

Fundamental Information about the Group

The Group

We are a vibrant science and technology company. Science is at the heart of everything we do. It drives the discoveries we make and the technologies we create. Our work makes a positive difference in millions of people's lives every day.

In Healthcare, we discover unique ways to treat the most challenging diseases such as multiple sclerosis and cancer. Our Life Science experts empower scientists by developing tools and solutions that help deliver breakthroughs more quickly. And in Performance Materials, we develop science that sits inside technologies and changes the way we access and display information.

Everything we do is fueled by a belief in science and technology as a force for good. A belief that has driven our work since 1668 and will continue to inspire us to find more joyful and sustainable ways to live. We are curious minds dedicated to human progress.

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.

In November, we announced the intent to form a joint venture under the brand name Syntropy, a joint venture with technology and software company Palantir Technologies. Syntropy is expected to empower scientists and research centers with a collaborative technology platform to advance cancer research, help drive scientific discovery and improve human lives.

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, 2018, we had 51,749 employees worldwide¹, which compares with 52,941 on December 31, 2017.²

Healthcare

Our Healthcare business sector comprises the two businesses Biopharma and Allergopharma. On December 1, our Consumer Health business transferred to Procter & Gamble (P&G). Since 2015, Belén Garijo has been CEO of the Healthcare business sector and member of the Executive Board. In 2018, Healthcare generated 42% of Group sales and 37% of EBITDA pre (excluding Corporate and Other), making it the largest of our three business sectors. The regions

Europe and North America generated 58% of Healthcare's net sales in 2018. In recent years, we have steadily expanded our presence in growth markets. In 2018, Asia-Pacific and Latin America accounted for 35% of sales.

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 larger of our Healthcare businesses and operates in four franchises: Oncology, Neurology & Immunology, Fertility and General Medicine & Endocrinology. Our R&D pipeline positions us with a clear focus on becoming a global specialty innovator in oncology, immunoncology and immunology including MS.

2018 marked the 20th anniversary of the European Commission's approval of our top-selling product Rebif® (interferon beta-1a), a disease-modifying drug used to treat relapsing forms of MS, acting in a way similar to that of interferon beta protein produced by the human body. Rebif®, which was approved in Europe in 1998 and in the United States in 2002, is registered in more than 90 countries worldwide. Rebif® has been proven to delay the progression of disability, reduce the frequency of relapses and reduce magnetic resonance imaging (MRI) lesion activity and area.

2018 also saw further launch progress of Mavenclad® (cladribine tablets), with approvals encompassing more than 40 countries. In addition, in July, the FDA accepted the resubmission of the New Drug Application (NDA) for cladribine tablets. The acceptance indicates that the FDA found the company's resubmission sufficiently complete to permit a substantive review. 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 March, we announced positive Phase IIb data for the first Bruton's tyrosine kinase (BTK) inhibitor to show clinical proof-of-concept in relapsing MS, namely evobrutinib, a highly specific, oral BTK inhibitor, and we further demonstrated our commitment to improving the lives of people with MS and other chronic progressive diseases via scientific advances and new data on our marketed and pipeline therapies (further details can be found under "Research & Development").

¹The Consumer Health business was transferred to Procter & Gamble (P&G) on December 1, 2018, and was already classified as a discontinued operation according to IFRS 5 in April 2018. With the completion of the sale, around 3,300 employees joined P&G.

²The 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.

Erbix[®] (cetuximab) remains the second-best-selling drug in terms of revenue in the portfolio of our Biopharma business and is our flagship product in oncology. Treating more than 900,000 patients since authorization, the product is a standard of care for patients with epidermal growth factor receptor (EGFR)-expressing, RAS wild-type metastatic colorectal cancer (mCRC), as well as both recurrent and/or metastatic and locally advanced squamous cell carcinoma of the head and neck (SCCHN). We continue to invest in Erbix[®] and are committed to making it available to those patients it will benefit most.

Together with Pfizer Inc., we are developing much-needed new treatment options for patients with hard-to-treat cancers. We have made key progress in this area, with regulatory approvals in 46 countries for our anti-PD-L1 antibody avelumab under the brand name Bavencio[®]. In 2018, approvals were granted in several countries including Australia and Brazil for Merkel cell carcinoma (MCC), Israel for both MCC and urothelial carcinoma (UC) and Canada for UC. Bavencio[®] was initially granted two approvals in 2017 by the U.S. Food and Drug Administration (FDA) for the treatment of adults and pediatric patients 12 years and older with metastatic MCC and previously treated patients with locally advanced or metastatic 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.

The Bavencio[®] approvals were based on data from our comprehensive clinical development program JAVELIN, which currently comprises at least 30 clinical programs, including several Phase III trials and over 9,000 patients evaluated across more than 15 different tumor types. In addition to MCC and UC, these cancers include gastric/gastro-esophageal junction, head and neck, non-small cell lung, ovarian and renal cell carcinoma.

We are continuing to explore all potential options and have entered into a number of strategic collaborations to evaluate avelumab in combination with a range of complementary oncology medicines (further details can be found under "Research & Development"). Key data from the JAVELIN program were presented at major medical congresses in 2018, including the European Society for Medical Oncology Congress (ESMO), where we shared promising new results from the Phase III JAVELIN Renal 101 study evaluating avelumab in combination with axitinib compared with sunitinib as initial therapy for patients with advanced renal cell carcinoma.

Earlier pipeline highlights included the presentation of new data for M7824 (TGF- β -trap/anti-PD-L1) in a range of tumors, adding to existing evidence for the potential of this bifunctional immunotherapy and supporting our plans to continue its exploration in advanced solid tumors and ongoing cohort expansions. Additionally, in August we initiated a trial to investigate M7824 compared with pembrolizumab as a first-line treatment in patients with PD-L1-expressing advanced non-small cell lung cancer (NSCLC). In December, the FDA granted orphan drug designation to M7824, its first regulatory designation, for the treatment of biliary tract cancer (further details can be found under "Research & Development"). Data shared for oral MET inhibitor tepotinib included positive results in NSCLC and advanced hepatocellular carcinoma (HCC). We are currently assessing the potential of investigating tepotinib in combination with novel therapies for the treatment of advanced HCC after the two HCC Phase II trials met their primary endpoints, with clinical activity and safety demonstrated both as first-line and second-line treatment. Both M7824 and tepotinib were discovered in-house at our company.

Being the global market leader in fertility drugs and treatments, with a unique and broad portfolio from therapeutics to technologies, our Fertility franchise is an important growth driver for our Biopharma business. Infertility represents an increasing challenge globally due to demographic changes and growing lifestyle trends like delayed childbearing. In this highly specialized market, the focus lies on quality, standardization and outcomes. With our portfolio we are confident of being well-equipped to face the challenges in this field, aiming to be the preferred fertility treatment partner of our customers and offering innovative solutions across therapeutics, lab technologies, connectivity and services.

The Pergoveris[®] Pen is the first product with a combination of recombinant follicle-stimulating hormone (FSH) and recombinant luteinizing hormone (LH) in a ready-to-use liquid version, eliminating the need for mixing. It thus provides an improved and convenient treatment option for women with severe deficiency of both FSH and LH, a group of patients that is difficult to treat. Launches will continue. The number of countries in which Pergoveris[®] Pen has launched reached 13 in 2018 and we will continue to provide patients with access to this innovative therapeutic.

In addition, we launched two new technologies at the annual meeting of the European Society of Human Reproduction and Embryology (ESHRE) in Barcelona. Our connectivity platform QBOX IVF streamlines the data transfer between lab instruments and electronic medical records, improving data management across the clinic. Geri[®] Assess 2.0 extends our innovative software portfolio, enabling automatic detection of key events in embryo and blastocyst development.

During the ESHRE meeting we also introduced our new online platform, www.fertility.com. It is the gateway to two online portals: one for healthcare professionals, offering the latest scientific information in the advancing field of fertility, and one supporting women, men and couples who are looking for information about fertility and/or undergoing fertility treatment.

Every day, more than 66 million patients around the world use our trusted general medicine and endocrinology (GM&E) medications. Today, Concor®, Euthyrox®, Glucophage® and Saizen® are highly valued 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 the Healthcare business sector, with strong growth in all major therapeutic areas of focus, 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. Euthyrox®, with the active ingredient levothyroxine, is the worldwide market leader with a market share above 40% for the treatment of hypothyroidism, a disease with high prevalence but still low diagnosis rates in most emerging markets. Glucophage®, containing the active ingredient metformin, is the drug of choice for first-line treatment of type 2 diabetes. During 2018, several health authorities worldwide continued to authorize Glucophage® for prediabetes when intensive lifestyle changes have failed. This indication for Glucophage® is now approved in 40 countries. Due to an increasing prevalence of diabetes we see great potential for this product.

We also help to raise awareness and education in the areas we operate in, such as thyroid diseases and diabetes. This is well demonstrated by our active role in International Thyroid Awareness Week and partnership with the International Diabetes Federation (IDF), which serves as a basis for implementation of education and communication activities emphasizing the importance of type 2 diabetes prevention.

Earlier in the year we announced our collaboration with U.S.-based Medisafe to help our cardiometabolic patients better manage medication intake and adhere to prescribed treatment regimens. In the countries of scope, our patients will have access to a customized version of Medisafe's mobile platform that could combine reminders, motivation and support systems, targeted content, coupons and interventions in their local language.

Saizen® (somatropin) is our main endocrinology product and is indicated for the treatment of growth hormone deficiency 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.

CONSUMER HEALTH

Our Consumer Health business transferred to P&G on December 1. The cash purchase price was approximately € 3.4 billion. The transaction comprises the Consumer Health business in 44 countries with more than 900 products and two production facilities in Spittal (Austria) and Goa (India). Around 3,300 employees have transferred to P&G. The successful completion of the transaction marks a further step in our company's strategic focus on innovation-driven businesses.

ALLERGOPHARMA

Our allergy business Allergopharma is one of the leading companies in the field of allergy immunotherapy (AIT) in Europe. For high-precision, effective allergy therapy, we offer comprehensive diagnosis solutions as a basis for individual treatment concepts. Our AIT products concentrate on causal treatment of type 1 allergies such as allergic rhinitis (for example, hay fever) and allergic asthma to meet patients' needs. For AIT, strong evidence of efficacy and an acceptable safety profile have been well-documented in allergy-induced allergic rhino-conjunctivitis in numerous clinical trials. Furthermore, there is a potential positive effect on the long-term course of the allergic disease. AIT is designed to induce tolerance in the immune system of the allergy patient to the allergy-triggering allergen, thus potentially inducing an immune modification.

We offer high dosage, hypoallergenic, standardized preparations for allergen-specific immunotherapy for pollen and house dust mite allergies as well as a wide range of diagnostic allergy tests. Based on long-standing expertise, scientific excellence and entrepreneurial responsibility, we do our utmost to provide physicians with first-class therapy options and help people with allergies lead more fulfilled lives. Products of Allergopharma are available in 18 countries worldwide.

Life Science

In Life Science, we are a leading, global supplier of tools, high-grade chemicals, and equipment for academic labs, biotech and biopharmaceutical manufacturers, as well as the industrial sector. We make scientific discovery easier and faster with technologies like CRISPR for gene-editing; and we provide drug manufacturers with process development expertise that make medicines safer and more effective for patients. We offer both testing kits and services to ensure that our food is safe to eat and water is clean to drink.

In Life Science, our purpose is to solve the toughest problems in life science by collaborating with the global scientific community. Since acquiring the chemical and technology company Sigma-Aldrich in 2015, we have put a strategy in place that we continue to execute today: complete the integration of Sigma-Aldrich; strengthen our core businesses by delivering a broad and relevant portfolio to our customers and establishing new pillars of growth in scientific areas like cell and gene therapy and continuous bioprocessing. As ranked by sales, our Life Science business sector has achieved a top-three ranking in the global life science industry.

Udit Batra was named CEO of the Life Science business sector in 2014 and was appointed to the Executive Board in 2016. In 2018, Life Science generated 42% of Group sales as well as 44% of EBITDA pre (excluding Corporate and Other).

Our portfolio comprises more than 300,000 products ranging 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 has built the expertise to further develop our BioReliance® End-to-End Solutions, a service offering for process development and manufacturing for emerging biotech. Another example is BrightLab™, our digital ecosystem for complete lab management.

Our e-commerce platform, sigmaaldrich.com, continues to grow and connect customers in nearly every country with the products needed to advance their research, development and production efforts. In 2018, we implemented initiatives to optimize how our customers search and find our products, engage with our content and make purchasing decisions. With our teams' technical expertise and dedication to customer service, we continued to experience growth in both user sessions and revenue. This was recognized with three external awards.

In the first quarter of 2018, we made the first of several investment announcements. In February, we invested €40 million in Asia, which included an integrated cell culture facility in Songdo, Incheon, Korea; a new manufacturing and distribution center near Mumbai, India; and a single-use manufacturing facility in Wuxi, China.

The Songdo center includes cell culture media facilities (imMEDIATE Advantage® Custom Media) and a logistics infrastructure to help meet the rapid growth in the biopharmaceutical industry in Songdo (Incheon, Korea). The new center in Mumbai, which is expected to be completed in 2019, is being built to ensure that our customers have ready access to the products needed to develop new therapies and biosimilars to accelerate access to health.

In June, we announced expansion plans to our operations in Gillingham, United Kingdom. The distribution center, which will grow by 5,250 square meters, will supply the pharmaceutical industry, biotechnology companies, research institutes and academic centers with biochemical and chemical reagents, laboratory supplies and testing services. The € 9 million investment will boost distribution capabilities for the business. Anticipated to open in early 2019, the updated facility will serve as the primary distribution center for the United Kingdom.

In September, we established our first Mobius® single-use manufacturing facility in China to support the development of the biopharma industry in the region. This facility, which is expected to be operational by the first quarter of 2019, will provide flexible and customized single-use solutions to support local customers in accelerating drug development and manufacturing.

In the second half of 2018, we opened a € 13 million (SG \$ 20 million), 3,800-square-meter laboratory in Singapore, the only lab of its kind in Singapore and outside of the United States and the United Kingdom. The lab will focus on biologics testing, which is a major step in the drug development process.

In October, we also opened a new, 1,000-square-meter M Lab™ Collaboration Center in São Paulo, Brazil, to serve the Latin America region. The lab, which is one of nine such centers around the world, includes a non-good manufacturing practice (non-GMP) pilot and bench scale labs for customers. This allows customers to engage in process development support, troubleshooting, demonstrations and hands-on training to explore new ways to increase productivity, improve processes and mitigate risks.

In addition to new facilities, in 2018 we also announced a new platform for our biopharmaceutical customers who manufacture monoclonal antibodies. In the third quarter, we launched our Bio-Continuum™ Platform, which addresses intensified bioprocessing and continuous manufacturing. Continuous bioprocessing integrates the typical batch-based, separate manufacturing steps into a connected process, enabling a continuous flow from the addition of raw materials through product harvest, purification and testing. Pilot studies suggest that conversion to such a manufacturing method may reduce manufacturing costs by up to 50%.

A key goal for our Life Science business units is to help our customers that manufacture drugs, from small to large innovator companies, bring life-enhancing medicines and therapies to market – and

to patients – faster. To facilitate reaching this target, we opened our first BioReliance® End-to-End Biodevelopment Center in North America in June 2018. This center supplies drug manufacturers with complete solutions for the development of cell lines, upstream processes and downstream processes as well as production not subject to good manufacturing practices, or non-GMP production. The facility is designed to help customers with their biopharmaceutical manufacturing processes and accelerate clinical development from DNA to market.

Today, 60% of drugs in the pipeline are being developed by biotech start-ups focused on innovative therapies, including those intended to treat niche diseases with small patient populations. These companies are the focus of our global health commitment to support them in bringing their drugs to market through our grant programs. Grants provide these companies with free products and services of our company to help accelerate market entry of new therapies. Through our Advance Biotech Grant Program, every six months, three recipients around the globe are awarded a total of € 200,000 in services and products to address their process development challenges.

In February, we announced a two-year research collaborative with Washington University in St. Louis, Missouri, United States, that includes the use of our CRISPR genome-editing technology. The goal of the research is to determine the differences between gut bacterial communities in healthy and malnourished children, and to identify what features of healthy intestinal bacteria are critical for supporting healthy growth.

Further to these grants, in the second quarter of 2018, we announced three new partnerships with leading academic institutions. The first is a partnership with Oxford University's Jenner Institute, in the United Kingdom, which seeks to develop more robust and scalable vaccine manufacturing processes. A second collaboration, in addition to the aforementioned grant, is with Washington University in St. Louis, Missouri, United States, to optimize nutritional supplements to restore a healthy gut microbial community (microbiome). The third is a partnership with Tongji University in Shanghai, China, for our CRISPR Core Partnership Program to provide the university with exclusive access to our genome-editing technology and comprehensive technical support.

Related to our advancements in CRISPR, in December we announced a strategic alliance in the CRISPR/Cas9 rodent model market with France-based biotechnology company genOway. Through an exclusive worldwide license of our foundational CRISPR integration patents, genOway will develop new models and solutions allowing non-profit and for-profit scientists to use CRISPR/Cas9 technology. Under the agreement, genOway will also develop a network of sublicensees in both the model creation and distribution businesses and preclinical services for all potential applications worldwide, with a strong focus on the United States, Asia and Europe.

In addition to awarding grants to academic institutions, our businesses also extend to the wider community through SPARK, our global volunteer program. In 2018, through this initiative, nearly 1,700 employees volunteered nearly 9,000 hours to engage 66,500 students around the world in science learning. For the second year, our Curiosity Cube™, mobile science lab toured North America, traveling 30,000 kilometers and engaging approximately 36,000 students at schools and city centers in 24 communities.

In 2018, we served as the exclusive sponsor of TeleScience, a new online platform for Seeding Labs, an organization that provides scientists in developing countries with lab equipment, training and opportunities to collaborate with experts in their field. To date, our partnership with Seeding Labs has enabled the organization to equip 65 universities in 34 developing countries with 77 shipments (containing nearly 200 tons) of equipment, providing access to the global scientific community and helping to accelerate scientific research.

In October, we announced an agreement to sell our Amnis® Flow Cytometry and Guava® Technologies businesses to Luminex Corporation for € 63 million. The transaction transferred our flow cytometry platforms Amnis and Guava as well as the associated reagents under those brands. This included a portfolio of leading technologies serving the research space.

We will continue to actively manage our comprehensive portfolio by tapping into innovation and placing it in the best hands to continuously drive value for customers.

Performance Materials

Our Performance Materials business sector comprises our specialty chemicals business and supplies solutions for displays, computer chips and surfaces of all kinds. Effective April 1, 2018, Performance Materials comprises three business units: Display Solutions, Semiconductor Solutions and Surface Solutions. If we compare Performance Materials with a smartphone, Display Solutions represents the user interface, Semiconductor Solutions the intelligence and Surface Solutions the aesthetics.

On July 3, the Performance Materials business sector presented a strategy update explaining how, after 2019, it aims to achieve average annual sales growth of around 2% to 3% with an expected sustainable EBITDA pre margin of around 30%. We expect to be able to more than offset the decline in our liquid crystals business for displays with growth in the other businesses after 2019.

One pillar of the "Bright Future" transformation program is the realignment of Research and Development (R&D) as presented at the Capital Markets Day on October 16. In the wake of this realignment, the business sector is seeking to align its resources more

purposefully to the requirements of end customers. On top of this, decisions on the evaluation of projects and the allocation of resources are to be made centrally, and the business sector aims to push ahead with integrated and interdisciplinary R&D.

We are currently undergoing a transformation in the Performance Materials business sector with a view to adjusting to new market realities and customer requirements. We are building the foundations for the future. It is our strategic goal to return to sustainable profitable growth, to ensure an attractive margin and to remain competitive as Performance Materials. In order to achieve this, we have to optimize our cost base and to adopt our R&D ratio, which is far beyond industry benchmark. Our goal is a ratio of R&D investments compared to Sales of around 8%. This is at the upper end of what comparable companies invest in Research and Development. We are adjusting our cost structure in the Display Solutions and Integrated Supply Chain business units as well as in Research & Development, in particular.

Performance Materials accounted for 16% of Group sales in 2018 and its share of EBITDA pre (excluding Corporate and Other) was 19%. The EBITDA pre margin amounted to 32.7% of net sales.

Our Display Solutions business unit comprises the liquid crystals, OLED (organic light-emitting diodes), photoresists and liquid crystal windows businesses. Even though competition has intensified, we defended our position as the global market and technology leader in the display materials business in 2018. Modern, energy-efficient technologies such as UB-FFS (ultra-brightness fringe-field-switching) have further established themselves on the market. We have secured projects in the area of large-surface displays and for high-resolution mobile devices for our product offerings of the newly launched XtraBright™ brand.

The first commercial lighthouse projects in the architecture segment are running with our liquid crystal window modules. In October, we launched our new product brand, eyrise™. Its launch follows the opening of our production plant for liquid crystal window modules in Veldhoven, the Netherlands, at the end of 2017. Our business with photoresists for displays continues to consolidate thanks to proven technical success in high-performance product lines, in particular. This growth is supported by a strong position in new display production lines on the growing Chinese market. As a result of continuous

improvements as well as substantial increases in the current lifetime and efficiency of the OLED materials in our portfolios, these materials have been selected for a large number of new devices being launched on the market.

Semiconductor Solutions, the second-largest business unit in Performance Materials, supplies products for integrated circuits, microelectronic systems, for antireflection coatings and for the miniaturization of transistor structures. Deposition materials and conductive pastes for semiconductor packaging round off the portfolio. We are continuously looking for new materials for metallization processes with low resistance and various dielectric characteristics for faster or better processors, servers and data storage density. Our business with dielectric materials for spin-on procedures is growing steadily. Furthermore, we are reporting rising demand for krypton fluoride (KrF) thick film resists, an important material in the production of 3D NAND staircase structures.

Materials for Directed Self Assembly (DSA) provide cost-effective patterning solutions which enable further chip scaling. DSA combines bottom-up with conventional top-down patterning. DSA uses a variety of different materials, in particular so-called block copolymers (BCP) that consist of two continuous, linked strands of different polymers. These BCPs have the ability to arrange themselves in even shapes along the conductive structure under certain conditions. They form the basis for the extremely fine transistors and printed circuit paths for the computer chips of the future. Our technological competence in combination with a strengthened supply chain have contributed to this growth.

In the Surface Solutions business unit our goal is to help customers with our materials and solutions to make innovative surfaces of all kinds more beautiful, more resistant or even more intelligent. Our pearlescent pigments enable striking automotive coatings, fascinating cosmetics, extraordinary packaging, innovative product design and even unique food creations. With our functional solutions we serve a large number of innovative applications, from dirt-repellent and easy-care surfaces to laser markings of plastic parts and cables.

On October 26, the Surface Solutions business unit announced that it would align itself even more closely with the needs of its markets. The future business areas of Surface Solutions will be automotive coatings, cosmetic solutions and industrial solutions.

Strategy

General principles

At our company, we believe in the opportunities of science, the transformational power of technology and the endless possibilities to change the lives of patients, researchers and customers. Our purpose is “We are curious minds dedicated to human progress”. Science is at the heart of everything we do. It drives the discoveries we make and the technologies we create, it inspires our ideas and drives our entrepreneurial spirit.

We believe that scientific exploration and responsible entrepreneurship are key to technological advances that benefit us all. Our everyday decisions are guided by our company values. We want to live courage, achievement, responsibility, respect, integrity and transparency in every step we take, in every decision we make.

Together, we have defined the road ahead until 2022. This strategy is based on our Group Foundation, external trends that will impact our industry and a concrete map on how to reach our future ambition.

Group Strategy

THE TRANSFORMATIONAL JOURNEY SINCE 2007

Throughout the past years, our company has grown significantly through a series of strategic moves that have enabled us to develop into the vibrant science and technology company we are today. We have systematically and continuously strengthened and focused our portfolio of innovative science and technology throughout our business sectors. In Healthcare we divested our Generics business (2007) to focus on highly specialized products and acquired Serono (2007) to expand our pipeline and strengthen our business. This focused approach has continued until today with the divestments of the Biosimilars business (2017) and Consumer Health business (2018), so that we can increase our efforts on our Oncology, Immuno-oncology and Immunology franchises. Within Life Science, we have significantly transformed to become a diversified industry leader through the acquisition of Millipore (2010) and Sigma-Aldrich (2015). We continue to leverage the Sigma-Aldrich e-commerce platform to expand our reach and leadership in the industry as well as investing in strategic initiatives such as Gene Editing & Novel Modalities and End-to-End Bioprocessing. During this time, Performance Materials has continued to deliver profitable growth and a significant cash contribution, and we evolved this business further into attractive science and technology areas such as semiconductor materials through the acquisition of AZ Electronic Materials (2014), which also

helped us further diversify our product portfolio that was strongly driven by liquid crystals.

Strategically, what we have achieved is the transformation of a classic chemicals and pharmaceuticals supplier into the vibrant science and technology company with leading positions in Healthcare, Life Science and Performance Materials. To further achieve our strategic goals from 2011–2017, we completed a transformation and growth program known as “Fit for 2018”, primarily targeting organizational effectiveness and process optimization, and in the later years new initiatives such as the commencement of our Innovation Center in Darmstadt, new product innovations and our new brand.

THE ROADMAP

Our Group Strategy considers certain foundational elements such as, first and foremost, a risk diversification strategy that ensures that we are not over-exposed to any single customer, industry or region. We want to be a forward-thinking company generating long-term sustainable value. We focus our efforts and activities on innovative areas to add maximum value to the future of science and technology. We continue to operate under our current ownership structure with the Merck family, as a majority owner, and external shareholders. We aim to maintain an attractive financial profile. M&A (mergers & acquisitions) is an important part of our long-term value creation strategy with a focus on innovation-driven technology. In 2018, we further prioritized our activities in line with our strategic ambition to become the vibrant science and technology company. This includes the initiation of a new strategic approach in Performance Materials focused on the expanding electronics market, optimizing R&D through the efficient reallocation and adjustment of resources, and increasing our customer focus. In Healthcare, in addition to the aforementioned divestment of Consumer Health, we have continued our strategy of becoming a Global Specialty Innovator through continued development and externalization of selected pipeline projects. This way, we aim to ensure that promising products can be brought to the market quickly for the benefit of patients everywhere. Life Science is on track with the integration of Sigma-Aldrich and has continued along the path of science and technology leadership through its sustained investment and focus on its strategic initiatives of Gene Editing & Novel Modalities, which includes gene editing tools, viral and gene therapies, cellular therapies and RNA therapies, End-to-End Solutions for Bioprocessing and Connected Labs.

From now until 2022, we categorize our strategy as a period of growth and expansion, with all business sectors contributing to our growth ambition. In order to achieve our strategic ambition by 2022, we want to work on ensuring strong and innovative, specialty-focused pillars with strong positions in our priority growth areas, such as Oncology, Immuno-oncology and Immunology, Bioprocessing, and Semiconductor Solutions.

In more detail, it is our goal to continue to accelerate organic growth, expand our market footprint and sustain our leadership positions within our science and technology specialty areas. We have clearly defined goals, such as generating annual sales of at least € 2 billion by 2022 with products from our Healthcare R&D pipeline – products that we launched recently or expect to bring to market soon. In addition, we aim to double our Group sales in China. Healthcare shall contribute significantly to our growth ambition with the main drivers being new product launches and stable base business delivery. We expect Life Science to continuously target above-market growth with Process Solutions contributing significantly to this.

We expect the Performance Materials business sector to generate an EBITDA pre margin of around 30% after 2019. The business sector initiated the “Bright Future” transformation program. Besides the ambition to get back to organic top-line growth, the program focuses on resource allocation, process excellence and active portfolio management.

We aim to keep an attractive financial profile, regain our financial flexibility through stringent deleveraging and sustain our strong investment-grade rating. It is of utmost importance to us that we meet our obligations at all times through our diversified and profitable businesses as the basis for sustained cash flow generation. We are aiming to achieve sustained organic profitable growth, while targeted acquisition remains a growth option. We pursue 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. In addition, our Group Strategy is always aimed at delivering our ambition of becoming the vibrant science and technology company, and be an innovation leader within our fields of activity. We will therefore strive to achieve our strategy by continuing to focus on our three core priorities: “Performance”, “People” and “Technology”.

Performance

Our priority area “Performance” includes all activities that create sustainable, profitable growth. We have defined a strategic roadmap until 2022 to meet our ambition. Our primary aim is to deliver accelerated profitable growth through sustained core business delivery and selective portfolio strengthening.

In Healthcare, a successful 2018 included our innovative product launches of Bavencio® and Mavenclad®, which together reached around € 160 million in sales in 2018. Our Healthcare core business has grown consistently for many quarters and we continue to diligently develop and manage our pipeline of innovative medicines. The 2018 news flow clearly shows that our pipeline contains highly attractive and innovative assets in key indications, in various stages of the clinical development process.

Going forward, in Healthcare, we will drive our positioning as a global specialty innovator by fully leveraging our pipeline potential. Here we aim to focus and prioritize development of key pipeline projects, deliver multiple study readouts in major tumor types and ensure a regular inflow of promising early-stage projects to ensure the long-term pipeline potential. We expect that our pipeline will continue to progress quickly. It therefore requires regular prioritization and de-risking decisions, with strategic partnerships and external financing being key. At the same time, it is our goal to continue to profitably deliver on our core business while further expanding our global reach.

In Life Science, we have achieved our € 280-million synergies target for 2018 and a net sales organic CAGR of around 6% since 2015, which is around 200 basis points (bps) above the market average – despite the integration of Sigma-Aldrich. Furthermore, we started various innovation projects to support our industry-leading growth and profitability in the future.

We are a highly differentiated leader, positioned for sustained and profitable growth, in Life Science. Working towards 2022, our strategy is to sustain above-market growth in our core businesses, with a focus on our leadership in Bioprocessing and delivering on our strategic initiatives such as End-to-End Bioprocessing and Gene Editing & Novel Modalities. The business sector will concentrate on advancing the already favorable portfolio mix with exposure to growth market segments, full operating leverage driving margin progression, ensuring that our strategic initiatives enable sustained above-market growth and making capacity investments that support industry growth dynamics.

Despite a decline in sales and profits at Performance Materials in 2018, we remain a market leader in this sector. In parallel we embarked on a transformation program to deliver on our strategy of becoming a leading electronics solutions provider and established a new R&D framework.

The focus of Performance Materials is on bringing the business back to a 2–3% organic sales growth trajectory from 2020 onwards, implementing our 5-year “Bright Future” transformation program and ensuring efficient resource allocation to foster the EBITDA pre margin of around 30%. We aim to further strengthen Performance Material’s position as a leading electronics solutions provider, ensure a stronger focus on existing end market needs and implement a rigorous innovation and project prioritization process.

China is a major innovation hotspot and one of our strategically most important growth markets. Cornerstones of our strategy are further localization via our Healthcare and Life Science production sites in Nantong and the OLED application center in Shanghai, the engagement of key stakeholders in the local environment and tapping into the Chinese innovation ecosystem via our future innovation hubs in Shanghai and Guangzhou. The establishment of both these hubs is already well underway, with scheduled openings in the second half of 2019. Together they will create a strong platform for us and our partners to drive innovation, while also significantly contributing to the range of our activities and general footprint in China.

People

Our People Strategy aims at building the capability of the organization to shape the future and to address 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.

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 2018” by the Dutch Top Employers Institute. In addition, we were ranked fifth among employers worldwide in the field of biotechnology and pharmaceuticals by Science magazine, a leading peer-reviewed international scientific publication.

Our leaders play a decisive role in our new “People Strategy”. We aim to place next to our employees leaders who will develop them for future requirements, not just current needs, and foster the diversity and unique strengths within the organization. At the same time, we want the leadership style of our managers to enable strategic innovation. On top of this, we promote curious talents who can solve complex problems and are passionate about the work they do. We will also strengthen results-driven teams and networks by valuing team collaboration and providing flexible frames for teams and individuals to drive.

In this process, it is our goal to take data-driven decisions, both when hiring new members of staff and in the personnel development of employees (people analytics). Another element of this strategy is the promotion of diversity, with a special focus on women and talent in Asia, and the use of the unique strengths and understanding of key customers and markets that these employees bring. We have to value different perspectives and encourage constructive conflicts.

We place great importance on the continuous advanced training and further development of our managers. This is essential for them to address the diverse needs of their team members and the changing requirements of the businesses and of digitalization. Our leaders are responsible for pushing our strategy ahead by building up the right competences, thereby fostering innovation. As part of this, they take calculated risks, set clear and inspiring direction to their employees and provide the requisite structures and resources.

In the context of the “People Strategy” we also want to look at new forms of cooperation and experiment with methods that result in better decision-making. For example, pilot initiatives focus on expanding our “Science Network” further. Through this project we are promoting the establishment of a science community within the company to accelerate the exchange of innovative ideas and improve the collaboration between all employees in the Research and Development sector. In the Healthcare sector, we have begun to deepen the awareness of unbiased decision-making. We want to support leaders to help them reflect on their decision-making processes and take unbiased decisions.

Technology

Our priority area “Technology” is twofold. It is inherent in our business sectors through our innovations, product pipelines and digitalization strategies. In addition, the ways in which we address cross-sector innovations is reflected in our approach to potentially disruptive technologies. It 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. Another example is Syntropy, our intended joint venture with Palantir Technologies to advance cancer research. Syntropy is expected to empower scientists and research centers with a collaborative technology platform to advance cancer research, help drive scientific discovery and improve human lives. Research institutions around the world are generating a rapidly growing amount of biomedical data, but much of it is trapped in silos within and between institutions. Today, this critical data is often inaccessible to the scientists and clinicians who need it to advance their work. Syntropy aims to unlock the value of this untapped data, enabling the world’s leading experts to collaborate in the fight against cancer and many other diseases.

Furthermore, we opened our Innovation Center in Darmstadt as a Group-wide infrastructural commitment to our science- and technology-driven growth. The Innovation Center aims to develop entirely new businesses beyond the current spectrum as well as bring together people, scientific expertise, technologies and skills from different areas under one roof. Our cross- and beyond-sector innovation offers incremental and disruptive ideas and aims to keep us ahead of the game. We are focusing on our activities within three core innovation fields of interest: Liquid Biopsy, Clean Meat and Biosensing and Interfaces. With liquid biopsies, a variety of diseases can be diagnosed through the detection of biomarkers in body fluids. This could be a key technology for early disease detection and for expanding the delivery of precision medicine to more patients. The innovation field Clean Meat comprises technological innovations to meet the world’s growing demand for protein- and nutrient-dense foods made by ethical, eco-friendly methods. The innovation field of Biosensing and Interfaces focuses on the integration of electronics with the human body to create a digital human/biological interface.

This could enable faster and more accurate (remote) health monitoring and treatment.

Additionally we focus on disruptive innovation beyond our currently established business sectors. To achieve innovation success, we transform ideas into businesses through different pathways. They include M Ventures, our strategic corporate venture capital fund, with a total volume of € 300 million. M Ventures invests in promising start-ups and businesses within our core business areas and in innovations outside these areas by providing financial and/or strategic value. Furthermore, our Digital Office works to generate new digital business opportunities within our areas of expertise. It also supports the existing businesses in selecting digital projects where maximum value for our company can be generated. The Innovation Ecosystem is responsible for scouting, ideating and delivering new internal projects across and beyond our current scope.

The transformation of our company towards a science and technology company is evident at our Darmstadt site, which we are growing into a center of excellence for science and technology. Our largest site in the world already stands for excellent research and development as well as production that creates value. Darmstadt is the only site at which all three of our business sectors have a presence. In addition to being global Group headquarters, Darmstadt is home to our Executive Board and Group functions. At our new Innovation Center in Darmstadt, internal and external experts collaborate on identifying trends of significance to our business and markets as well as generating technology-driven growth going forward. All in all, this site offers a very good foundation for implementing our Group strategy successfully.

Business strategies

HEALTHCARE

Our Healthcare business sector comprises the Biopharma and Allergopharma businesses. Our businesses specialize in key franchises and specific diseases. Global megatrends such as a growing world population and an increase in average life expectancy continue to drive 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 from the successes over the past two years, 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 the Healthcare business sector is to become a global specialty innovator, operating in franchises with significant unmet medical need and

bringing high value to patients and consumers. Therefore, we continue to invest 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, e.g. bringing the innovation of our pipeline to patients and grow our presence in the United States and in China. The emerging markets and China are expected to be the largest growth driver for our established products in the future. Managing the balance between delivery of innovative medicines while expanding reach and ensuring profitable growth of the existing business will be one of the strategic challenges.

The second pillar of our strategy is the focus on specialty medicine franchises. Here, we expect oncology, immuno-oncology and immunology markets to remain highly attractive in terms of size, growth prospects, and profitability. Within each specialty franchise, our approach is to develop deep internal expertise and insight from internal research to commercialization, augmented by external talent sourcing, strategic partnering and asset acquisitions. Fertility and Endocrinology offer significant opportunities to bring value to patients, with high profitability and growth potential; maximizing the commercial potential of these areas will remain important.

The third pillar of our aspiration is innovation: to develop high-quality, first-to-market and best-in-class therapies, and to build a portfolio in each of our franchises. We have streamlined our pipeline and expanded our innovation capabilities with strong investigational drug candidates. In order to maximize the output of our R&D investments and increase our chances of success in discovering and developing new therapies, we focus our expertise on specific franchises and are exploiting synergies in disease mechanisms and biological pathways. We are investing in digital technologies as well as personalized and translational medicine in order to drive continued pipeline success.

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 the industry.

On December 1, 2018, we announced the completion of the sale of our Consumer Health business to Procter & Gamble. The divestment of Consumer Health was aligned with our strategy of focusing on our pipeline of innovative medicines.

LIFE SCIENCE

Since closing the acquisition of Sigma-Aldrich, in November 2015, Life Science's organic sales growth has exceeded that of the industry and has remained the highest among integrated peers.

The Life Science business sector is executing an ambitious strategy to capture near-term opportunities and to invest for future growth. Our integration is on track, and we have consistently outperformed the market during the largest integration in our history and that of the industry.

Our aspiration remains to reinforce our leadership position as a tools and equipment supplier that is solving the toughest problems in life science. This has allowed us to achieve quality growth with a well-leveraged balance sheet.

To sustain our leadership for the future, Life Science has established a strategy based on three key pillars:

1. Ensure operational excellence by focusing on creating value, building a strong organization and implementing consistent processes
2. Strengthen the core organization by rejuvenating chemistry and reagents, expanding our leadership in bioprocessing, continuing to access new growth areas and strengthening our e-commerce platform to maintain our leadership position
3. Establish new growth pillars through our four strategic initiatives: Gene Editing & Novel Modalities, BioReliance® End-to-End Solutions, BioContinuum® Platform and BrightLab™.

We began the year 2018 with a recently signed commercial supply agreement to manufacture viral vectors for bluebird bio, Inc., of Cambridge (Massachusetts, United States), a clinical-stage company that develops potentially transformative gene and cell therapies for severe genetic diseases and T-cell-based immunotherapies for cancer. As part of the multi-year agreement, we will manufacture lentiviral vectors for bluebird bio's drug products developed to treat a variety of rare genetic diseases.

Throughout 2018, we streamlined our business through integrating strategic initiatives, such as single-use technologies for Bioprocessing, into the base business. We expanded our foundational intellectual property for our CRISPR technology with patents in key markets in Asia Pacific, the Middle East and Europe. We also expanded our business sector through the opening of new facilities throughout Asia and South America.

Looking ahead, we expect our strategy to continue to deliver net sales growth ahead of the market and maintain our market leading EBITDA pre margin. Our priorities for 2019 are to continue to support new growth pillars with our Gene Editing & Novel Modalities offerings, as well as differentiated gene editing tools, drug safety systems and models, and clinical viral manufacturing. In addition, we will further develop our BioReliance® End-to-End Solutions, a service offering for process development and manufacturing for emerging biotechs as well as our BioContinuum™ Platform, to address intensified bioprocessing and continuous manufacturing. We will also focus on expanding the use of BrightLab™, our digital ecosystem for complete lab management.

PERFORMANCE MATERIALS

Performance Materials targets attractive end markets that are driven by megatrends: digitalization, urbanization, mobility and affluency will drive advanced electronic systems with semiconductors at their heart. As a result, electronics demand is expected to grow for the foreseeable future. Roughly 80% of our sales are currently linked to the electronics market, which of course includes our Semiconductor Solutions and Display Solutions business units, but also parts of Surface Solutions.

The remaining 20% of our sales relate to the automotive and cosmetics market served by Surface Solutions. We expect demand in these segments to likewise benefit from global trends such as increasing affluency in developing countries.

Within the electronics market, we are active in the field of semiconductor and display solutions, targeting a material market of about € 85 billion. We are already one of the largest players in this field, while operating in selected and highly attractive market segments. In coming years, we expect that the market for liquid crystal materials for TVs – still our largest business and one of the most attractive – will continue to decline. For us, after 2019, this development is expected to be more than offset by growth in OLED materials and photoresists as well as in semiconductor materials and our solutions for surfaces. As a result, we want to achieve an attractive average sales growth of 2–3% after 2019 and to generate EBITDA pre margins of around 30%, substantially above the specialty chemicals industry average.

We have a solid foundation: a strong global customer network, a proven track record of delivering high-tech solutions, an efficient production infrastructure and the highest quality standards throughout the industry. Our innovative solutions allow us to establish intimate and long-term customer relationships, and understand the changing requirements of end customers in markets as diverse as consumer electronics, automotive and cosmetics.

The market segments we operate in represent a well-balanced mix of new and fast-growing areas (such as deposition materials in Semiconductor Solutions or OLED materials in Display Solutions), but also more mature segments where we have established ourselves as the clear market leader (liquid crystals for Display Solutions, for example, or pearlescent pigments used for coatings).

Our priorities are:

- Focus on the attractive electronics market to achieve long-term organic growth perspective of 2–3% per year (CAGR)
- Allocate our resources more efficiently to maintain an above-industry EBITDA pre margin of around 30%
- Actively manage our portfolio and expand our partnership network
- Foster our customer-centric orientation with an integrated R&D approach to better serve market and customer needs

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 can fulfill our obligations at all times. In this context, we pursue a conservative, proactive financing strategy in which we deploy a variety of financial instruments. We have diversified and profitable business activities as the basis for our strong and sustainable cash flow generation capacity. In addition, we have several sources of financing, including a € 2 billion syndicated loan facility that was renewed in 2018 and is in place until 2023 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, in 2018 we used bilateral bank loan agreements with first-class banks in order to optimize the funding structure and cost.

The bond market additionally represents a key source of financing. The most recent bond issues took place in 2014 and 2015 in connection with the acquisition of Sigma-Aldrich. They have terms that run to 2025, with the first redemption options for hybrid bonds in 2021 and 2024. 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.

DIVIDEND POLICY

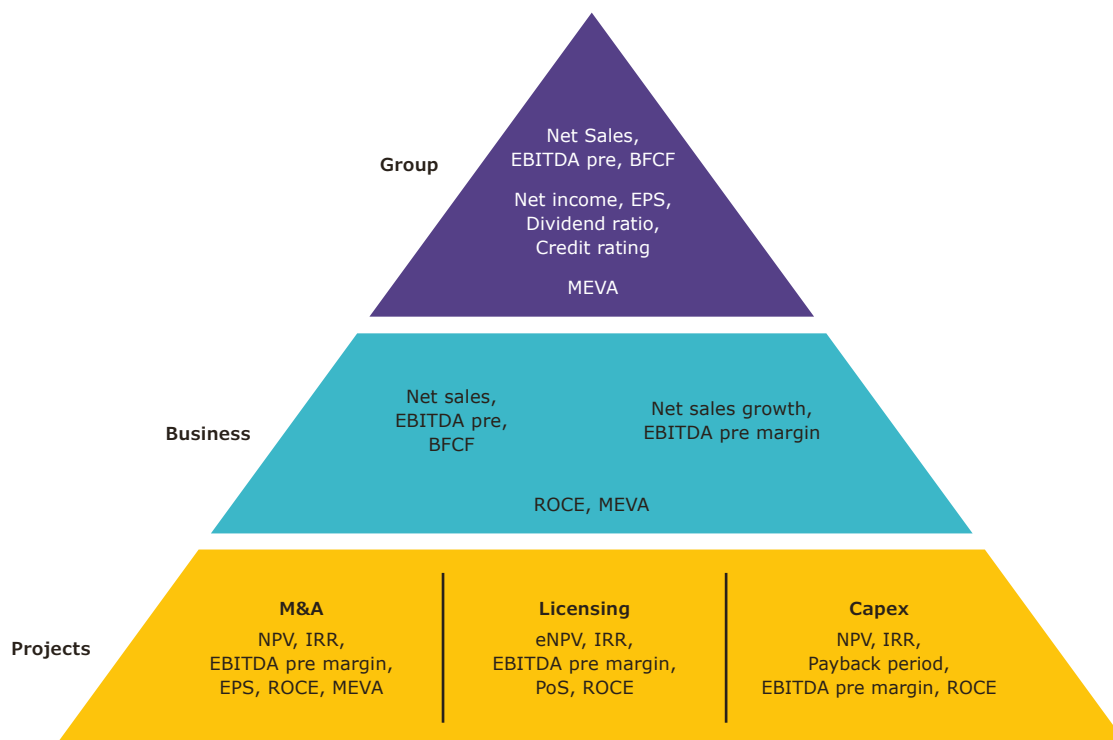
We are pursuing a sustainable dividend policy. Provided that the economic environment develops in a stable manner, the current dividend represents the minimum level for future dividend proposals.

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 earnings per share 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 pre¹.

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 pre¹ = Earnings before interest, income tax, depreciation and amortization as well as adjustments
 EPS = Earnings per share
 MEVA¹ = Value added of Merck KGaA, Darmstadt, Germany
 BFCF¹ = Business free cash flow
 ROCE¹ = Return on capital employed
 NPV¹ = Net present value
 IRR¹ = Internal rate of return
 eNPV¹ = expected Net present value
 PoS¹ = Probability of success
 M&A = Mergers & Acquisitions

¹ Not defined by International Financial Reporting Standards (IFRSs).

Key performance indicators of the Group and its businesses

The three key performance indicators of net sales, EBITDA pre and business free cash flow 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 sales¹

€ million	2018	2017	Change	
			€ million	in %
Net sales	14,836	14,517	319	2.2%

¹ Previous year's figures have been adjusted, see Note (49) "Effects from new accounting standards and other presentation and measurement changes" in the Notes to the Consolidated Financial Statements.

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 expenses, IT expenses for selected

projects, restructuring expenses, gains/losses on the divestment of businesses, acquisition expenses, 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^{1,2}

€ million	2018	2017	Change	
			€ million	in %
Operating result (EBIT)²	1,727	2,423	-696	-28.7%
Depreciation and amortization	1,743	1,742	1	-
Impairment losses/reversals of impairment losses	58	-1	58	>100.0%
EBITDA²	3,528	4,164	-636	-15.3%
Restructuring expenses	46	61	-15	-24.6%
Integration expenses/IT expenses	142	188	-46	-24.4%
Gains (-)/losses (+) on the divestment of businesses	25	-310	335	>100.0%
Acquisition-related adjustments	2	63	-61	-97.2%
Other adjustments	58	81	-23	-28.1%
EBITDA pre²	3,800	4,246	-446	-10.5%

¹ Previous year's figures have been adjusted, see Note (49) "Effects from new accounting standards and other presentation and measurement changes" in the Notes to the Consolidated Financial Statements.

² Not defined by International Financial Reporting Standards (IFRSs).

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^{1,2}

€ million	2018	2017	Change	
			€ million	in %
EBITDA pre²	3,800	4,246	-446	-10.5%
Investments in property, plant and equipment as well as software and advance payments for intangible assets	-932	-1,012	80	-7.9%
Changes in inventories	-214	-18	-197	>100.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses	-145	-22	-123	>100.0%
Elimination first-time consolidation of BioControl Systems	-	-2	2	-
Business free cash flow²	2,508	3,193	-685	-21.4%

¹ Previous year's figures have been adjusted, see Note (49) "Effects from new accounting standards and other presentation and measurement changes" in the Notes to the Consolidated Financial Statements.

² Not defined by International Financial Reporting Standards (IFRSs).

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 expenses, IT expenses for selected projects, restructuring expenses, gains/losses on the divestment of businesses, acquisition expenses 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, 2}

€ million	2018	2017	Change	
			€ million	in %
Net income	3,374	2,605	769	29.5%
Non-controlling interests	22	10	12	> 100.0%
Profit after tax from discontinued operation	-2,303	-57	-2,246	> 100.0%
Income tax	368	-428	796	> 100.0%
Amortization of acquired intangible assets	1,175	1,198	-23	-1.9%
Adjustments ²	327	64	264	> 100.0%
Income taxes on the basis of the underlying tax rate ²	-741	-814	73	-9.0%
Non-controlling interests to be adjusted	-3	-3	-	0.4%
Net income pre²	2,219	2,574	-355	-13.8%
Earnings per share pre² (in €)	5.10	5.92	-0.82	-13.9%

¹ Previous year's figures have been adjusted, see Note (49) "Effects from new accounting standards and other presentation and measurement changes" in the Notes to the Consolidated Financial Statements.

² Not defined by International Financial Reporting Standards (IFRSs).

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).

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 fur-

thering 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.

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.

Corporate Responsibility

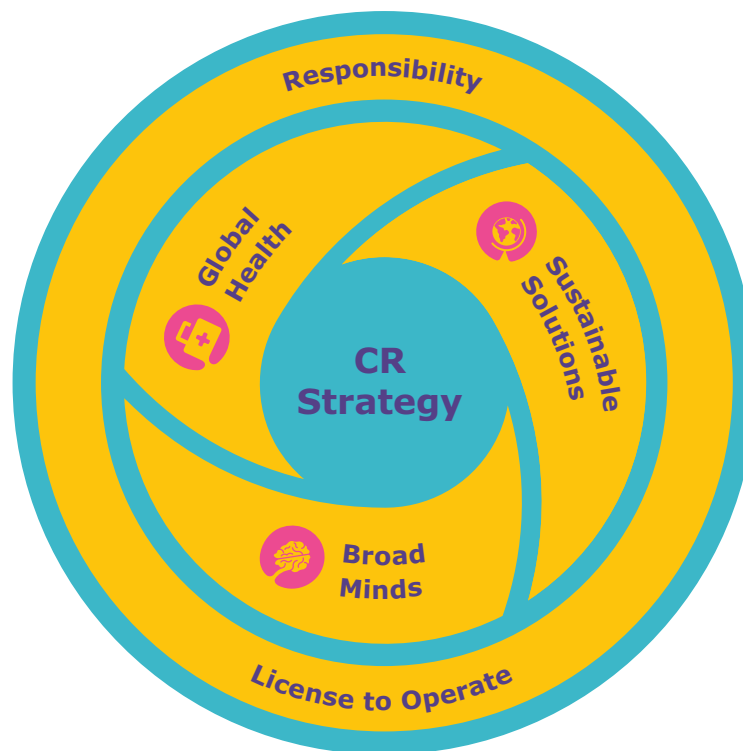
We take responsibility every day – and have been doing so for 350 years. This commitment is codified in our corporate strategy and values. Responsible conduct with respect to employees, products, the environment and society is a fundamental prerequisite for our business success.

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. The Chairman of the Executive Board and CEO is responsible for the committee, which is chaired by the head of the Group Corporate Responsibility unit.

Humankind is being confronted with global societal challenges such as climate change, resource scarcity and insufficient access to

healthcare in low- and middle-income countries. Responsible governance can help solve these global issues. We believe that in pursuing this approach, we can also strengthen our financial performance. In 2018, we strategically repositioned ourselves: We focus even more on creating sustainable value for both our company and society. To achieve this, we are taking a shared value approach. We have adapted our three strategic spheres of activity to bring them more in line with our business. These spheres are organized under the headings of “Global Health”, “Sustainable Solutions” and “Broad Minds”. We focus our resources on those areas where we can have the greatest impact. The effects our actions have on society – such as the development of new products – should be considered strategically in their own right. Needless to say, we respect the interests of our employees, customers, investors and the community, and work to minimize ethical, economic and social risks, thereby sustainably contributing to our long-term corporate success.

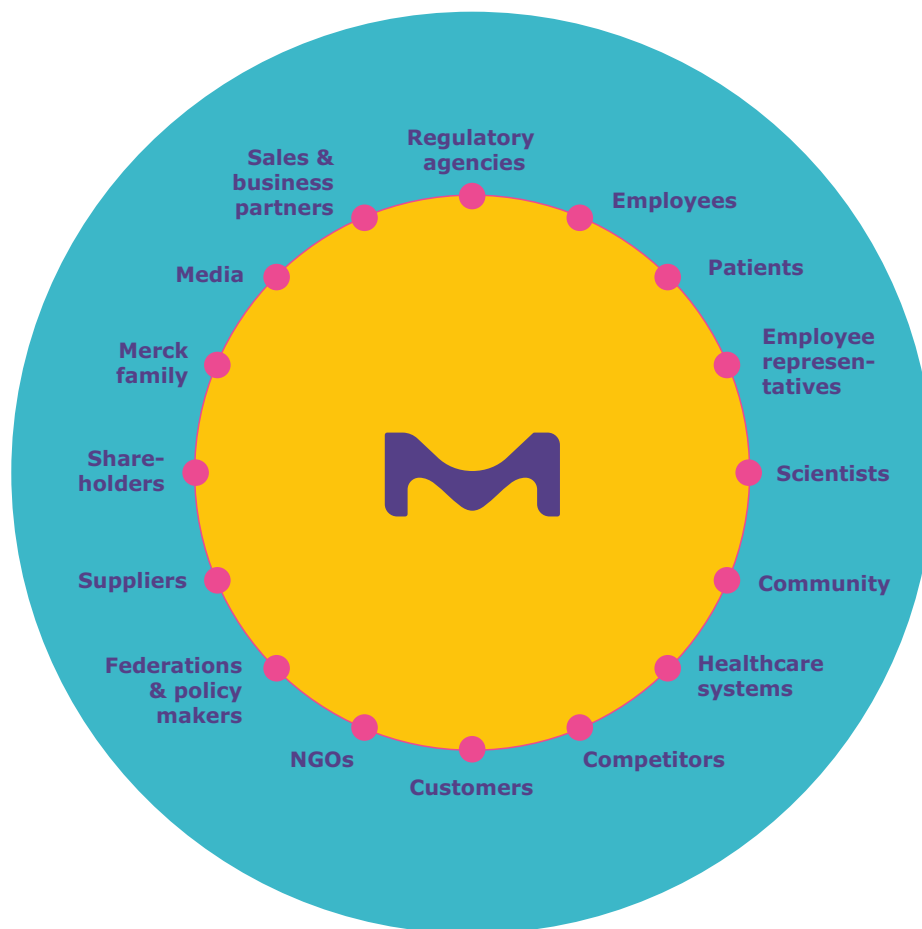


Global Health: In low- and middle-income countries, many people lack access to high-quality health solutions. We join forces with partners to provide local solutions and develop treatments for neglected tropical diseases in Africa. For instance, we are using praziquantel tablets to fight schistosomiasis. Through our Global Health Institute, we are developing diagnostics, therapies and preventive solutions to address infectious diseases such as malaria and therapeutic challenges such as antimicrobial resistance.

Sustainable Solutions: We are constantly working to improve the sustainability footprint of our products – even during their use phase – which also helps our customers achieve their own sustainability goals. To this end, we have established systematic approaches for product development such as Design for Sustainability, a program within our Life Science business sector that allows us to assess the sustainability of our products during development. Product developers use various tools, such as product lifecycle analyses.

Broad Minds: As a science and technology company, we endeavor to excite people about science, inspire curiosity and help creativity to soar. Our goal is to strengthen our reputation in the field of science, especially in those areas where we have particular expertise. We not only support educational programs for schools, but also back pioneering research at institutes of higher learning. Reflecting the way that music and literature inspire people, we promote a range of cultural initiatives worldwide. Creativity and curiosity are the bedrock of science, culture and art, and also underpin our holistic approach.

Our corporate responsibility efforts are aligned with the United Nations (UN) Sustainable Development Goals (SDGs), and we are working to help achieve this ambitious agenda by 2030. In addition to promoting the SDGs, we also support relevant responsible governance initiatives. Through our membership in the UN Global Compact we are committed to upholding the Compact’s principles on human rights, labor standards, environmental protection and anti-corruption. We ensure that we live our own corporate responsibility



principles by following the guidelines of the Responsible Care Global Charter, which is an initiative of the International Council of Chemical Associations (ICCA). Responsible Care aims to help the chemical industry enhance its environmental, health and safety performance. We are also a member of the Chemie³ 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). This globally unique alliance seeks to make sustainability a core part of the chemical industry's guiding principles and to drive the sector's position within the German economy as a key contributor to sustainable development.

To us, corporate responsibility means listening and taking action, and so we place great importance on dialogue with our various stakeholders. These stakeholders include employees, business associates, the Merck family, investors, regulatory agencies and industry associations. This continuous exchange creates transparency and clearly demonstrates how we live our values. In recognition of our dedication to responsible and sustainable business practices, we were again listed on the FTSE4Good index in 2018. Inclusion in this leading international sustainability index is only possible if a company meets stringent social, environmental and ethical behavior criteria.

Our good standing in other major sustainability indices was also maintained in 2018, with our inclusion in the STOXX Global ESG Leaders index, the Euronext Vigeo Eurozone 120 index and the Ethibel Sustainability Index (ESI) Excellence Europe. In early 2019, EcoVadis, an independent rating agency, granted us Gold status for our sustainability performance. EcoVadis assesses around 45,000 suppliers from 150 countries across the four categories of Environment, Social, Ethics and Sustainable Procurement.

Strategic sphere of activity: Global Health

Our aim is to create a healthier future for all: for individuals, communities and countries. We want to use innovation in science and technology to improve the health of underserved populations in low- and middle-income countries. To achieve this, we are leveraging our expertise from all business sectors and collaborating closely with a wide range of partners. We also participate in industry-wide initiatives and work closely with other businesses to develop new approaches.

In 2018, we refined our strategy for addressing the global needs that impact access to healthcare. Our strategy is designed to overcome barriers to access for underserved populations and communities in developing countries in a business-integrated and sustainable manner, thereby creating "shared value". For us, creating shared value means developing business models that increase the value and competitiveness of our company and at the same time solve unmet health needs and bring value to underserved populations. We want to be instrumental in the elimination of schistosomiasis and fight

malaria and other infectious diseases while helping to build local capacity across the value chain and positioning our company as a leading and reliable partner.

The 2018 Access to Medicine Index continues to rank us in fourth place. Every two years, this index assesses the world's leading pharmaceutical companies on activities and initiatives they have implemented to promote access to medicine in developing countries. We received particular recognition for leading practices such as establishing our Global Health Institute to accelerate research and development (R&D) targeting schistosomiasis, malaria and bacterial infections, strengthening commitment to open innovation and establishing the Capacity Advancement Program to improve access to better diabetes, cancer, hypertension and fertility therapies in underserved regions.

Strengthen the availability of healthcare solutions

We research, develop and refine healthcare solutions that address unmet needs, tailoring them to local environments. With our Global Health Institute, we have defined a comprehensive portfolio of R&D projects to develop integrated health solutions. This includes treatments, diagnostics, preventive measures against infections and approaches to strengthen health systems, targeting schistosomiasis, malaria and bacterial infections. The Institute operates as a social business enterprise delivering innovations for the most vulnerable – with a special focus on women and children in the developing world.

This portfolio also includes the development of a new pediatric formulation of praziquantel to treat the worm disease schistosomiasis in children under the age of six, through the Pediatric Praziquantel Consortium, which is a public-private partnership. Marketing Authorization Application is planned for 2020, and we expect the product to be ready to launch in the first endemic countries in Africa in 2021.

For malaria, we are completing the Phase I/Ib clinical activities of our anti-malarial compound, which has the clear potential to treat and prevent malaria. In the drug discovery area, our strategic collaboration with the University of Cape Town in South Africa has led a new research and development platform. In 2018, this collaboration (including Medicines for Malaria Venture) was extended to continue screening activities with the aim of identifying new therapeutic solutions while building up research capacity in and for Africa. This program continues to leverage our proprietary chemical library of almost 100,000 compounds to identify new lead programs for the treatment of malaria. The program is co-funded by the German Federal Ministry of Education and Research.

We have developed a kit for malaria diagnosis based on our Muse[®] cell analyzer. It aims to accurately diagnose malaria and measure the type of malaria parasite as well as the infection level. The malaria kit was launched for research use in 2018. At the end of 2018, we divested the technology platform developed by our Life Science business sector to the U.S. laboratory supplier Luminex, which is now marketing the diagnostic kit.

Additionally, we are working towards demonstrating the efficacy of our product IR3535[®] for malaria prevention in Africa. The insect

repellent is already used for complementary prevention from vector-borne diseases, such as dengue fever or ZIKA. Products containing this active ingredient stand out due to their particularly good tolerance in young children and pregnant women. In 2018, we entered a collaboration to support the National Malaria Control Program in Ghana. Here we develop malaria prevention solutions based on IR3535®.

Address affordability challenges

Through intellectual property initiatives and equitable pricing strategies we are able to provide assistance to those people who are unable to pay for the health solutions they need. Publicly available databases enable us to be transparent about our patents and patent applications. To strengthen our commitment to the London Declaration to fight neglected tropical diseases, we formed a partnership with the Drugs for Neglected Diseases initiative (DNDi), under which we are involved in the Drug Discovery Booster project for neglected tropical diseases. The objective is to find potential cures for leishmaniasis and Chagas disease.

As one of more than 100 members of WIPO Re:Search, an open innovation platform sponsored by the World Intellectual Property Organization (WIPO), we share intellectual property and knowledge with the aim of accelerating early discovery for infectious diseases. Through WIPO we are collaborating with the University of Buea (Cameroon) and University of California San Diego (United States) to find potential cures for onchocerciasis, leishmaniasis, Chagas disease and African trypanosomiasis (sleeping sickness).

We continue to work with the World Health Organization (WHO) to combat the worm disease schistosomiasis in Africa. In 2018, we donated approximately 200 million praziquantel tablets for distribution in 34 African countries, and this year our donation program was expanded to include Burkina Faso, Niger and Sierra Leone. We keep production capacities at a level sufficient for manufacturing 250 million tablets a year. Since 2007 we have supplied almost 900 million tablets free of charge, which is equivalent to the treatment of around 360 million schoolchildren. As a founding member of the Global Schistosomiasis Alliance, we are helping to eliminate schistosomiasis worldwide.

Raising awareness

Health professionals, communities and patients are empowered through access to the appropriate tools, knowledge and skills to help them make informed decisions about prevention, diagnostics, treatment and care. Our regular campaigns help to increase awareness of certain diseases globally, with a focus on those diseases where we have extensive expertise, such as cancer, thyroid disorders, diabetes and multiple sclerosis. In addition, we have championed World Malaria Day with awareness campaigns and through engagement around the We for Malaria program. In 2018, we hosted events in Ghana that created the opportunity for collaborations in research and business activities to tackle preventive methods against malaria. Via our charitable organization, we bring together some of our activ-

ities in underserved regions of the world. Our Access Dialogues series promote discussion with numerous public and private stakeholders on access-to-healthcare challenges. Dialogues in 2018 covered the topics of innovation and intellectual property as well as supply chain and delivery.

A schistosomiasis health education project in Ethiopia was launched jointly with the NALA Foundation at the end of 2017, with the aim of promoting the long-term behavioral change that is needed to eliminate schistosomiasis. The project targets a rural area in Ethiopia, focusing on approximately 260,000 students in 290 schools through activities such as distribution of customized educational material. In 2018, we reached 74 schools with nearly 70,000 students. The goal is to extend this model to other regions in Africa.

The Global Pharma Health Fund (GPHF), a non-profit organization funded by our company, works to combat falsified medicines in developing and emerging countries. To date, the GPHF has supplied 843 Minilabs at cost to detect falsified medicines in around 100 countries. In 2018, the GPHF developed testing methods for five additional active ingredients so that the Minilab can now test 90 active ingredients, ranging from antimalarials, antimycobacterials and antivirals to antipyretics and antibiotics.

Promoting accessibility and improving supply chains

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.

NTDeliver is our digital information tool, which facilitates transparency in supply chains for medicine donations. Deliveries from companies running donation programs are clearly displayed – from purchase orders made by the WHO through to delivery to the first warehouse in the destination country. This improves coordination and provides a more transparent overview of the in-country inventory. Following a pilot in 2017, we carried out two implementation rounds in 2018, including using NTDeliver last mile tracking as a standard reporting tool in the school-based schistosomiasis program in Kenya. The system is collecting and consolidating field information and has helped us to reach out to more than 12,000 teachers throughout Kenya.

In 2018, we started the CURAFA™ project as part of our vision to improve primary healthcare for everyone everywhere. So-called CURAFA™ points of care for integrated primary healthcare services are run by local pharmacists and nurses, who provide pharmaceutical and clinical services, medicine, digital health solutions, and insurance and financing schemes. The project was implemented in collaboration with the non-governmental organization Amref Health Africa. We rolled out five primary healthcare points in Kenya during 2018.

Strategic sphere of activity: Sustainable Solutions

Through our products, we are helping overcome global challenges such as climate impact and resource scarcity. In doing so, we are also supporting our customers in reducing the impacts of their own activities and achieving their own sustainability goals.

Life Science: reducing environmental impacts throughout the product life cycle

It is important to us that we improve the environmental 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, we have developed a comprehensive approach for more sustainable life science products. This keeps sustainability criteria in the foreground during product development or re-engineering, and documents them in a scorecard. When developing a new product, our aim is to improve on as many of these criteria scores as possible. 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. By the end of 2018, 27% of these product development projects met three or more sustainability criteria.

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. More than 750 greener alternatives to conventional products are available so far. With DOZN®, we have developed a web-based quantitative Green Chemistry analysis tool. To date, we have used this matrix to assess and improve more than 40 products. It is our goal to make this system available to our customers in 2019, so that they can measure the environmental impact of their research and make more environmentally conscious decisions.

We are expanding our portfolio to include greener alternatives, such as the new bio-based solvent, Cyrene™, which 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.

The focus is not just on the current life of our products, as we 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 led to the recycling of more than 2,738 metric tons of our customers’ products from 2015 to 2018.

Performance Materials: increasing the sustainability of manufacturing processes and end products

In 2018, our Performance Materials launched the new liquid crystal technology SA-VA (Self-Aligned Vertical Alignment). 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 fewer waste products than conventional technologies during display manufacture. SA-VA also provides a more efficient display manufacturing process. Since SA-VA technology can be applied at lower temperatures, it is also suitable for sensitive materials such as those used in premium products, or for forward-looking applications such as flexible displays.

Organic light-emitting diodes (OLEDs) likewise increase the energy efficiency of displays while also providing brilliant colors and razor-sharp images. To further enable unique display applications and efficient production of large-area OLED displays, we are developing high-performance OLED materials for vacuum evaporation methods or printing processes.

To utilize our market and technological leadership in liquid crystals beyond applications in energy-saving displays, we started manufacturing liquid crystal window modules at a new site in Veldhoven (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. These windows can be manually or automatically controlled to darken and provide sun protection or can create privacy by switching from transparent to opaque. In contrast to competing technologies, our newly branded Eyrise™ products switch within seconds and are highly color-neutral. Architects and builders can customize the desired color to suit the setting. In response to market demand, we have prioritized solar control during 2018, and we have three sophisticated architectural projects in the pipeline. We were able to realize the first commercial project in October 2018: large solar control windows for the company Orkla in Oslo (Norway). Furthermore, we presented a selection of these innovative architectural solutions at the trade fair “BAU 2019”, where we focused on our Eyrise™ technology. Among other things, we showed an iconic building design by renowned Brazilian architect Oscar Niemeyer. The building is currently being constructed for the company Kirow Ardelit in Leipzig (Germany).

For the semiconductor industry, we have developed a series of environmentally sustainable specialty chemicals and materials – including PFOS-free antireflective and photoresist coatings.

In the cosmetics industry, we are addressing the continuing trend for ingredients that meet stringent sustainability criteria. Our portfolio of fillers eliminates the need for microplastic particles that are heavily criticized for polluting waters and damaging marine life. We are also committed to continuously increasing the energy efficiency of our production processes. Our cosmetic formulations comply with strict criteria. By the end of 2018, 68 of our cosmetic pigments and active ingredients were certified according to Ecocert’s COSMOS standard for organic and natural cosmetics.

Strategic sphere of activity: Broad Minds

The promotion of science, education and culture in an integrated manner constitutes one of the central concerns of our engagement in society. This is in line with our 350-year tradition of advancing art and culture. In this way we champion characteristics that are indispensable for our business activities as a high-tech company: creativity, the passion for new discoveries and curiosity, together with 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 35 years. Since 1996, we have been organizing the state-level competition for the German Federal State of Hesse. In 2018, we hosted the nationals for the third time.

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 2018, around 2,500 school students used the chemistry laboratory and around 1,000 school students experimented in the biology laboratory.

In 2017, we launched a pilot project for the continuing education of teachers in order to transfer our commitment to STEM education in an international context for the first time. We started in India, followed by projects in Chile, Kenya and Tanzania in 2018. By the end of the year, we had trained almost 100 teachers who act as multipliers and will reach thousands of school students.

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 students to consider a STEM-related career. In 2018, over 2,800 employees invested more than 19,000 hours in the program, reaching over 66,000 young people. As part of SPARK, in 2018 we once again sent our Curiosity Cube™ on a journey through the United States and Canada. This is a freight container that transforms into a mobile laboratory and is equipped with state-of-the-art technology. Directed by our employees, school students can use it to carry out scientific experiments. In 2018, the Cube traveled approximately 30,000 kilometers across the United States and engaged students in 108 communities. 94% of schools visited fall under the “Title 1” category, where students mainly come from low-income backgrounds.

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 31,000 people attending them in 2018. In the orchestra workshop, children and young people gained their first experience in a professional orchestra. We also fostered enthusiasm for classical music among young people through seat cushion concerts for children aged four years and above as well as through youth concerts. In addition, the orchestra again toured internationally. Concerts took place in Austria, the United States and China in 2018. In Beijing, the musicians held an orchestra workshop with music students at the local university. The subsequent concert in front of an audience of around 1,700 was a huge joint success.

Promoting literature

Like music, literature is an important mediator between cultures. That is why we support five literary prizes around the world. The awards primarily recognize those authors who build bridges between cultures, as well as between literature and science. We awarded four of the prizes in 2018: The Johann Heinrich Merck Award for Literary Critique and Essay of Merck KGaA, Darmstadt, Germany, in Germany went to author and translator Martin Pollack. The Italian Premio Letterario of Merck KGaA, Darmstadt, Germany, was awarded to natural scientist, author and professor Carl Safina, and to physicist and science historian Lucio Russo. The winners of the Japanese Kakehashi Literature Award of Merck KGaA, Darmstadt, Germany, were author Clemens J. Setz and his translator Ayano Inukai. The Translation Award of Merck KGaA, Darmstadt, Germany, in Russia went to authors Nina Federowa, Ekaterina Aralova, Natalia Stillmark and Tatiana Zborovskaja. The Tagore Literature Award of Merck KGaA, Darmstadt, Germany, in India will once again be offered in 2019.

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, far 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.

In 2018, we successfully completed the third and final phase of the REACH registration process by registering all substances annually produced or imported in quantities ranging from one to 100 metric tons with respect to the risks they pose in terms of their use, storage, transport and disposal. All the chemical substances concerned in our portfolio were registered on schedule. This process also includes substances added to our portfolio from the Sigma-Aldrich acquisition.

Safety of our Healthcare products

Patient safety has a top priority in everything we do. During the entire life cycle of our medicines, we provide patients 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 Patient Safety unit continuously monitors and evaluates the safety and risk-benefit ratio of our medicines worldwide (pharmacovigilance). For products in our Allergo-pharma 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 at all times with high-quality original 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 global focus of our procurement, we are continuously working to ensure adherence to our supply chain standards.

As a member of the industry initiative “Together for Sustainability” (TfS), we are able to use the supplier self-assessments and audit results shared among all member companies, who in turn abide by all restrictions stipulated within competition law. Through the shared platform approach, we have access to the sustainability assessment scorecards of more than 10,700 companies as well as over 1,000 audits reports.

Responsibility for our employees

Our employees contribute to groundbreaking progress in science and technology across the world. They are the basis of our success and therefore play a central role for the success of our business. In accordance with our company values, we live a culture of mutual esteem and respect. To remain successful in the future we want to attract people to our company who contribute their curiosity, their courage and spirit of invention. We therefore place a strategic focus on employee development, leadership and performance management. Furthermore, we strive to foster diversity among our employees (more information can be found under “People”).

Responsibility for the environment

We seek to impact the environment as little as possible while doing business. 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 ISO 14001. 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 2018, we obtained

an ISO 14001 group certificate for the tenth consecutive year. This certificate covers 81 sites around the world.

All reported environmental key figures do not include data on the Consumer Health business, since these operations were transferred to Procter & Gamble – effective December 1, 2018 – and have been classified as discontinued operations within the meaning of IFRS 5 since April 2018.

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 2018, the CDP (formerly the Carbon Disclosure Project) gave our efforts for the sustainable use of energy a “C” rating (2017: B). The CDP assesses companies in terms of their performance and transparency in climate impact and water management.

ENERGY CONSUMPTION^{1,2}

In gigawatt hours	2015	2016	2017	2018
Total energy consumption	2,141	2,117	2,194	2,232
Direct energy consumption	1,343	1,330	1,319	1,322
Natural gas	1,200	1,260	1,254	1,256
Liquid fossil fuels ³	110	36	32	32
Biomass and self-generated renewable energy	33	34	33	34
Indirect energy consumption	798	787	875	910
Electricity	702	692	729	761
Steam, heat, cold	96	95	146	149
Total energy sold	0.3	0.3	0.1	0.0
Electricity	0.3	0.3	0.1	0.0
Steam, heat, cold	0.0	0.0	0.0	0.0

In terajoules	2015	2016	2017	2018
Total energy consumption	7,708	7,621	7,898	8,035
Direct energy consumption	4,835	4,788	4,748	4,759
Natural gas	4,320	4,536	4,514	4,522
Liquid fossil fuels ³	396	130	115	115
Biomass and self-generated renewable energy	119	122	119	122
Indirect energy consumption	2,873	2,833	3,150	3,276
Electricity	2,527	2,491	2,624	2,740
Steam, heat, cold	346	342	526	536
Total energy sold	1.1	1.1	0.4	0.0
Electricity	1.1	1.1	0.4	0.0
Steam, heat, cold	0.0	0.0	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 corporate structure as of December 31 of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).

² All reported environmental key figures do not include data on the Consumer Health business, since these operations were transferred to Procter & Gamble – effective December 1, 2018 – and have been classified as discontinued operations within the meaning of IFRS 5 since April 2018.

³ 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, 2}

In metric kilotons	2006 ³	2015	2016	2017	2018
Total CO₂eq⁴ emissions	786	722	689	704	698
thereof					
direct CO ₂ eq emissions	378	391	384	373	354
Indirect CO ₂ eq emissions	408	331	305	331	344
Biogenic CO₂ emissions	0	13	14	13	13

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 corporate structure as of December 31 of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).

² All reported environmental key figures do not include data on the Consumer Health business, since these operations were transferred to Procter & Gamble – effective December 1, 2018 – and have been classified as discontinued operations within the meaning of IFRS 5 since April 2018.

³ Baseline for our emission targets is 2006.

⁴ eq = equivalent.

To achieve our climate impact mitigation goals, we have launched the EDISON program, which consolidates all our climate impact mitigation and energy efficiency activities. Through the more than 360 EDISON projects initiated since 2012, we aim to annually save around 177 metric kilotons of CO₂ in the medium term. Overall, thanks to the EDISON projects we have saved approximately 89,000 megawatt hours of energy since 2012.

At the same time, we are pushing forward with the changeover to renewable energies. In 2017, we installed a solar voltaic system in Burlington, Massachusetts, United States. It has an installed capacity of 182 kilowatts and generated 136,000 kilowatt hours in 2018. 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 29% 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 are working to implement further measures to achieve our climate goal. For example, we are steadily reducing our process-related emissions in our Life Science business sector through process optimization. In 2018, this enabled us to save 16,000 metric kilotons of CO₂ equivalents.

Alongside energy efficiency and climate protection, we also focus on water. 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 2018, we had lowered our water consumption at the relevant sites by 11% in comparison with 2014. In 2018, the CDP gave our efforts to conserve water a “B-” rating (2017: B). Natural resources are becoming scarcer. We therefore want to use raw materials as efficiently as possible and to limit the loss of raw materials. In this way, 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. Based on this score, we have set ourselves the goal of reducing the environmental impact of our waste by 5% by 2025 (2016 baseline). For this purpose, we continuously analyze the improvement potential of our production processes and disposal routes. In 2018, we also established two expert panels on the topic of waste management. They regularly discuss best practice examples and thus facilitate an exchange of experience between our global sites.

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 culture projects and furthermore support education, especially in the natural sciences. Additionally, we provide disaster relief and support people in need in the areas 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 2018, we spent a total of € 36 million on community engagement activities. For the first eleven months this amount includes the Consumer Health business, which was divested as of December 1, 2018. This figure does not include contributions from our charitable organization.

To mark our 350-year anniversary, we stepped up our commitment and carried out more than 350 charitable projects in 60 countries in 2018. In more than 60% of all initiatives our colleagues joined us in our efforts, whether through donations in cash or in kind or through their active collaboration in projects.

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.

In 2018, approximately 7,200 employees worked for our company researching innovations to serve long-term health and technology trends in both established and growth markets (in 2017: approximately 6,800).

Our company spent around € 2.2 billion on research and development (R&D) in 2018 (2017: around € 2.1 billion). In our research and development activities, we focus on both in-house research and external collaborations that enable us to increase the productivity of our research while simultaneously reducing financial outlay. The organizational set-up of our R&D activities reflects the structure of our company with three business sectors.

Healthcare

BIOPHARMA

Oncology and Immuno-Oncology

Oncology and immuno-oncology are core focus areas in our R&D portfolio. With an emphasis on biomarker-driven research, we aim to deliver personalized treatments and a transformative pipeline. Translational research is embedded into the whole R&D process, with several projects addressing unmet needs in hard-to-treat cancers through innovative treatment approaches and novel combinations. In 2018, we achieved a number of significant milestones across our oncology and immuno-oncology pipeline.

We continue to develop much-needed new treatment options for patients with hard-to-treat cancers and have made key progress in this area with avelumab, an anti-PD-L1 antibody that we are co-developing and co-commercializing with Pfizer. To date, avelumab has received approval in 46 countries across the world under the brand name Bavencio®. In 2018, approvals were granted in several countries, including Australia and Brazil, for Merkel cell carcinoma (MCC) as well as Israel for MCC and urothelial carcinoma (UC) and Canada for UC.

In September, we announced positive top-line results from the pivotal Phase III JAVELIN Renal 101 study evaluating avelumab in combination with Inlyta® (axitinib), compared with Sutent® (sunitinib)

as initial therapy for patients with advanced renal cell carcinoma (RCC). As part of a planned interim analysis, an independent data monitoring committee confirmed that the trial showed a statistically significant improvement in progression-free survival (PFS) by central review for patients treated with the combination whose tumors had PD-L1+ expression greater than 1% (primary objective), as well as in the entire study population regardless of PD-L1 tumor expression (secondary objective). The detailed analysis of this clinical trial read-out was presented at the 2018 European Society for Medical Oncology (ESMO) Congress. The US Food and Drug Administration (FDA) granted Breakthrough Therapy Designation for avelumab in combination with Inlyta® for treatment-naive patients with advanced RCC in December 2017.

Through our strategic alliance with Pfizer, we continue to explore the therapeutic potential of avelumab. Our clinical development program JAVELIN comprises more than 30 clinical programs, including various Phase III trials, involving over 9,000 patients across more than 15 different tumor types. In addition to MCC, UC and RCC, these cancers include breast, gastric/gastro-esophageal junction and head and neck cancers, non-small cell lung cancer and ovarian cancer.

We provided an update on our Phase III JAVELIN Lung 200 trial in February, Phase III JAVELIN Ovarian 200 trial in November and Phase III JAVELIN Ovarian 100 trial in December. While these studies did not meet or were not expected to meet their pre-specified primary endpoints of overall survival (JAVELIN Lung 200), superior overall survival or PFS (JAVELIN Ovarian 200) and PFS (JAVELIN Ovarian 100), the data are being further examined to better understand the results.

As part of our ongoing 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 various new strategic collaborations in 2018 with avelumab. The first was in July, when our collaboration with Vyriad to evaluate avelumab in combination with Voyager-V1, an oncolytic virus therapy, in a Phase I clinical trial in patients with solid tumors was announced. A few days later, we announced a collaboration with Leap Therapeutics to investigate avelumab in combination with Leap Therapeutics' G1TR agonist, TRX518, and chemotherapy in a Phase I/II clinical trial in advanced solid tumors including expansion populations in patients with relapsed/refractory ovarian, breast and prostate cancers.

In September, together with Pfizer, we entered into a clinical trial collaboration and supply agreement with Checkmate Pharmaceuticals to evaluate CMP-001, a TLR9 agonist, in combination with avelumab.

The collaboration will evaluate the safety and effectiveness of CMP-001 administered in combination with avelumab in selected previously treated patients with advanced squamous cell carcinoma of the head and neck (SCCHN) whose disease has progressed.

Also in September, we announced a collaboration with Immunetep to evaluate avelumab in combination with eftilagimod alpha (“efti” or “IMP321”), an investigational LAG-3Ig fusion protein, in a Phase I trial in patients with advanced solid malignancies. Shortly afterwards, in October we entered into a clinical trial collaboration agreement with Daiichi Sankyo Company to study the combination of avelumab and/or our investigational DNA damage repair (DDR) inhibitor with [fam-] trastuzumab deruxtecan (DS-8201), an investigational HER2-targeting antibody drug conjugate, in patients with HER2-expressing or mutated solid tumors.

Finally, in November, we entered into two collaboration agreements. The first was with Kyowa Hakko Kirin to study avelumab with Kyowa Hakko Kirin's novel IDO inhibitor, KHK2455, in a Phase I clinical trial of patients with solid tumors. The second agreement was with Immunetep to investigate avelumab in combination with ilixadencel, an off-the-shelf, cell-based, cancer immune primer, in a planned multi-indication Phase Ib/II clinical trial of patients with advanced head and neck cancer and gastric adenocarcinoma.

In 2018, we celebrated several important milestones for our leading oncology pipeline molecules we discovered in-house, including tepotinib, an investigational oral MET inhibitor, and M7824, an investigational bifunctional immunotherapy.

In March, tepotinib received its first regulatory designation when the Japanese Ministry of Health, Labor and Welfare (MHLW) granted SAKIGAKE “fast-track” designation to tepotinib for patients with advanced non-small cell lung cancer (NSCLC) harboring MET exon 14 skipping mutations. The SAKIGAKE designation promotes research and development in Japan, aiming at early practical application for innovative pharmaceutical products, medical devices and regenerative medicines, and can reduce a drug's review period down from 12 months to a target of 6 months. The SAKIGAKE designation system is a core component of the MHLW's “Strategy of SAKIGAKE”. The system's objective is to designate drugs that have the potential of prominent effectiveness against serious and life-threatening diseases in order to make them available to patients in Japan ahead of the rest of the world.

In August, we initiated a trial to investigate M7824 compared with pembrolizumab as a first-line treatment in patients with PD-L1-expressing advanced NSCLC. In December, the FDA and the European Medicines Agency (EMA) granted orphan drug designation (ODD) to M7824 for the treatment of biliary tract cancer (BTC). The FDA's ODD follows the recent presentation of the first clinical data for M7824 in BTC at the ESMO Congress (see below). BTC is a collective term for a group of rare and aggressive gastrointestinal cancers, including intrahepatic cholangiocarcinoma, extrahepatic cholangiocarcinoma and gallbladder carcinoma. Approximately 16,000 cases

of BTC are estimated to occur every year in the United States. These cancers present late in the majority of patients and treatment options are limited. The median survival rate in the advanced setting is less than one year and the objective tumor response with commonly used chemotherapy is typically less than 10% with a short duration of response.

Our integrated R&D capacity is strongly supported by external innovation to complement our pipeline, strengthen our technology base and enhance our scientific capabilities. In 2018, we initiated new pipeline collaborations to further diversify our development risks and enable a more efficient pipeline prioritization.

In January, we announced a multi-project and licensing deal with Cancer Research UK's Commercial Partnerships Team and The Institute of Cancer Research (ICR), London, to discover and develop new anticancer drugs. Together we will collaborate on three independent research projects spanning discovery to preclinical candidate nomination. This work will progress the discovery and development of potential cancer drugs, as well as develop biomarkers for target engagement and patient selection. Under the terms of the deal, we have worldwide rights to take molecules discovered through the collaboration forward into clinical development. Cancer Research UK and the ICR will receive milestone payments based on the achievement of research and development, regulatory and sales goals plus royalty payments on net sales of future products discovered or developed under the agreement. Any payments made to Cancer Research UK and the ICR will be invested in future lifesaving research.

In April, we announced a development and risk-sharing collaboration with the SFJ Pharmaceuticals Group (SFJ), a U.S.-based company focused on increasing R&D output and productivity through innovative models. In a novel innovation model recently emerging in the biopharma industry, SFJ – one of the pioneers of such collaborations – will finance and be responsible for Phase II/III development of abituzumab, our IgG1 monoclonal antibody, as a first-line treatment for metastatic colorectal cancer (mCRC) in combination with Erbitux® and chemotherapy.

Additionally, we are currently assessing the potential of investigating tepotinib in combination with novel therapies for the treatment of advanced hepatocellular carcinoma (HCC) after the two HCC Phase II trials met their primary endpoints, with clinical activity demonstrated both as first-line and second-line treatment and safety findings in line with earlier studies.

At the 2018 ASCO Annual Meeting (June 1–5 in Chicago, Illinois, United States), we shared results from our increasingly broad oncology portfolio, from immuno-oncology to DDR approaches, in a wide range of hard-to-treat cancers. Representing seven therapeutic agents and eight tumor types, we showcased the significant potential in not only later-stage priority programs, but also in early pipeline programs that could make a real difference for patients. We presented data across our oncology and immuno-oncology pipeline for molecules including avelumab and Erbitux®, and pipeline updates

on M7824, tepotinib, the p70S6K/AKT targeted agent M2698, the DNA-PK inhibitors M3814 and M6620.

Multiple presentations on avelumab at ASCO included two-year safety and efficacy data in metastatic MCC for avelumab from the pivotal JAVELIN Merkel 200 trial, as well as data in NSCLC and UC. Pipeline updates at ASCO also included early clinical results for tepotinib patients with NSCLC harboring MET exon 14 skipping mutations, M7824 in patients with HPV-associated cancers and NSCLC, M6620 in NSCLC and advanced solid tumors as well as data for M3814 and M2698 in solid tumors.

At the 2018 ESMO Congress (October 19–23 in Munich, Germany), we presented a total of 41 abstracts representing eight therapeutic agents and 14 tumor types. The data presented showcased the diversity of our pipeline, with results from a number of high-priority clinical development programs.

They included the first presentation of data from the pivotal Phase III study JAVELIN Renal 101 evaluating avelumab in combination with axitinib compared with sunitinib as initial therapy for patients with advanced RCC. For avelumab, updated data in MCC and advanced gastric or gastroesophageal junction cancer were also presented.

Additionally, new data for M7824 were presented from expansion cohorts of two ongoing Phase I clinical trials, including the first presentation data for SCCHN, BTC and esophageal cancers. In addition, updated data for M7824 in NSCLC and gastric cancer were shared. Data presented for tepotinib included results from three Phase II trials, two in advanced HCC and one in NSCLC, providing further evidence of this precision medicine's promising clinical activity in solid tumors. In DDR, results were presented from a Phase I trial investigating M6620 (formerly VX-970) in combination with gemcitabine in patients with advanced NSCLC; and two Phase I trials of DNA-dependent protein kinase inhibitor M3814. From the broader pipeline, results were also shared from the Phase I/II trial of M7583, a Bruton's tyrosine kinase (BTK) inhibitor, in patients with B cell malignancies, as well as a retrospective analysis of the Phase I/II Poseidon study investigating abituzumab in patients with mCRC.

Moreover, data from our legacy brand Erbitux® (cetuximab) were presented, adding to the growing body of real-world evidence supporting the therapy's role as a standard of care in RAS wild-type mCRC, first-line recurrent or metastatic SCCHN and for patients with locally advanced SCCHN who may not be able to tolerate cisplatin-based regimens in full.

Neurology & Immunology

Multiple sclerosis (MS) is one of the world's most common neurological disorders. Despite the emergence of several therapies in the last two decades, there are still significant unmet needs for MS patients, particularly those with highly active relapsing MS (RMS).

On July 30, we announced that a resubmission of the New Drug Application (NDA) for cladribine tablets as a potential treatment for patients with relapsing forms of MS was accepted for review by the FDA. The acceptance indicates that the FDA found the company's resubmission sufficiently complete to permit a substantive review. The resubmission was in response to the Complete Response Letter issued by the FDA in 2011 requesting an improved understanding of safety risks and the overall benefit-risk profile. The NDA acceptance follows global approvals of cladribine tablets under the trade name Mavenclad® in more than 40 countries since August 2017, including the European Union (EU), Canada, Australia, Israel, Argentina, United Arab Emirates, Chile and Lebanon. In 2018, Mavenclad® was approved in a total of 11 countries. Additional filings in other countries are planned.

The results from the key magnetic resonance imaging (MRI) findings of the CLARITY Extension study of Mavenclad® (cladribine tablets) were published in January in the journal *Therapeutic Advances in Neurological Disorders*. The findings suggest that two-year treatment with Mavenclad® (given over 20 days) has a durable effect on MRI during observation in years 3 and 4.

On March 7, we announced positive results from our Phase IIb study in RMS of evobrutinib, an investigational, highly specific, oral BTK inhibitor and the first BTK inhibitor to show clinical proof-of-concept in RMS. The study met its primary endpoint, demonstrating that oral evobrutinib resulted in a clinically meaningful reduction of gadolinium-enhancing T1 lesions on MRI scans measured at weeks 12, 16, 20 and 24 in comparison to patients receiving placebo.

In April, data for Mavenclad® and Rebif® (interferon beta-1a) were presented at the American Academy of Neurology (AAN) 70th Annual Meeting, April 21–27 in Los Angeles (California, United States). Mavenclad® data presented included poster presentations highlighting analyses of the CLARITY, CLARITY Extension and ORACLE-MS trials evaluating long-term safety and durable efficacy in patients with MS.

In May, the *Multiple Sclerosis Journal* published data outlining the effects of Mavenclad® treatment on patients with highly active RMS. The data showed that Mavenclad® reduced the risk of 6-month Expanded Disability Status Scale (EDSS) progression by 82% vs placebo.

In June, 14 abstracts were presented further characterizing the complementary profiles of Mavenclad® and Rebif® at the 4th Congress of the European Academy of Neurology (EAN) in Lisbon, Portugal.

In October, we presented 23 abstracts, including new safety and efficacy data on Mavenclad®, Rebif® and investigational therapy evobrutinib at the 34th Congress of the European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS) in Berlin, Germany. The data presented at ECTRIMS build on the existing real-world and clinical evidence around the safety and efficacy of Mavenclad® and reaffirm a positive benefit-risk profile of the oral treatment, which is taken for a maximum of 20 days over two years.

Based on an integrated analysis of patients from the CLARITY, CLARITY EXT and ORACLE-MS trials, including two additional years of data from the long-term PREMIERE Registry, the treatment emergent adverse event (TEAE) profile associated with Mavenclad® in patients with RMS was confirmed, with no new safety findings. Late-breaking data from the multi-sponsored European IFNβ Pregnancy Registry and Nordic health registers demonstrated that treatment with interferon beta formulations – including Rebif® – before conception or during pregnancy did not affect outcomes for the pregnancy or for the infant. Positive late-breaking data from the 24-week results of the double-blind, randomized, placebo-controlled, 48-week, Phase II study of evobrutinib in patients with RMS were presented at ECTRIMS. The study met its primary endpoint, with evobrutinib 75mg QD (once daily) and 75mg BID (twice daily) significantly reducing the number of gadolinium-enhancing T1 (T1 Gd+) lesions measured at weeks 12, 16, 20 and 24 in comparison to patients receiving placebo.

In addition, following the #MSInsideOut campaign launch on World MS Day at the end of May, we premiered the MS Inside Out Documentary film executively produced by Shift.ms during an event on October 11. At the event, we shone a light on the untold stories of MS, as well as revealing the findings from a new global MS carers survey conducted in collaboration between leading international carer organizations IACO (International Alliance of Carer Organizations) and Eurocarers. The data presented at ECTRIMS further demonstrated the need for a deeper understanding of those affected by MS and their carers.

We also announced in Berlin (Germany) the winners of the annual Grant for Multiple Sclerosis Innovation (GMSI) Award, which supports the advancement of science and medical research in the field of MS and provides a grant of up to € 1,000,000 per year to one or more selected research projects. The winners were Professor Franca Deriu of the University of Sassari (Italy); Professor Jennifer Gommerman and Dr. Valeria Ramaglia of the University of Toronto (Canada); Professor Edgar Meinl of the Institute of Clinical Neuroimmunology of the University of Munich (Germany); as well as Dr. Gerd Meyer zu Hörste and Professor Heinz Wiendl of Münster University Hospital (Germany).

At the Osteoarthritis Research Society International (OARSI) 2018 World Congress – held in April in Liverpool (United Kingdom) – 16 abstracts, including two oral presentations, were presented. Our presence at OARSI reflects the company's dedication to helping optimize outcomes for patients living with chronic progressive diseases, with the goal of developing novel disease-modifying therapies for osteoarthritis (OA). Oral presentations on sprifermin offer further insights supporting its dose-response structural effect in patients with knee OA, observed in earlier studies.

At the European Lupus Society in March (Düsseldorf, Germany), data were presented on atacicept, a recombinant fusion protein thought to target the cytokines APRIL and BLYS. Two oral presentations of analyses of the Phase II ADDRESS II clinical trial assessing atacicept in patients with systemic lupus erythematosus (SLE) reported attainment of low-disease activity and reduction of flares in patients with high SLE disease activity.

Fertility

At the Grant for Fertility Innovation (GFI) ceremony at the annual meeting of the European Society of Human Reproduction and Embryology (ESHRE) in Barcelona, Spain, we confirmed our commitment to supporting potential breakthrough research projects in the field of fertility. With an amount of € 300,000, the GFI is again supporting the advancement of medical science, aiming to bring innovation to life. The two winners – Louise Glover from Ireland and Cinzia Di Pietro from Italy – received their awards during the ceremony, which was also attended by Louise Brown, the world's first person to be conceived using in vitro fertilization (IVF), as well as IVF pioneer Professor Bruno Lunenfeld.

General Medicine & Endocrinology

During 2018, we received further authorizations for Glucophage® (metformin) for the reduction in the risk or delay of the onset of type 2 diabetes when intensive lifestyle changes have failed. We now have this indication in 40 countries, among them Brazil, United Kingdom, Singapore and Saudi Arabia. Global roll-out in other countries is ongoing.

In July, the EU worksharing procedure was finalized and the German Federal Institute for Drugs and Medical Devices (BfArM) recommended the approval of our new formulation of Euthyrox® (levothyroxine) in 21 EU countries. The German BfArM decision was based on a study demonstrating bioequivalence between the old and new formulations and a dose form proportionality study with the new formulation. The new formulation came at the request of several health authorities worldwide. It was introduced in France in March 2017 and Switzerland in April 2018. Since October the product has been available on the Turkish market. Following the positive recommendation from BfArM, which is acting as a representative of all 21 EU countries involved in the EU worksharing procedure, we expect the new formulation of Euthyrox® to be available in these countries from 2019 onwards.

On September 28, we announced the recipients of the Grant for Growth Innovation (GGI) for 2018 during the 57th European Society of Paediatric Endocrinology (ESPE) meeting in Athens, Greece. Applications were reviewed by an independent scientific steering committee consisting of six internationally renowned endocrinologists and researchers. Research groups based in Finland and Italy were each awarded a grant for innovation projects in the field of growth and growth disorders.

BIOPHARMA PIPELINE

as of December 31, 2018

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 (MET kinase inhibitor)	Non-small cell lung cancer	Phase II
Tepotinib (MET kinase inhibitor)	Hepatocellular cancer	Phase II
M2698 (p70S6K and Akt inhibitor)	Solid tumors	Phase I
M3814 (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
Immuno-Oncology		
Avelumab (anti-PD-L1 mAb)	Non-small cell lung cancer, 1st line	Phase III
Avelumab (anti-PD-L1 mAb)	Gastric cancer, 1st line maintenance	Phase III
Avelumab (anti-PD-L1 mAb)	Ovarian cancer, 1st line	Phase III ²
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 carcinoma, 1st line	Phase II
Avelumab (anti-PD-L1 mAb)	Solid tumors	Phase II ³
Avelumab (anti-PD-L1 mAb)	Non-small cell lung cancer	Phase II ³
Avelumab (anti-PD-L1 mAb)	Urothelial cancer	Phase II ³
Abituzumab (pan- α v integrin inhibiting mAb)	Colorectal cancer, 1st line	Phase II ⁴
M7824 (anti-PD-L1/TGF- β trap)	Non-small cell lung 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
M7824 (anti-PD-L1/TGF- β trap)	Solid tumors	Phase I

BIOPHARMA PIPELINE

as of December 31, 2018

Therapeutic area	Indication	Status
Compound		
Immunology		
Sprifermin (fibroblast growth factor 18)	Osteoarthritis	Phase II
Atacept (anti-BLYS/anti-APRIL fusion protein)	Systemic lupus erythematosus	Phase II
Atacept (anti-BLYS/anti-APRIL fusion protein)	IgA nephropathy	Phase II
Evobrutinib (BTK inhibitor)	Rheumatoid arthritis	Phase II
Evobrutinib (BTK inhibitor)	Systemic lupus erythematosus	Phase II
M1095 (ALX-0761, anti-IL-17 A/F nanobody)	Psoriasis	Phase II ⁵
M6495 (anti-ADAMTS-5 nanobody)	Osteoarthritis	Phase I
M5049 (immune receptor inhibitor)	Immunology	Phase I
General Medicine		
M5717 (PeEF2 inhibitor)	Malaria	Phase I

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.

¹ As announced on July 30, 2018, the U.S. Food and Drug Administration (FDA) accepted the resubmission of the New Drug Application (NDA) for cladribine tablets.

² Avelumab in combination with talazoparib.

³ Avelumab combination studies with talazoparib, axitinib, ALK inhibitors, chemotherapy or novel immunotherapies.

⁴ As announced on May 2, 2018, in an agreement with SFJ Pharmaceuticals Group, abituzumab will be developed by SFJ for colorectal cancer through Phase II/III clinical trials.

⁵ 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.

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	<i>Plasmodium</i> eukaryotic elongation factor 2
PK	Protein kinase
TGFβ	Transforming growth factor β

Allergopharma

Allergopharma, our allergy business, is one of the leading manufacturers of diagnostics and prescription drugs for allergen immunotherapy. As experts, we are determined to fully understand allergies as well as be able to discover new solutions and therapeutic concepts. In close cooperation with research institutions and other partners throughout the world, we gain valuable insights regarding the complex immunological mechanisms responsible for allergy development. And we pursue new paths in developing innovative treatments. Thus, we want to create the best conditions today for the next generation of products for optimally taking care of patients suffering from allergies.

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 1,750 employees working in various R&D functions around the world.

In 2018, we continued to focus on delivering the promise of accelerating access to health for people everywhere. We launched nearly 13,000 products, including nearly 6,000 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

Advancing the global availability of our CRISPR technology

In early 2018, we received two patents for our CRISPR technology: the first from the Korean Intellectual Property Office and the second from the Israel Patent Office. These patents address cutting of the chromosomal sequence of eukaryotic cells (such as mammalian and plant cells) and insertion of an external or donor DNA sequence into those cells using CRISPR.

In April, we were granted a patent for this CRISPR insertion technology in China. Shortly thereafter, a paper we co-authored entitled, "Ethical Considerations in the Manufacture, Sale and Distribution of Genome-Editing Technologies," was published in *The American Journal of Bioethics*. The paper highlights the importance of science-based bioethics in genome editing and novel processes to ensure products meet the highest standards.

To complete an active year advancing the intellectual property (IP) of our CRISPR technology, in October and December, respectively, we were awarded Australian and European CRISPR patents for foundational genome-editing technology. The patents covered paired Cas9 nickase technology to reduce off-target effects, advance gene therapy and research. A second patent covering CRISPR insertion was also awarded to our company by the European Patent Office in December.

These patents expand the foundational CRISPR cutting and integration IP necessary to correct genetic defects in gene therapy patients and to fix diseased genes while not affecting healthy ones. Further, this allows us to license CRISPR-related patents to interested parties and further supports genome-editing research under ethical and legal standards. In total, we have achieved foundational CRISPR patents in seven markets, including Canada and Europe.

Partnerships and agreements to broaden our reach

In March, we signed a Memorandum of Understanding (MoU) with Schneider Electric, a global specialist in energy management and automation. The MoU aims to automate biopharmaceutical processes for China's biopharmaceutical industry and to help our biopharma customers in their quest for reliable, less expensive and better medical solutions.

In May, we announced a collaboration with Solvias, a Swiss contract research and service provider, to offer our PyroMAT™ System, a new Monocyte Activation Test (MAT) kit for pyrogen detection. The system offers a high-quality, ready-to-use in vitro method that does not require live animal testing and detects the broad spectrum of pyrogens. The new kit also eliminates the laboratory work required to maintain the cell line.

In June, we signed an agreement with HistoCyte Laboratories Ltd, Tyne and Wear, United Kingdom, to be the exclusive multinational distributor of the company's portfolio of cell lines in the United States and other select geographies. For our customers, the agreement provides a cost-effective and practical solution to the problem of tissue heterogeneity.

As we began the second half of 2018, we entered into a global cooperation agreement with InnoCore Pharmaceuticals to provide its proprietary SynBiosys® biodegradable polymer platform to develop sustained release solutions for biologicals in injectable formulations. This proprietary technology allows the development of injectable sustained release biological formulations with conserved bioactivity of these sensitive molecules.

An expanded portfolio to benefit our customers

We launched innovations across all segments of our portfolio throughout 2018. In January, Applied Solutions released Steritest NEO, a new product that replaces the current Steritest EZ for sterility testing, which is a flagship for our business. In February, Process Solutions introduced Viresolve® Barrier capsule filters designed to remove viruses, mycoplasma and bacteria from cell culture media, protecting against bioreactor contamination. These filters are a key component of our Viral Safety Assurance program to mitigate the risk of viral contamination in upstream bioprocesses and minimize the potential impact on drug supply and patient safety.

In April, Applied Solutions launched our new CellStream™ bench-top flow cytometry system, a compact, customizable flow cytometer that uses a camera for detection. The system expands the limits of sensitivity, allowing scientists to tailor their instruments to their needs in immunology, cancer research and many other areas.

In May, Applied Solutions also released its new PyroMAT™ in vitro system for Pyrogen Detection, a new robust and sensitive solution for pyrogen detection. It is the only cell-line based Monocyte Activation Test (MAT) provided as a ready-to-use kit on the market, providing an alternative to animal-based testing. In July, we released Milli-Q® HX 7000 SD, a new series of all-in-one water purification systems to purify, store, distribute, monitor and control a type 2 pure water supply entirely from one Milli-Q® HX 7000 SD system.

Over the course of 2018, we expanded our nanomaterials portfolio with the launch of more than 250 new products. Our portfolio includes inorganic and carbon nanomaterials for biomedical applications, novel 2D inorganics and alternative energy materials for use in flexible electronics, implantable wearable sensors, batteries and solar energy generation.

Nanomaterials possess unique properties that drive the development of advanced technology. In biomedical research, nanomaterials are used to develop probes for high-sensitivity assays and imaging. In theranostics, innovative nanomaterials enable breakthroughs in nanomedicines for cancer therapies by improving therapeutic efficacy and tumor-specific delivery, and minimize side-effects to improve patient care. In applications beyond life science such as energy and electronics, the unique properties of nanomaterials enable more vibrant displays; they will also make enhanced energy storage and flexible and wearable electronics a reality.

In September, Process Solutions announced three new products to help biomanufacturers navigate the evolving biopharma landscape with increased speed, greater flexibility and enhanced quality. The Eshmuno® CP-FT resin is a first-of-its kind CEX chromatography resin for the flow-through removal of aggregates from mAb therapeutics. Two modified amino acids (Phospho-L-Tyrosine Disodium Salt EMPROVE® EXPERT, L-Cysteine S-Sulfate Sodium Sesquihydrate EMPROVE® EXPERT) simplify feeding and reduce total volume in cell culture.

In October, Applied Solutions released the new Milli-Q® IQ 7003/7005 Integrated Ultrapure & Pure Water System. It is a fully integrated Type 1 and Type 2 water purification solution that is intelligent, easy to use and environmentally friendly.

In November, Process Solutions launched its new BioContinuum™ platform to advance biotherapeutic drug manufacturing through improved efficiency, simplified plant operations, and greater quality and consistency. This continuous bioprocessing platform integrates what are typically batch-based, separate manufacturing steps into a connected process, enabling continuous flow from the addition of raw materials through product harvest, purification and testing. Pilot studies suggest that conversion to continuous manufacturing may reduce manufacturing costs by up to 50%.

Recognized for award-winning innovation

As a result of our long-standing efforts in Asia, in March we were named the “Best Bioprocessing Supplier” and we received the “Best Bioprocessing Supplier Award for Single-use Systems” at the Asia-Pacific Bioprocessing Excellence Awards 2018 ceremony in Singapore.

In April, our Millistak+® HC Pro portfolio won an INTERPHEX Exhibitor Award for Best Technological Innovation. The Millistak+® HC Pro portfolio is a family of synthetic depth filters providing cleaner, more consistent depth filtration media than other DE- and cellulose-based filter offerings.

In October, we won two 2018 Convention on Pharmaceutical Ingredients (CPhI) awards. Our Parteck® MXP Excipient won the “Excellence in Excipients” category and our modified amino acids won the “Excellence in Bioprocessing and Manufacturing” category.

In November, our BioReliance® Viral and Gene Therapy Assay Portfolio and proxy-CRISPR technology took top honors for innovation at the R&D 100 Awards. These awards honor the 100 most innovative and significant technologies introduced in the past year. Over the past six years, we have won nine R&D 100 awards.

Performance Materials

With our Performance Materials business sector, we are the market and technology leader in most of our businesses. As a science and technology company we are, in many cases, able to offer innovative products and solutions, which allow us to stand out from the competition. Successful Research & Development (R&D) is therefore a material part of the strategy deployed by Performance Materials. In 2018, the part of our R&D activities that is not close to the products in the business units was combined with a central innovation unit, Early Research & Business Development. Our goals in taking this step were to sharpen our focus on our customers' needs as well as to centrally decide on the assessment of projects and the related use of resources as part of an integrated approach to research and development.

The unit develops a technology vision for Performance Materials and supports the business units in identifying projects with growth potential and tapping new markets. We evaluate the economic success of our projects and expand our activities to encompass neighboring areas in growing markets.

Display Solutions

In our Display Solutions business unit, our liquid crystal technology UB-FFS (ultra-brightness fringe-field switching) continues its successful growth thanks to new product qualifications and rising demand in the liquid crystal displays (LCD) sector for mobile devices, especially mobile phones and tablet PCs.

The development of high-resolution 4K and 8K TV sets continues to pose a challenge to the light efficiency of LC displays. We are therefore actively working to expand UB-FFS technology with our UB-Plus liquid crystal materials.

Our aim is to increase the efficiency of applications for large-format TV sets and display panels by 10% to 15%. The liquid crystal technology PS-VA (polymer-stabilized vertical alignment) remains predominant when it comes to large-format TV sets. Here, our latest materials provide additional performance benefits and improve the processing efficiency in the production of TV sets that are based on PS-VA technology. Moreover, we have successfully demonstrated our manufacturing expertise with respect to the new liquid crystal technology SA-VA (self-aligned vertical alignment). We are now focusing our attention on applications for specialized display products from

the premium segment through to TV applications produced in large numbers, as this technology offers the high contrast and image quality of the PS-VA technology while also enabling improvements in display design and panel production, for example through the reduction of waste and energy consumption in the production of LCDs.

Semiconductor Solutions

The technology area of gas-phase deposition materials (such as atomic layer deposition, ALD) is an area with high growth rates for our Semiconductor Solutions business unit. Thanks to increased research activities in collaboration with original equipment manufacturers and chip producers, we are steadily improving our positioning. Our research projects seek to identify new materials for metallization processes with low resistance and various dielectric characteristics for faster and better processors, servers and data storage density.

We have also invested in the development of advanced removers used in the photolithographic process to provide customers with a green alternative in compliance with upcoming environmental regulations.

We are currently refocusing our product portfolio to better meet the requirements of our customers operating in various compound semiconductor markets such as sensors, radio frequency filters or integrated circuits. Our conductive paste materials offer value propositions to our customers as compared with existing interconnect materials, which are reaching end-of-life status.

To better support our customers, we have expanded our research capacities in the United States, Germany and Taiwan, and are planning further research and production capacity expansions in Korea, Japan and China.

Surface Solutions

In our business with pigments for the automotive industry, we are currently focusing on the development of achromatic pigments. The latest example is our Iriodin® Icy White Pristine for silky, three-coat white stylings. Furthermore, we have expanded our regional application labs to better support the marketing of our innovative clear-coat additives, for example those manufactured on a polysilazane basis. As part of the Smart Effects initiative, we are focusing the development of cosmetic pigments on matte effects (Allure series) and luster effects (Lights series). In addition, active ingredients of natural origin are a focal topic for new cosmetic solutions.

People

“Bring Your Curiosity to Life” – our promise as an employer describes how we collaborate, how we advance our business, how our employees can develop within the company and who we are. Our development into a global science and technology company over the past 350 years would not have been possible without the passion, creativity and curiosity of our employees. And we are certain that our current and future employees safeguard our economic success. They create innovations for patients and customers, and secure our ability to compete. For this reason, the development of all our employees is such an important concern to us. In short, we are working to create an environment where people are able to develop and to reach their full potential.

A career with Merck KGaA, Darmstadt, Germany, is enriching – both from a professional and a personal perspective. We offer the necessary framework conditions that meet the individual needs of our employees, that encompass an exciting range of tasks and advanced training possibilities, furthering flexible forms of cooperation and a culture of mutual esteem and respect. The latter is particularly important as our workforce represents a broad range of nationalities, cultures, religions and age groups as well as a variety of personal and professional backgrounds. We are convinced that this diversity paired with a corporate culture based on mutual respect strengthens our innovative potential and contributes to our success.

OVERVIEW OF OUR HEADCOUNT FIGURES

As of December 31, 2018, we had 51,749 employees worldwide¹ (2017: 52,941). In 2018, we were represented by a total of 207 legal entities with employees in 66 countries.²

DISTRIBUTION OF EMPLOYEES

by region



Driving innovation through curious people

As a science and technology company, we are always looking for new solutions and working to continuously evolve our approaches. Engaged, curious employees are key to our ability to innovate – and therefore also for our success. We need a corporate culture that broadens the knowledge base of our employees, one that creates exciting opportunities and motivates them to take a proactive role in shaping the development of our company.

FOSTERING INNOVATIVE POTENTIAL

Curiosity and a focus on new ideas provide a fruitful basis for innovation and have a positive impact on company performance. In order to create a place – supplementing classic research and development, where we can develop ideas into viable businesses beyond the current scope – we opened the modular Innovation Center in Darmstadt back in 2015. It serves as the prototype for our Innovation Center that we opened in March 2018 as part of the 350-year anniversary festivities. The Innovation Center offers our employees the opportunity to explore new ideas in an inspiring setting and to work on selected projects. Sufficient scope and adequate support, also in the form of a suitable working environment, actively promote the innovative strength of our employees. The strategic orientation of our innovation activities is determined by innovation fields that are related to our business fields and provide potential for revolutionary technologies and business ideas. In 2018, in addition to the existing innovation field of Biosensing and Interfaces, we defined two further fields: Clean Meat and Liquid Biopsy technologies.

In order to contribute external ideas and offer the opportunity of open innovation for our innovation projects, we are building strong relationships with external partners in all industries and target the start-up community via our Accelerator.

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. In 2018, initial projects in the Innovation Center reached a milestone by becoming minimum viable products. This includes a solution where our company anchors real objects, such as products, in a blockchain to make supply chains secure and thus protect companies as well as end consumers.

¹The Consumer Health business was transferred to Procter & Gamble (P&G) on December 1, 2018, and was already classified as a discontinued operation according to IFRS 5 in April 2018. With the completion of the sale, around 3,300 employees joined P&G.

²The 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.

VALUING CULTURAL DIVERSITY

We are a global science and technology company with employees who represent a varied cross-section of gender identities, nationalities, cultures, religions, age groups and sexual orientations. They contribute their professional backgrounds, individual life experience and perspectives to their work. We believe that a diverse workforce – paired with a respectful corporate culture – strengthens our ability to innovate and contributes significantly to our business success.

Our Chief Diversity Officer is responsible for the strategic management of diversity and inclusion. The Diversity Council, a body consisting of senior leaders from all business sectors and selected Group functions, is specifically working on the implementation of our diversity strategy, revised in 2018. Key elements of this are recruiting people representing a breadth of qualifications, skills and experiences as well as developing and retaining these people. 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 (lesbian, gay, bisexual, trans, intersex, questioning) community as well as African-American and international employees. Our carer network brings together employees from all over the world who care for a relative.

Our aim is to raise awareness for diversity and inclusion among our employees. We piloted initial training sessions in 2018 to create awareness of unconscious bias, which will be rolled out globally in 2019. Accordingly, around 380 employees have already been given the opportunity to identify their own unconscious thought patterns and stereotypes to help them avoid any unconscious unfair treatment resulting from such bias. We also introduced the Job Analyzer, an online tool that allows job advertisements to be checked for critical wordings prior to their publication, thus fostering gender-neutral communication with those applying for jobs.

As a global employer with intercultural expertise, people from a total of 136 nations work for our company; 24.1% of our employees are German citizens and 73.9% of our employees work outside Germany. At our headquarters in Darmstadt, 11% of our staff comes from 89 different countries.

Women currently make up 44% of our 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 to the society in Germany as well as several other EU countries, the United States, China and Japan. The average age of our employees is slightly above 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 multi-faceted continuing education throughout our employees' careers.

In Germany, we signed the "Charta der Vielfalt" (Diversity Charter) in 2013, the "Charta der Gleichstellung" (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 in 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 develop current and future employees and offer them interesting advanced training opportunities in order to prepare them for 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. This process enables us to offer employees better development opportunities. 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, supervisors, Human Resources and new employees can exchange information and documents before their 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 2018, we again maintained a constant, high vocational training rate in Darmstadt, our largest site. A total of 562 young people were enrolled in vocational training in 24 different occupations at our headquarters in the reporting period. We give unlimited employment contracts to all employees in vocational training who work in occupations for which we have sustainable demand. On average, the post-vocational training 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 60 young employees participated.

We promote the professional and social expertise of our employees in vocational training through numerous regional and global project activities. This included the support of a foundation for street children in South Africa in 2018. Furthermore, through our “Start in die Ausbildung” (Starting vocational training) program, we help prepare young people who have not been able to find a vocational training position. The number of interns increased slightly compared to the previous year with 21 participants aged between 16 and 25 years. Although they have a school leaving qualification, they had been searching for a vocational training position 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 twelve young people who were forced to flee their home countries started language, technical, cultural, and career-related 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 ongoing 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.

Furthermore, we have established our “Science Network”. Due to the broad positioning of our company, we do not have a central research and development organization that unites expertise across our businesses. Through this project we are promoting the establishment of a science community within the company to accelerate the exchange of innovative ideas and facilitate collaboration among all our R&D employees. One element of this project is the “Continuous Performance Dialogues” between 1,300 employees and their supervisors to align performance and potential appraisals with research and development needs. Other aspects focus on the advanced training of experts and their career paths and on the transfer of knowledge within the network.

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 2018, more than 4,100 employees participated. Digital solutions in the form of more than 3,735 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 globally standardized development plan.

Individual development opportunities are also supported by our job architecture. It applies globally and enables us to harmonize all positions and to simplify their classification. This job architecture defines three fundamental career types: managers, experts and project managers. They are all equivalent. 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 managers is to motivate and encourage employees to show their innovative strength. A dialog 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 managers can build a strong culture of collaboration based on curiosity, creativity and trust. In addition, our leaders are expected to set an example by living our company values and taking responsibility for their own decisions. Based on this competency model, we have defined six leadership behaviors that summarize the conduct we expect from our leaders.

To assess the performance and potential of every individual and to establish an effective leadership culture, regular and differentiated feedback is of utmost importance. In this way, employees and supervisors can develop a shared vision, execute the business strategy and further develop a unifying corporate culture.

USING THE OPPORTUNITIES PROVIDED BY DIGITALIZATION

The digital transformation has been leaving its mark on the world of work for a long time now. New, agile ways of working are thus increasingly gaining in importance. At our company, we want to support this trend actively, which is why we are offering our employees many opportunities for digital and innovative working.

Using the big data applications developed by People Analytics within Human Resources, managers receive quick and targeted answers to personnel-related questions. In addition to the traditional master data, the software also holds information on compensation, performance and potential as well as on commitment or succession planning and is able to link this data. This means that leaders have a comprehensive data set at their disposal, which they are able to use taking into account data protection provisions. The analyses are based on algorithms and allow the early identification of trends (predictive analysis) and data-based decisions.

Our manager and employee self-services are another good example of modern working methods. Employees can use these services to manage their own data, retrieve information and perform personnel-related tasks independently.

Digitalization also features in our training and advanced training programs as IT skills are becoming increasingly important. At the same time, digital media create new ways of learning. For this reason, we are integrating topics such as 3D printing and artificial intelligence into our training content with increasing frequency. We are also increasingly relying on new kinds of learning and innovation methods, such as scrum or design thinking.

DIVERSITY AND MANAGEMENT

In order to manage our global and diverse organization, we need managers who can build international teams and promote international collaboration so as to contribute to a productive and flexible working environment. 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 our company, 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 2018, 63.6% of our executives were not German citizens. Altogether, 70 different nationalities are represented in such positions.

Our goal for the period until 2021 is to maintain the proportion of women 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, during the reporting period 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 2018, women occupied 32.3% 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 (AktG) can be found in the Corporate Governance section of this report.

MANAGEMENT PROGRAMS FOR EXECUTIVES

We use targeted advanced training to nurture our top talent and senior executives. The eight-month International Management Program strengthens the leadership competencies and global thinking of top talent at the start of their career. In cooperation with leading international universities, our Company University has been offering a cross-regional, modular advanced training program since 1999. To date, 397 members of top management have taken part. Furthermore, our company cooperates globally with academic institutions in order to support employees who wish to earn an MBA. In 2015, we launched management programs specifically for people managers in growth markets, which focus on business management and Group-

specific topics. These programs are offered in China, the Middle East, Africa and Latin America, for example. Moreover, in 2018 we ran the “Managerial Foundation Program” (MFP) for new people managers in 20 countries with 795 participants. The “Advanced Management Program” (AMP) for experienced leaders (“managers of managers”) builds on the MFP and was attended by 242 people managers in five countries. For the top management we also offer a “Global Leadership Program” (GLP). This program addresses issues such as leadership culture and prepares participants for the leadership challenges of tomorrow. Since 2016, 678 leaders have participated in the GLP.

In 2018, we once again expanded our workforce pool to internally fill management positions when they become vacant. In 2018 once again, most management position vacancies were filled by internal candidates. 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 stabilize their long-term satisfaction at a high level, 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. We plan to roll out a Group-wide guideline on flexible working in 2019. At present, we offer our employees at many sites around the world various flexible and innovative working models. The Mywork at Merck KGaA, Darmstadt, Germany, working model allows employees at the German sites in Darmstadt and Gernsheim, for example, 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, 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 Selbst-medikation GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, and Merck Chemicals GmbH GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. Employees no longer record their time electronically and must document their hours only if they exceed their standard working hours within the agreed working time framework. At the end of December 2018, a total of 5,698 employees made use of this model. In 2018, 4.8% of our employees worldwide worked part-time, 12.5% of whom are men.

By offering information, advice and assistance in finding childcare and nursing care 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. For example, a daycare center has been operating at the Darmstadt site, looking after children between the ages of one and twelve, for over 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. 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 fringe benefits feature globally under the internal “benefits4me” brand. Its offerings comprise three pillars:

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

Specific benefit packages are in place at a national level to meet the different needs of our employees using well-established management mechanisms. 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 the highest 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 1.3 in 2018, we overachieved 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 achieve a steady improvement in the current situation. 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 2018, 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 2018, it was awarded to 62 out of 90 sites.

REGULAR GLOBAL EMPLOYEE SURVEYS

We want to create a working environment that empowers our employees to think outside of the box and find new solutions, opening the door to creative ideas and the discovery of new market opportunities. In order to promote this and to allow us to carry out even better comparisons both within the company and with our competitors, we conduct Group-wide employee engagement surveys every year. In this way we ensure a regular exchange between employees, leaders and the top management. The honest feedback we receive from staff shows us whether the aforementioned measures and initiatives are successful as well as highlighting areas where we can improve further.

In October 2018, the global employee engagement survey was again conducted in 22 languages and the status of implementation reviewed. Around 45,000 employees (86%) took part. Our Group-wide score, which indicates how attached our employees feel to the company, was 61%. We are thus on a par with other pharmaceutical and chemical companies. These surveys are supplemented by smaller “snapshot surveys”, where employees are asked about selected strategic issues or projects.

The results are used to identify strategic focus areas and they feed into the company-wide work on an ongoing basis.

OVERVIEW OF EMPLOYEE FIGURES¹

		Group (overall) Dec. 31, 2016	Group (overall) Dec. 31, 2017	Group (overall) Dec. 31, 2018 ²
Number of employees	global, total	50,414	52,941	51,749
	Asia-Pacific (APAC)	10,754	11,294	10,486
	Europe	24,438	25,980	25,792
	by region Latin America	4,140	4,050	3,340
	Middle East and Africa (MEA)	1,045	1,097	1,153
	North America	10,037	10,520	10,978
Number of employees (FTE – full-time equivalents)	global, total	49,652.7	52,223.5	51,039.8
	Asia-Pacific (APAC)	10,725.3	11,272.1	10,462.9
	Europe	23,727.1	25,302.5	25,126.8
	by region Latin America	4,136.5	4,046.2	3,339.5
	Middle East and Africa (MEA)	1,041.8	1,096.1	1,151.1
	North America	10,022.0	10,506.7	10,959.6
Number of countries		66	66	66
Number of legal entities	global, total	215	217	207
Number of nationalities	global, total	129	131	136
Number of nationalities working in Germany		91	97	95
Percentage of employees with German citizenship		23.1%	23.2%	24.1%
Percentage of employees working outside Germany		75.3%	74.9%	73.9%
Percentage of employees with global managers		9.7%	10.2%	10.6%
Percentage of women in the workforce	global, total	42.8%	43.1%	44.0%
	in Germany	38.6%	39.1%	38.9%
Percentage of women in leadership positions (= role 4 or higher)	global, total	28.8% ³	30.3% ³	32.3% ⁵
	in Germany	28.7% ³	29.7% ³	30.9% ⁵
Percentage of executives (= role 4 or higher)	global, total	5.7% ³	6.0% ^{3,4}	6.5% ⁵
	Percentage of executives who are not German citizens	64.7% ³	64.4% ³	63.6% ⁵
	Number of nationalities	70 ³	65 ³	70 ⁵
Number of employees in vocational training in Germany		576	588	604
Vocational training rate		5.1%	4.4%	4.1%
Number of employees in the model (Germany) of the Mywork at Merck KGaA, Darmstadt, Germany		4,507	5,267	5,698
Percentage of employees working part-time	global, total	4.7%	4.6%	4.8%
	Men	10.6%	10.7%	12.5%
Percentage of employees aged 17 – 29 years	global, total	14.7%	14.5%	14.5%
Percentage of employees aged 30 – 49 years	global, total	62.5%	62.1%	61.1%
Percentage of employees aged 50+	global, total	22.8%	23.4%	24.4%
Average age globally		41.3	41.4	41.7
	Asia-Pacific (APAC)	36.7	36.9	36.9
	Europe	42.4	42.5	42.8
	Latin America	39.9	40.3	40.4
	Middle East and Africa (MEA)	39.3	39.4	39.2
	North America	44.3	44.1	44.1
Average length of service	Germany	42.9	43.0	43.3
	global, total	9.9	9.8	10.0
Average length of service in Germany		14.2	14.0	14.5

¹ The Group also has employees at sites that 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 The Consumer Health business was transferred to Procter & Gamble (P&G) on December 1, 2018, and was already classified as a discontinued operation according to IFRS 5 in April 2018.

³ With the completion of the sale, around 3,300 employees joined P&G.

⁴ Not including Sigma-Aldrich legal entities in Germany or Allergopharma.

⁵ Ratio adjusted retrospectively.

⁶ Not including the Sigma-Aldrich legal entity in Steinheim (Germany) or Allergopharma.