russia	SAF-LAB LLC	Moscow	100.00	
Slovakia	Sigma-Aldrich, spol.s.r.o.	Bratislava	100.00	
Switzerland	iOnctura SA	Plan-les-Ouates	73.60	
United Kingdom	B-Line Systems Limited	Gillingham	100.00	
United Kingdom	Bristol Organics Ltd.	Gillingham	100.00	
United Kingdom	Fluka Chemicals Ltd.	Gillingham	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
United Kingdom	Merck Cross Border Trustees Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Pension Trustees Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Nature's Best Health Products Ltd.	Tunbridge Wells	100.00	
United Kingdom	Sigma Chemical Co. Ltd.	Gillingham	100.00	
United Kingdom	Sigma Entity One Limited	Gillingham	100.00	
United Kingdom	UFC Ltd.	Gillingham	100.00	
United Kingdom	Ultrafine Limited	Gillingham	100.00	
United Kingdom	Webnest Ltd.	Gillingham	100.00	
United Kingdom	Wessex Biochemicals Ltd.	Gillingham	100.00	
North America				
United States	BioControl Systems International, Inc.	Seattle	100.00	
United States	Fluka Chemical Corp.	St. Louis	100.00	
United States	Nysa Membranes USA, Inc.	Acton	100.00	
United States	Techcare Systems, Inc.	St. Louis	100.00	
United States	TocopheRx, Inc.	Groton	62.83	
Asia-Pacific (APAC)				
Australia	Biochrom Australia Pty. Ltd.	Bayswater	100.00	
South Korea	SAFC Hitech Korea Ltd.	Yongin City	100.00	
Latin America				
Dominican Republic	Merck Dominicana, S.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Santo Domingo	100.00	
Mexico	Consumer Health Distribution S.A. de C.V.	Mexico City	100.00	
Mexico	Merck Biopharma Distribution S.A. de C.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Mexico City	100.00	
Middle East and Africa (MEA)				
Israel	PMatX Ltd.	Yavne	90.00	
Mauritius	Millipore Mauritius Ltd.	Cyber City	100.00	
Morocco	Merck Maroc S.A.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Casablanca	100.00	
Nigeria	Merck Pharmaceutical and Life Sciences Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Lagos	100.00	
South Africa	Serono South Africa Ltd.	Johannesburg	100.00	
III. Non-controlled companies majority-owned				
Latin America				
Venezuela	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Caracas	100.00	
Venezuela	Representaciones MEPRO S.A.	Caracas	100.00	

Country	Company	Registered Office	Equity interest (%)	Thereof: Merck KGaA, Darmstadt, Germany (%)
IV. Associates not included at equity due to secondary importance				
Germany				
Germany	Mobile Chamber Experts GmbH	Berlin	25.00	
Other European Countries				
Switzerland	Asceneuron SA	Lausanne	40.26	
Switzerland	CAMAG Chemie-Erzeugnisse und Adsorptionstechnik AG	Muttenz	39.11	
Switzerland	Prexton Therapeutics SA	Plan-les-Ouates	28.36	
Switzerland	Vaximm AG	Basel	24.07	
North America				
United States	Prolog Healthy Living Fund, L. P.	St. Louis	38.32	
United States	Prolog Healthy Living Fund II, L. P.	St. Louis	50.58	
Middle East and Africa (MEA)				
Israel	Neviah Genomics Ltd.	Yavne	69.00	7.75

Darmstadt, February 14, 2018

Stefan Oschmann

Udit Batra

Kai Beckmann

Walter Galinat

Belén Garijo

Marcus Kuhnert

Responsibility Statement

To the best of our knowledge, and in accordance with the applicable reporting principles, the consolidated financial statements of the Group give a true and fair view of the assets, liabilities, financial position and profit or loss of the Group, and the combined management report includes a fair review of the development and performance of the business and the position of the Group, together with a description of the material opportunities and risks associated with the expected development of the Group.

Darmstadt, February 14, 2018

Stefan Oschmann

Udit Batra

Kai Beckmann

Walter Galinat

Belén Garijo

Marcus Kuhnert

Note: This is a translation of the German original. Solely the original text in German language is authoritative.

Independent Auditor's Report

To MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany

Report on the Audit of the Consolidated Financial Statements and of the Combined Management Report

Opinions

We have audited the consolidated financial statements of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, and its subsidiaries (the Group) – which comprise the consolidated balance sheet as at December 31, 2017, the consolidated income statement, consolidated statement of comprehensive income, consolidated statement of changes in net equity and consolidated cash flow statement for the financial year from January 1, 2017 to December 31, 2017, and notes to the consolidated financial statements, including a summary of significant accounting policies. In addition, we have audited the combined management report at MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, for the financial year from January 1, 2017 to December 31, 2017.

In our opinion, on the basis of the knowledge obtained in the audit,

- the accompanying consolidated financial statements comply, in all material respects, with the IFRSs as adopted by the EU, and the additional requirements of German commercial law pursuant to Section 315e (1) HGB [Handelsgesetzbuch: German Commercial Code] and, in compliance with these requirements, give a true and fair view of the assets, liabilities, and financial position of the Group as of December 31, 2017 and of its financial performance for the financial year from January 1, 2017 to December 31, 2017, and
- the accompanying combined management report as a whole provides an appropriate view of the Group's position. In all material respects, this combined management report is consistent with the consolidated financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development.

Pursuant to Section 322 (3) sentence 1 HGB, we declare that our audit has not led to any reservations relating to the legal compliance of the consolidated financial statements and of the combined management report.

Basis for the Opinions

We conducted our audit of the consolidated financial statements and of the combined management report in accordance with Section 317 HGB and the EU Audit Regulation No. 537/2014 (referred to subsequently as "EU Audit Regulation") and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW). Our responsibilities under those requirements and principles are further described in the "Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Combined Management Report" section of our auditor's report. We are independent of the group entities in accordance with the requirements of European law and German commercial and professional law, and we have fulfilled our other German professional responsibilities in accordance with these requirements. In addition, in accordance with Article 10 (2) point (f) of the EU Audit Regulation, we declare that we have not provided non-audit services prohibited under Article 5 (1) of the EU Audit Regulation. We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our opinions on the consolidated financial statements and on the combined management report.

Key Audit Matters in the Audit of the Consolidated Financial Statements

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements for the financial year from January 1, 2017 to December 31, 2017. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon; we do not provide a separate opinion on these matters.

MEASUREMENT OF THE VARIABLE PURCHASE PRICE RECEIVABLE FROM THE SALE OF THE BIOSIMILARS BUSINESS ACTIVITIES

Explanatory notes on the sale of the Biosimilars business activities can be found in note 4 and 6 of the notes to the consolidated financial statements.

Financial statement risk

As consideration for the sale of the Biosimilars business activities to subsidiaries of Fresenius SE & Co. KGaA (Fresenius), the Group received a payment of EUR 156 million as well as the right to contingent milestone payments and additional royalties based on future product revenue generated by Fresenius from the Biosimilars business activities. The gain on the disposal of the Biosimilars business activities amounted to EUR 319 million.

For the purpose of determining the fair value of these variable payments, the Group made assumptions about the progress and expected completion of clinical studies, on the success of potential product launches, and on the potential earnings development of these products. In addition to the assessment of whether these events will occur at all, the Group made assumptions about the timing of such events. Furthermore, a distinction had to be made for the different components of potentially realizable variable payments, namely whether they represent payments for services still to be rendered by the Group, or elements of the purchase price for the Biosimilars business activities that were sold. The allocation of the purchase price receivable (including variable components) to the respective contractual components is to be made at relative fair values and the determination of the relative fair values is subject to judgment. An external expert engaged by the Group reflected the contractual agreements and the assumptions made in a binomial valuation model suitable for this purpose.

In light of the extent of estimates and judgment included in the assumptions as well as the complexity of the valuation model, there is a risk for the consolidated financial statements that the reported variable purchase price receivable and the resulting gain on disposal from the sale of the Biosimilars business activities were not accurately determined.

Our audit approach

In our audit of the variable purchase price receivable from the sale of the Biosimilars business activities, we involved our valuation experts.

In a first step, we scrutinized the distinction whether the variable earn-out payments represent payments for services still to be rendered by the Group, or whether they represent components of the purchase price for the Biosimilars business activities that were sold. For this purpose, we referred to the contractual agreements to assess whether the services to be rendered had been fully identified and whether the purchase price components allocated to the services still to be rendered were in line with their respective relative fair values.

In another step, we assessed the reasonableness of the key assumptions used for the measurement of the variable purchase price receivable. In assessing the assumptions used to predict the progress and the expected completion of clinical studies as well as the success of potential product launches, we inspected external studies on the subject matter of valuation of biosimilars development activities, inspected documents on the clinical studies that were transferred to Fresenius, and we performed inquiries of management and of employees in the Company's controlling and the alliance management departments. We used general and sector-specific market expectations and market studies to assess the revenue forecasts used in the valuation model. We compared the assumptions and parameters underlying the capital costs used in the valuation model, in particular the risk-free interest rate, the market risk premium and the unlevered beta factor, with our own assumptions and publicly available data.

To ensure the arithmetical accuracy of the valuation model and conformity of the applied valuation method with the applicable valuation principles, we used a risk-based audit approach to recalculate the Company's calculations on a sample basis. We also assessed whether the contractual components were appropriately reflected in the valuation model. Furthermore, we assessed the competence, capabilities and objectivity of the external experts engaged by the Group.

Our conclusions

The valuation method used to determine and measure the variable purchase price receivable from the sale of the Biosimilars business activities is appropriate. The assumptions underlying the valuation model are reasonable.

RECOGNITION AND MEASUREMENT OF INCOME TAX LIABILITIES AND DEFERRED TAX LIABILITIES

Explanatory notes on the recognition and measurement of income tax liabilities and deferred tax liabilities can be found in notes 6, 14, 31 and 40 of the notes to the consolidated financial statements.

Financial statement risk

As of December 31, 2017, the balance sheet of the Company includes current income tax liabilities in the amount of EUR 1,059 million and deferred tax liabilities of EUR 1,489 million. In addition, other noncurrent liabilities include EUR 99 million of income tax liabilities.

The Group operates in different jurisdictions with different legal systems. The application of local regulations on income tax, tax incentives and transfer pricing rules is complex. The recognition and measurement of income tax liabilities require the Group to exercise judgment in assessing tax matters and to make estimates regarding uncertain tax positions.

The measurement of income tax liabilities as well as the assessment of unrecognized contingent tax liabilities are subject to judgment and estimation uncertainty. Among others, this relates to intra-group business transfers, legal disputes attributable to the determination of earnings under tax law, and transfer pricing adjustments. The Group routinely engages external experts to support its own risk assessment with expert opinions from tax specialists.

In particular, the US tax reform, which was enacted on December 22, 2017, had a significant impact on the recognition and measurement of income tax liabilities and deferred tax liabilities as of December 31, 2017. The revaluation of deferred tax liabilities resulted in a tax benefit of EUR 1,020 million. However, the US tax reform also gave rise to an additional income tax liability in the amount of EUR 114 million due to the new rules on the taxation of profits of foreign subsidiaries.

There is a risk for the financial statements that income tax liabilities and deferred tax liabilities are not fully recognized or not appropriately measured.

Our audit approach
We involved our own specialists in international, particularly US tax law into the audit team in order to evaluate the Group's assessment of tax risks, the related opinions of external experts engaged by the Group and the impact of the US tax reform.

We obtained an understanding of existing tax risks through inquiry of management of the affected group companies and employees of the tax department. We assessed the competence, capabilities and objectivity of the external experts and evaluated their expert opinions.

In addition, we analyzed correspondence with the relevant tax authorities and assessed the assumptions underlying the determination of income tax liabilities based on our knowledge and experience of how the relevant legal requirements are currently applied by the tax authorities and courts. We have scrutinized the Group's approach regarding the recognition and measurement of deferred tax liabilities, based on laws and regulations enacted as of the reporting date, and performed recalculations.

Our conclusions
The valuation model and assumptions underlying the recognition and measurement of income tax liabilities are reasonable. The approach regarding the recognition and measurement of deferred tax liabilities (in particular, with respect to the impact of the US tax reform) is adequate.

IMPAIRMENT TESTING OF GOODWILL

Explanatory notes on the impairment tests can be found in note 6 of the notes to the consolidated financial statements.

Financial statement risk
Due to the acquisition of Sigma-Aldrich Corporation, USA, in November 2015, goodwill, in particular for the cash-generating unit Life Science, increased significantly. In aggregate, goodwill amounts to EUR 13,582 million and thus represents 38% of the Group's total assets as of December 31, 2017, with EUR 10,519 million of this attributable to Life Science.

Goodwill is to be tested for impairment at least once a year, and may need to be tested ad hoc if necessary. In performing the goodwill impairment test, the Group primarily determines the value in use by means of a discounted cash flow method. The valuation model used to determine the value in use is complex and the result of this valuation is highly dependent on the projection of future net cash flows (taking into account future revenue growth, profit margins, exchange rates and long-term growth rates) and the discount factor used, and therefore is subject to significant estimation uncertainty.

There is a risk for the financial statements that an existing goodwill impairment loss was not recognized as of the reporting date. In addition, there is a risk that the related disclosures in the notes to the consolidated financial statements are not complete and appropriate.

Our audit approach
We applied a risk-based approach to our audit. Using our own sensitivity analyses, we assessed the extent to which the goodwill of each cash generating unit would still be sufficiently covered by the respective values in use if assumptions and parameters underlying the calculations were to change in a manner that is deemed possible. On the basis of these analyses, our audit particularly focused on the cash-generating unit Life Science.

We reconciled the expected net cash flows underlying the value in use calculations with the current medium-term plan approved by management. To assess the assumptions used in preparing the medium-term plan, we obtained an understanding of the planning process through discussions with company representatives, including corporate management and representatives from the corporate divisions and the research and development department, we assessed the plausibility and consistency of the explanations received with the projections, and we compared the assumptions used with the expectations of external analysts and sources.

As part of our audit of the discount factor, we analyzed the peer group used. With regard to other assumptions and parameters (e.g. risk-free interest rate, beta factor, market risk premium), we compared those assumptions and parameters with our own assumptions and publicly available data to assess whether these were appropriate and whether they were within the range of external recommendations, to the extent available. In addition, we verified the calculation model used to determine the discount factor.

We assessed the appropriateness of the valuation model used. To ensure arithmetical accuracy, we used a risk-based audit approach to recalculate the Company's calculations on a sample basis.

In addition, we assessed whether the Company's disclosures regarding the goodwill impairment test in the notes to the consolidated financial statements are complete and appropriate.

Our conclusions
The calculation method used for the goodwill impairment test is appropriate and in line with the applicable valuation principles. Overall, the assumptions and parameters used by management are balanced. The disclosures in the notes to the consolidated financial statements are complete and properly depict the judgment associated with the subsequent measurement of goodwill.

MEASUREMENT OF PROVISIONS FOR PATENT DISPUTES

Explanatory notes on the provisions for patent disputes can be found in notes 6 and 27 of the notes to the consolidated financial statements.

Financial statement risk
As of December 31, 2017, provisions for legal disputes amount to EUR 526 million, which among others include provisions for patent disputes.

The amount of the provisions for patent disputes is determined based on the best estimate of the expenditure required to settle the dispute. Consequently, the measurement of related provisions is based on estimates and judgment of external lawyers and management.

There is a risk for the financial statements that the provisions for patent disputes were not measured appropriately as of the balance sheet date. There is also a risk that the notes to the consolidated financial statements do not contain the required disclosures on the key assumptions.

Our audit approach
As supporting evidence for the estimated expenditure required to settle the patent disputes, we obtained written confirmations from external legal counsel engaged by the Group to obtain an understanding of the current status of the pending legal proceedings, reviewed correspondence with the plaintiffs and relevant courts and other authorities, and also assessed underlying documents and minutes. In this context we also interviewed the Company's in-house patent counsel, employees in the Group's controlling and accounting departments, and verified the plausibility and consistency of the explanations obtained with the determination of the best estimate of the expenditure required to settle the disputes.

To ensure arithmetical accuracy of the valuation model used, we used a risk-based audit approach to recalculate the Company's calculations on a sample basis.

In addition, we assessed whether the Company's explanations on the measurement of provisions for patent disputes in the notes to the consolidated financial statements include appropriate and complete disclosures on the key assumptions.

Our conclusions
The assumptions for the measurement of the provisions for patent disputes are reasonable. The disclosures in the notes to the consolidated financial statements appropriately illustrate the key assumptions.

Other Information

Management is responsible for the other information. The other information comprises the annual report, with the exception of the audited consolidated financial statements and combined management report and our auditor's report.

Our opinions on the consolidated financial statements and on the combined management report do not cover the other information, and consequently we do not express an opinion or any other form of assurance conclusion thereon.

In connection with our audit, our responsibility is to read the other information and, in so doing, consider whether the other information
- is materially inconsistent with the consolidated financial statements, with the combined management report or our knowledge obtained in the audit, or
- otherwise appears to be materially misstated.

Responsibilities of Management and the Supervisory Board for the Consolidated Financial Statements and the Combined Management Report

Management is responsible for the preparation of the consolidated financial statements that comply, in all material respects, with IFRSs as adopted by the EU and the additional requirements of German commercial law pursuant to Section 315e (1) HGB and that the consolidated financial statements, in compliance with these requirements, give a true and fair view of the assets, liabilities, financial position, and financial performance of the Group. In addition, management is responsible for such internal control as they have determined necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is responsible for assessing the Group's ability to continue as a going concern. They also have the responsibility for disclosing, as applicable, matters related to going concern. In addition, they are responsible for financial reporting based on the going concern basis of accounting unless there is an intention to liquidate the Group or to cease operations, or there is no realistic alternative but to do so.

Furthermore, management is responsible for the preparation of the combined management report that, as a whole, provides an appropriate view of the Group's position and is, in all material respects, consistent with the consolidated financial statements, complies with German legal requirements, and appropriately presents the opportunities and risks of future development. In addition, management is responsible for such arrangements and measures (systems) as they have considered necessary to enable the preparation of a combined management report that is in accordance with the applicable German legal requirements, and to be able to provide sufficient appropriate evidence for the assertions in the combined management report.

The supervisory board is responsible for overseeing the Group's financial reporting process for the preparation of the consolidated financial statements and of the combined management report.

Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Combined Management Report

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and whether the combined management report as a whole provides an appropriate view of the Group's position and, in all material respects, is consistent with the consolidated financial statements and the knowledge obtained in the audit, complies with the German legal requirements and appropriately presents the opportunities and risks of future development, as well as to issue an auditor's report that includes our opinions on the consolidated financial statements and on the combined management report.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Section 317 HGB and the EU Audit Regulation and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW) will always detect a material misstatement. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements and this combined management report.

We exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements and of the combined management report, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinions. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit of the consolidated financial statements and of arrangements and measures (systems) relevant to the audit of the combined management report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of these systems.
- Evaluate the appropriateness of accounting policies used by management and the reasonableness of estimates made by management and related disclosures.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in the auditor's report to the related disclosures in the consolidated financial statements and in the combined management report or, if such disclosures are inadequate, to modify our respective opinions. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to be able to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements present the underlying transactions and events in a manner that the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and financial performance of the Group in compliance with IFRSs as adopted by the EU and the additional requirements of German commercial law pursuant to Section 315e (1) HGB.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express opinions on the consolidated financial statements and on the combined management report. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our opinions.
- Evaluate the consistency of the combined management report with the consolidated financial statements, its conformity with [German] law, and the view of the Group's position it provides.
- Perform audit procedures on the prospective information presented by management in the combined management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular,

the significant assumptions used by management as a basis for the prospective information, and evaluate the proper derivation of the prospective information from these assumptions. We do not express a separate opinion on the prospective information and on the assumptions used as a basis. There is a substantial unavoidable risk that future events will differ materially from the prospective information.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with the relevant independence requirements, and communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, the related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter.

Other Legal and Regulatory Requirements

Further Information pursuant to Article 10 of the EU Audit Regulation

We were elected as group auditor by the annual general meeting on April 28, 2017. We were engaged by the supervisory board on June 1, 2017. We have been the group auditor of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, without interruption since the financial year 1995.

We declare that the opinions expressed in this auditor's report are consistent with the additional report to the audit committee pursuant to Article 11 of the EU Audit Regulation (long-form audit report).

German Public Auditor Responsible for the Engagement

The German Public Auditor responsible for the engagement is Bodo Rackwitz.

Frankfurt am Main, February 15, 2018

KPMG AG
Wirtschaftsprüfungsgesellschaft

Braun	Rackwitz
Wirtschaftsprüfer	Wirtschaftsprüfer
(German Public Auditor)	(German Public Auditor)

Business Development 2013 – 2017

This overview may include historically adjusted values in order to ensure comparability with 2017.

€ million	
Earnings performance	
Net sales	
Operating result (EBIT)[1]	
Margin (% of net sales)[1]	
EBITDA[1]	
Margin (% of net sales)[1]	
Adjustments[1]	
EBITDA pre[1]	
Margin (% of net sales)[1]	
Profit before income tax	
Profit after tax	
Earnings per share (in €)[2]	
Assets and liabilities	
Total assets[3]	
Non-current assets[3]	
of which:	
Goodwill[3]	
Other intangible assets[3]	
Property, plant and equipment[3]	
Current assets[3]	
of which:	
Inventories[3]	
Trade accounts receivable	
Cash and cash equivalents	
Net equity	
Financial liabilities	
Non-current	
Current	
Liquidity	
Investments in intangible assets[4]	
Investments in property, plant and equipment[4]	
Business free cash flow[1]	
Net financial debt[1]	
Other key data	
Equity ratio (in %)[1]	
Research and development costs	
Dividend per share before share split (in €)[5]	
Dividend per share after share split (in €)[5]	
Employees (number as of December 31)	

[1] Not defined by International Financial Reporting Standard (IFRS).
[2] Taking into account the share split in 2014; fiscal 2013 has been adjusted accordingly.
[3] Fiscal 2016 has been adjusted, see Note (4) "Acquisitions and divestments" in the Notes to the Consolidated Financial Statements.
[4] According to the Consolidated Cash Flow Statement.
[5] In fiscal 2014, a 2:1 share split took place.
[6] Proposal on the appropriation of profits for 2017.

2013	2014	2015	2016	**2017**	Change in %
10,735	11,363	12,845	15,024	15,327	2.0%
1,611	1,762	1,843	2,481	2,525	1.8%
15.0%	15.5%	14.3%	16.5%	16.5%	
3,069	3,123	3,354	4,415	4,282	–3.0%
28.6%	27.5%	26.1%	29.4%	27.9%	
–184	–265	–276	–75	–132	75.3%
3,253	3,388	3,630	4,490	4,414	–1.7%
30.3%	29.8%	28.3%	29.9%	28.8%	
1,389	1,557	1,487	2,154	2,224	3.2%
1,209	1,165	1,124	1,633	2,610	59.9%
2.77	2.66	2.56	3.75	5.98	59.5%
20,819	26,010	38,081	38,258	35,621	–6.9%
13,434	15,530	30,737	30,589	28,166	–7.9%
4,583	5,694	14,492	15,015	13,582	–9.5%
5,284	5,702	10,930	9,980	8,317	–16.7%
2,647	2,990	4,008	4,231	4,512	6.6%
7,385	10,480	7,344	7,670	7,455	–2.8%
1,474	1,660	2,610	2,609	2,632	0.9%
2,021	2,220	2,738	2,889	2,923	1.2%
981	2,879	832	939	589	–37.3%
11,069	11,801	12,855	14,050	14,066	0.1%
3,698	5,637	13,713	12,597	10,823	–14.1%
3,257	3,561	9,616	8,809	8,033	–8.8%
440	2,076	4,097	3,788	2,790	–26.3%
110	143	179	132	392	>100.0%
407	481	514	716	919	28.4%
2,960	2,605	2,766	3,318	3,318	–
307	559	12,654	11,513	10,144	–11.9%
53.2%	45.4%	33.8%	36.7%	39.5%	
1,507	1,704	1,709	1,976	2,140	8.3%
1.90	–	–	–	–	
–	1.00	1.05	1.20	1.25[6]	4.2%
38,154	39,639	49,613	50,348	52,880	5.0%

Information and Service

The Annual Report for 2017 was published in German and English. A fully navigable online version of the report along with the consolidated financial statements is available on the Web at ar.emdgroup.com/2017/. It has been optimized for mobile devices.

More information about our company can be found on the Web at www.emdgroup.com and in the brochure “Who we are”, which you may read or order at emdgroup.com/publications.

You can order all publications from Group Communications, Merck KGaA, 64271 Darmstadt, Germany, comms@emdgroup.com.

Published on March 8, 2018 by
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PHOTOS
Maks Richter (pages 11, 12, 13, 14, 15)
Getty (pages 16 – 17, 27, 34 – 35)
Stocksy (pages 20, 24)
Shutterstock (pages 36, 39, 40)
Merck KGaA, Darmstadt, Germany

PRINTING
gutenberg beuys feindruckerei gmbh

PAPER
Druckfein

FINANCIAL CALENDAR
for 2018

March
3/8/2018
Annual Press Conference

August
8/9/2018
Report on the second quarter

April
4/27/2018
Annual General Meeting

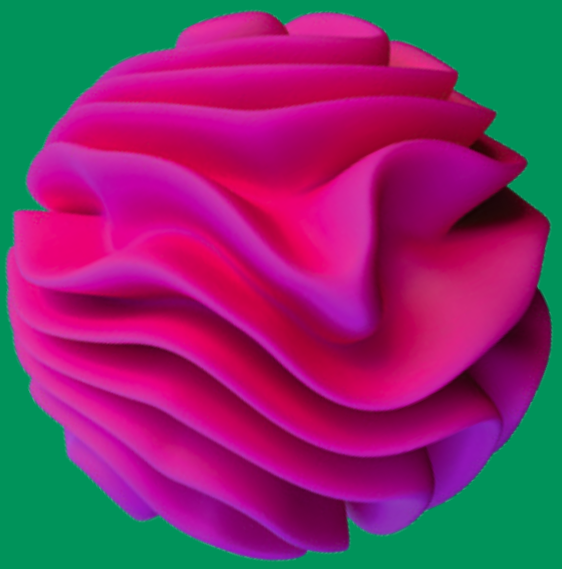
November
11/14/2018
Report on the third quarter

May
5/15/2018
Report on the first quarter

ANNUAL REPORT 2017
Online

What does the future that we're helping to shape look like? What topics are relevant, what projects are being driven forward and why? You'll find out more in our online report.

ar.emdgroup.com/2017



The cover of our Annual Report sparkles thanks to Miraval® 5320 Scenic Gold. We produce this industrial pigment in Germany. Based on glass flakes, it is non-flammable and stable at temperatures of up to 450°C.