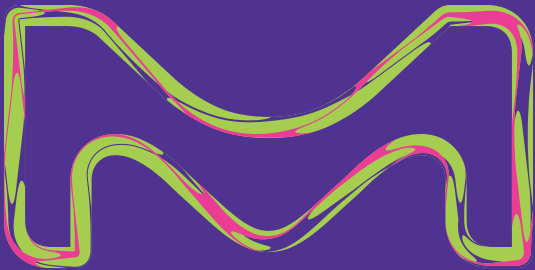




# **MERCK KGAA, DARMSTADT, GERMANY – Q3 2018 ROADSHOW**

Investor Relations

November 2018





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# Agenda

- 01 Business overview**
- 02 Transforming the company**
- 03 Healthcare – Funding for success**
- 04 Life Science – Focusing on profitable growth**
- 05 Performance Materials – Maintaining leadership and innovation**
- 06 Executive summary and guidance**



01

## **BUSINESS OVERVIEW**

Group

## A platform of three high-tech & science businesses to compete in attractive markets



### Leading in specialty pharma markets

- Biologics and small molecules
- Research focus: Oncology, Immunology & Immuno-Oncology



### Leading life science company

- Tools and services for biotech research & production
- Tools and laboratory supply for the academic research and industrial testing

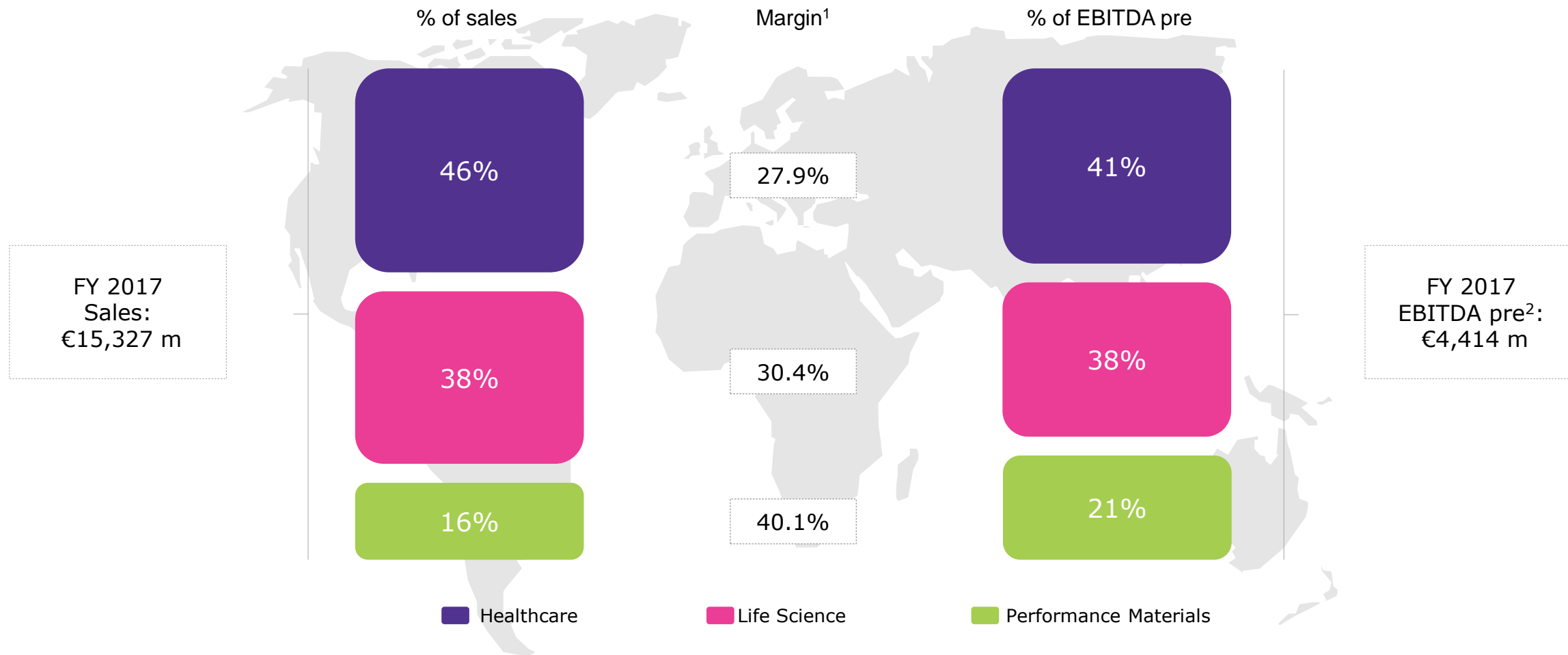


### Leading Company in high-tech solutions

- High-tech solutions and materials for electronics
- Broad portfolio of decorative and functional solutions

# Group

## Strong businesses with attractive margins



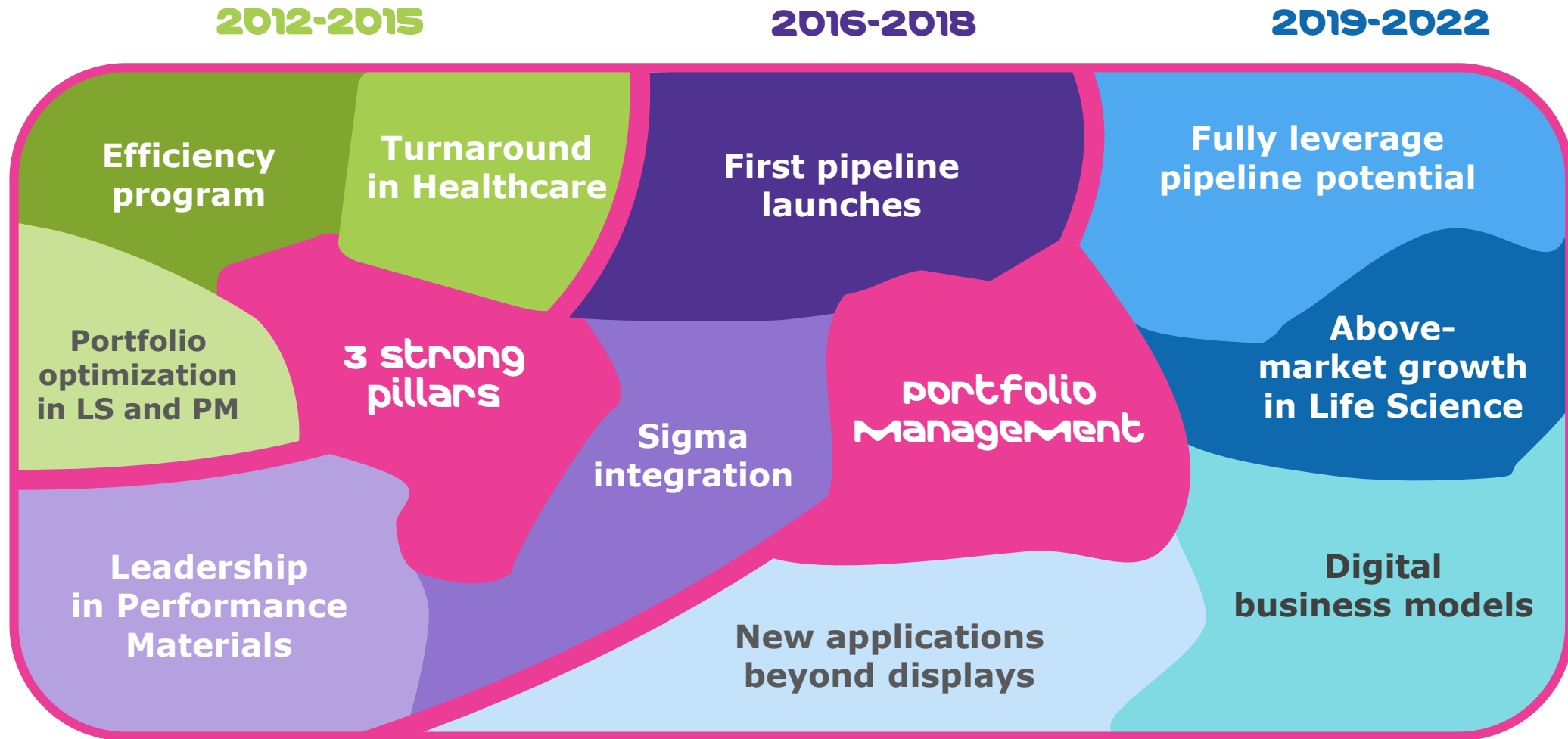
<sup>1</sup>EBITDA pre margin in % of net sales; <sup>2</sup>Including Corporate/Others (-€301 m)



## 02 TRANSFORMING THE COMPANY

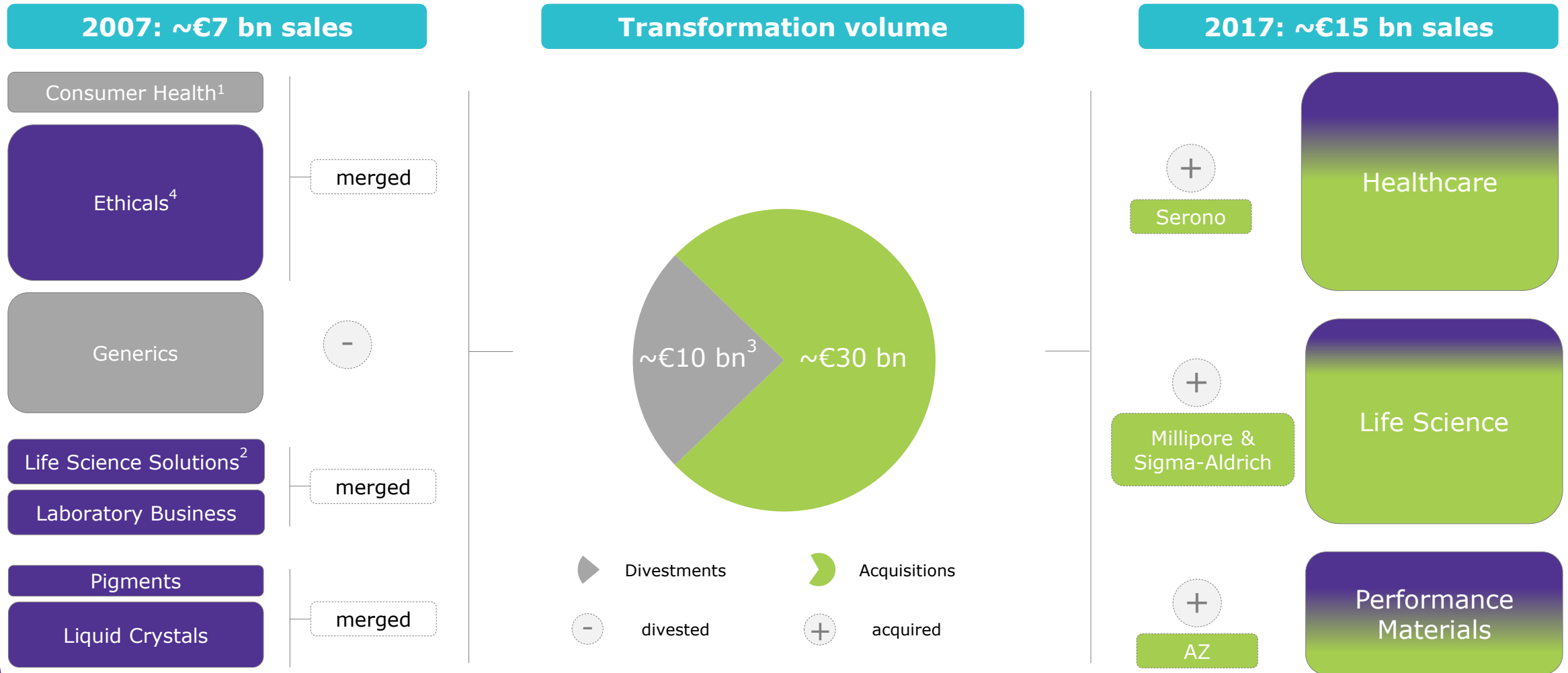


# Group Strategic roadmap 2016-2022



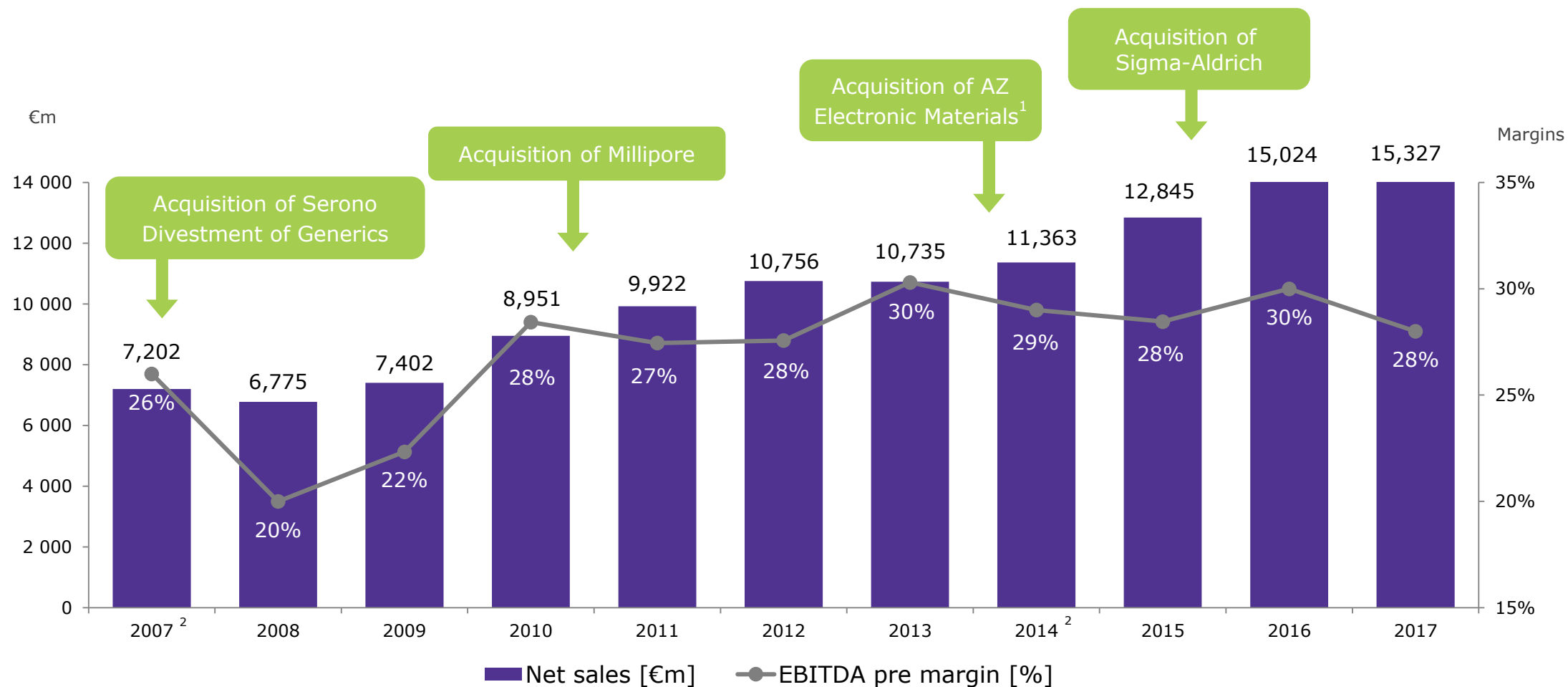
## Group

# We have added scale and strengthened the attractiveness of our portfolio



<sup>1</sup>Consumer Health divestment announced on April 19<sup>th</sup> 2018, closing expected at the end of Q4 2018; <sup>2</sup>Excluding "Crop Bioscience", which was divested; <sup>3</sup>Profroma divestment volume includes cash proceeds for Consumer Health <sup>4</sup>Excluding "Theramex", which was divested;

# Group Profitability improved fundamentally



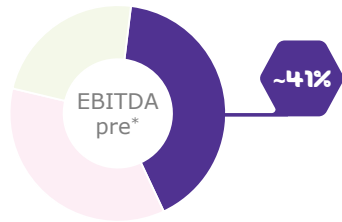
<sup>1</sup>Included since 2 May 2014; <sup>2</sup>2007 and 2014 EBITDA pre margin adjusted for comparability

## Group

# Clear set of priority goals to be realized by 2018



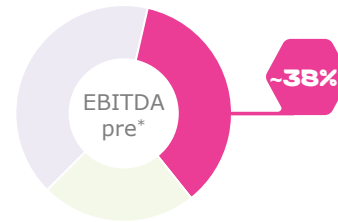
### Healthcare



- Maximize growth of existing franchises
- Deliver pipeline: one product launch or indication p.a. from 2017



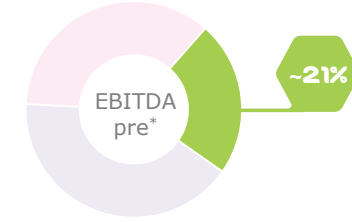
### Life science



- Focus on seamless integration and deliver cost synergies
- Leverage strategic capabilities for value creation



### Performance Materials



- Drive innovation and technology leadership across all businesses
- Innovate in applications also beyond displays

**MERCK KGaA,  
Darmstadt,  
Germany**

- Deleverage to <2x net debt / EBITDA pre in 2018
- No large acquisitions (>€500 m) until end of 2018 (unless financed by divestments)
- Dividend policy that ensures a sustainable and resilient development

\*based on FY 2017 reported EBITDA pre, excluding Corporate & Other

## Regular portfolio review and optimization remains key

- Acquisitions and divestments are part of our history
- Licensing transactions remain on our agenda
- All prior transactions earned their required cost of capital

---

**Regular portfolio review and active capital allocation will continue**

---

**DNA and  
track  
record**

**clear  
criteria**

- Supporting mid-term strategy and strengthening core business
- Growing in attractive markets
- Proven track record: strong ability to win
- Compelling financials:
  - $IRR > WACC$
  - EPS pre accretive
  - Maintain investment-grade credit rating

---

**Disciplined approach to portfolio management will persist**

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# 03 **HEALTHCARE**

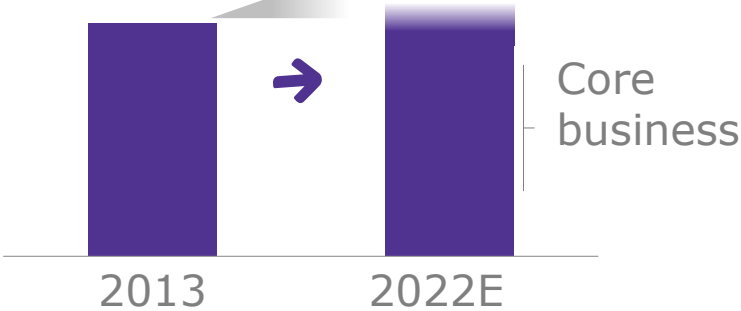
Funding for success

# Healthcare

## Healthcare is set to deliver on promising pipeline candidates

Focus on the pipeline

Deliver organic growth

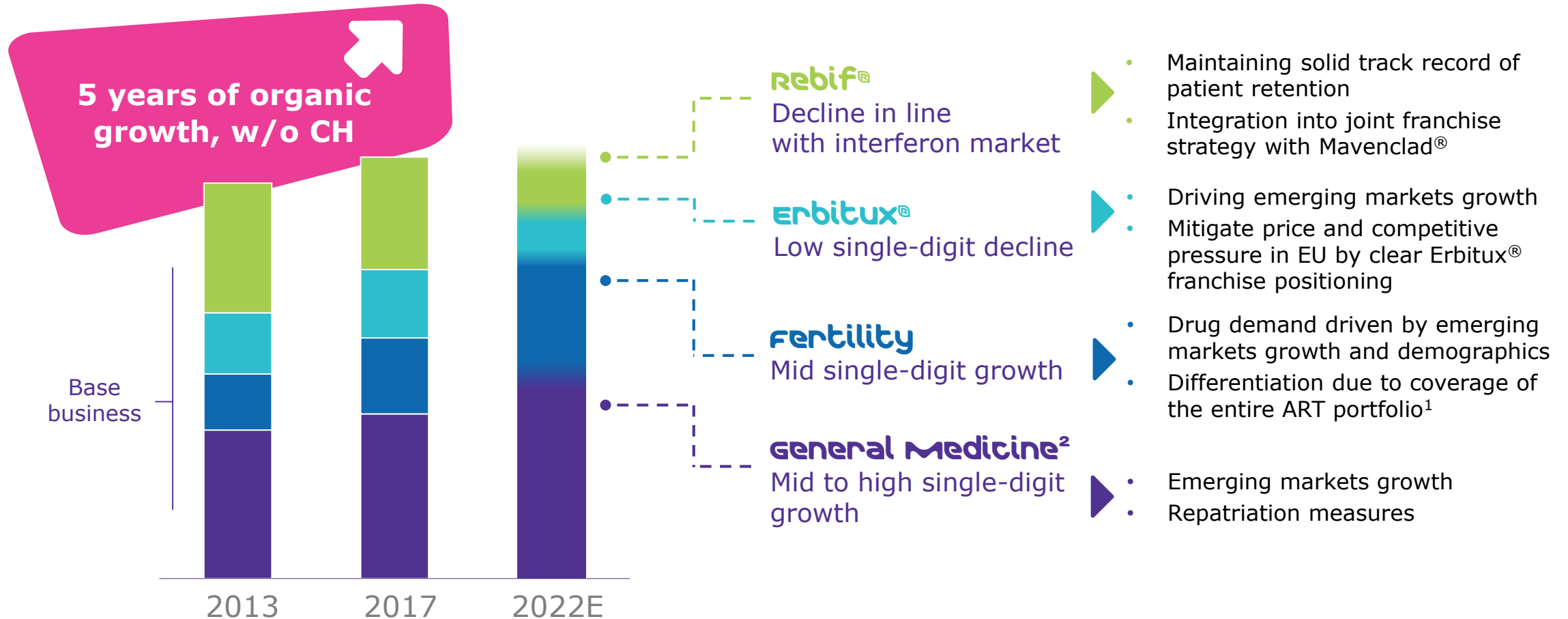


<sup>1</sup>Guidance 2018

# Healthcare

## Ambition to keep core business sales organically stable until 2022

### Healthcare core business net sales until 2022



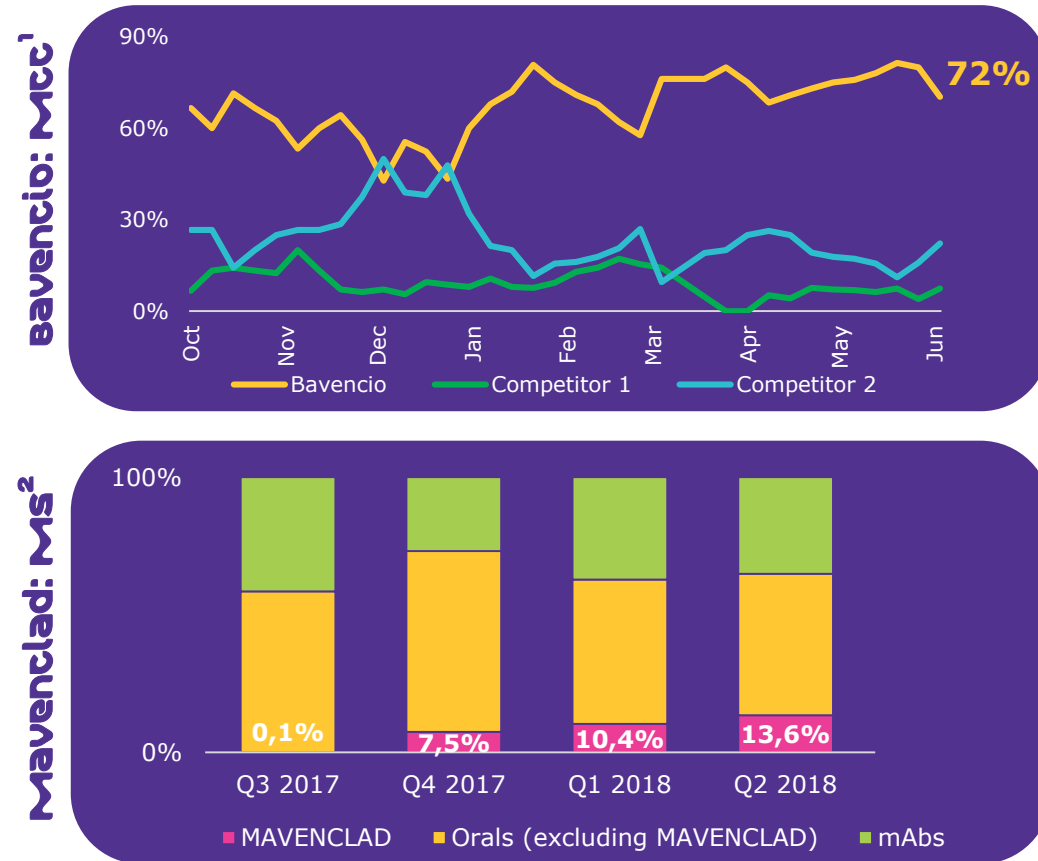
<sup>1</sup>ART: Assisted Reproductive Technology; <sup>2</sup>includes General Medicine, CardioMetabolic Care (CMC), Endocrinology & Allergopharma



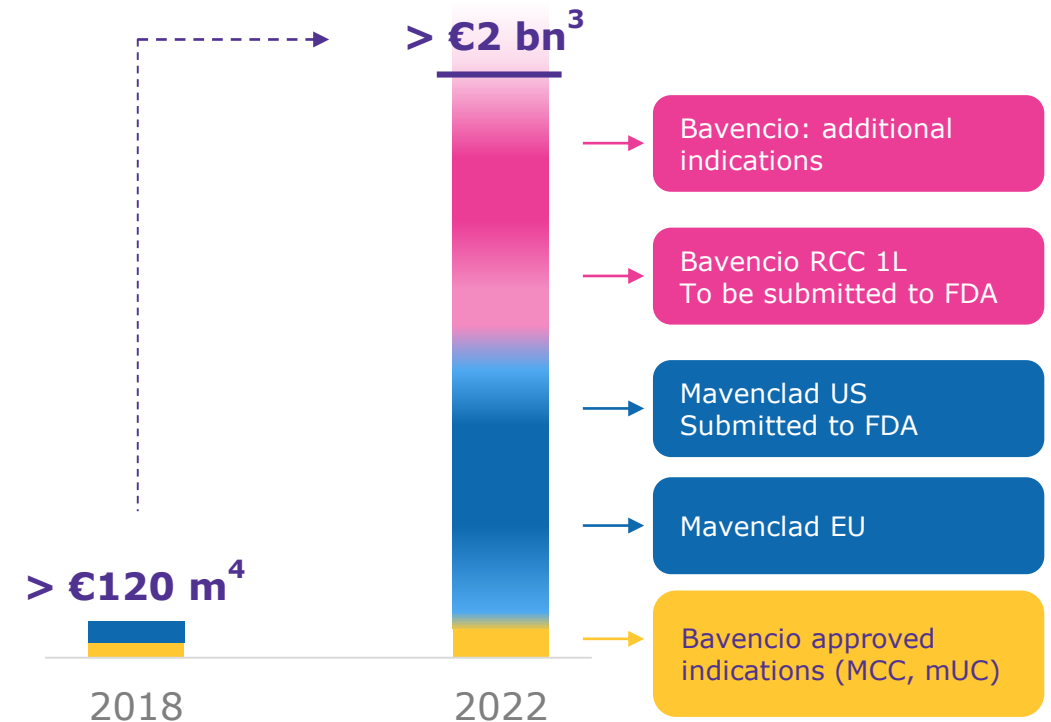
# Healthcare

## Mavenclad<sup>®</sup> and Bavencio<sup>®</sup> are growing well and support €2 bn pipeline target

Recently launched products continue to gain market traction in 2018 ...



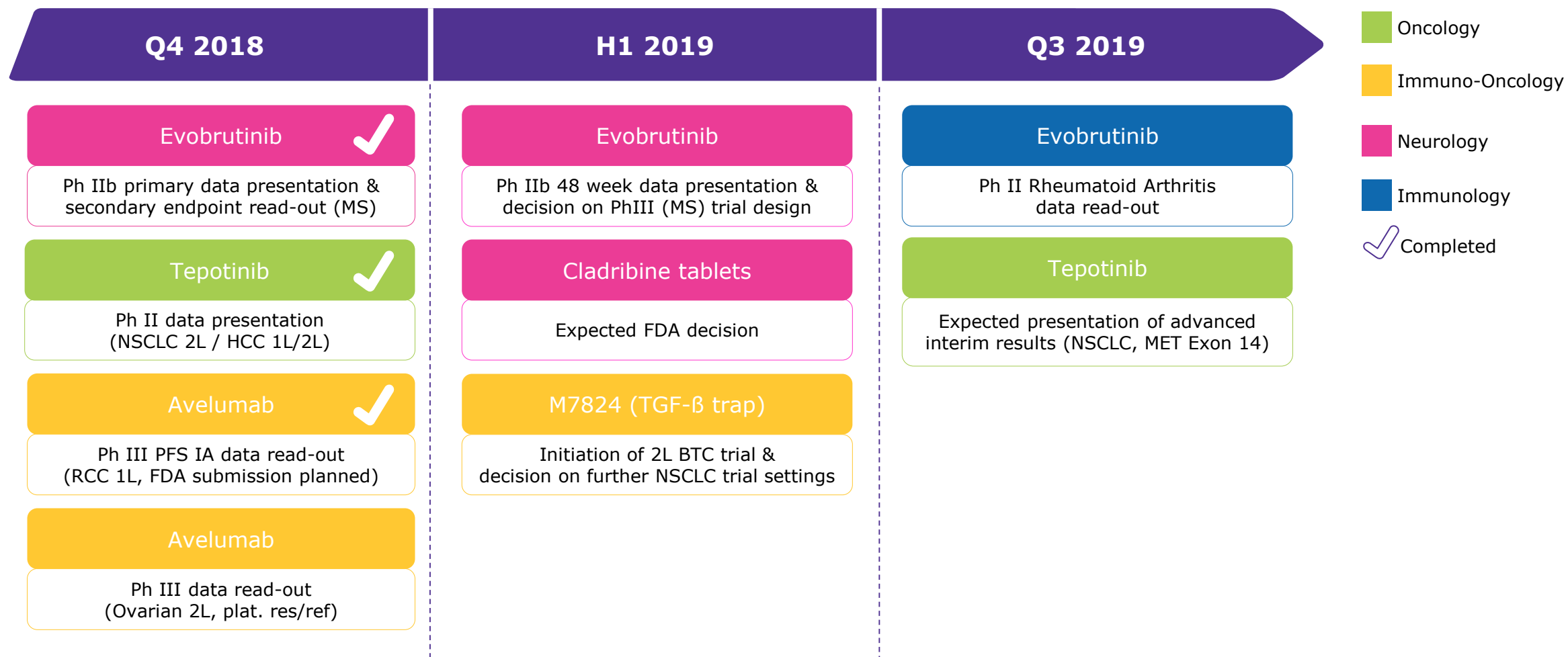
... and support €2 bn pipeline sales ambition for 2022



<sup>1</sup>US: naïve/1L Patient share of IO class in 2018 - Data source: IMS claims data; <sup>2</sup>Germany: share of HE dynamic patients (RMS only) - Data source: actual patients per IMS and shares estimated from IPSOS MS Monitor; Dynamic markets per internal company estimates; <sup>3</sup>Indication, risk adjusted; composition is an illustration and may change subject to data read-outs and registration outcomes; <sup>4</sup>Guidance 2018

# Recent & upcoming catalysts

## An eventful Q4 and a year of continued pipeline development ahead<sup>1</sup>



<sup>1</sup>Note: All timelines are event-driven and may be subject to change; Acronyms: NSCLC – Non small cell lung cancer | MS – Multiple Sclerosis | RCC – Renal Cell Carcinoma | HCC – Hepatocellular Carcinoma | plat. res/ref – platinum resistant/refractory | FDA – U.S. Food and Drug Administration | IA – Interim Analysis



## **LIFE SCIENCE**

Focus on profitable growth

## Life Science

### Serving customers across the highly attractive life science industry

#### RESEARCH

~€45-50 bn

Low single-digit growth



Academic and government institutions

Biopharma R&D

Industry R&D

#### PROCESS

~€50 bn

High single-digit growth



Pharmaceutical companies

Small biotech

Contract manufacturing organizations

#### APPLIED

~€55 bn

Mid single-digit growth



Diagnostic manufacturers

Clinical testing labs

Food & Beverage manufacturers

**~€150 bn\* market growing at ~4% CAGR**

- Growth in volume of experiments
- Mild growth in academic funding
- Investment in industry R&D

- Drug volume growth
  - from biologics
  - from emerging modalities
- Continued shift to single-use

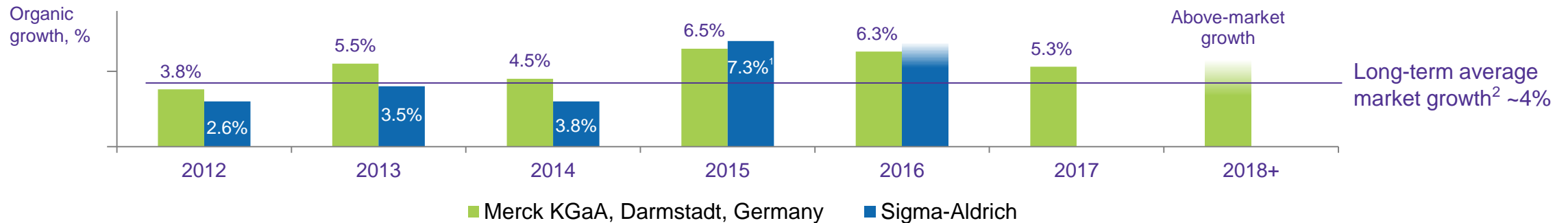
- Volume growth from
  - Population growth
  - Rise in quality standards
  - Increased testing needs

\*Source: Merck KGaA, Darmstadt, Germany estimate 2018

## Life Science

# Above-market growth to be enhanced by top-line synergies

## Merck KGaA, Darmstadt, Germany and Sigma-Aldrich organic growth rates versus market growth



### Sources of market outperformance

1

#### Portfolio composition

- Exposure to biopharma
- Highest share of consumables
- Broad product offering

2

#### Top-line synergies

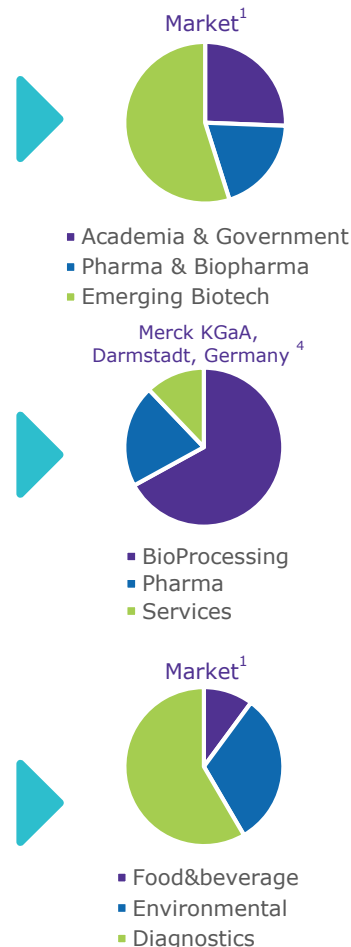
- Best in class eCommerce
- Excellent service capabilities
- Global reach

<sup>1</sup>Growth for 9M 2015 (organic growth of \$152 m on prior 9M 2014 sales of \$2,080 m); <sup>2</sup>Source: Merck KGaA, Darmstadt, Germany market intelligence and broker research

# Life Science

## Business is on track to deliver above-market organic growth

### Life Science



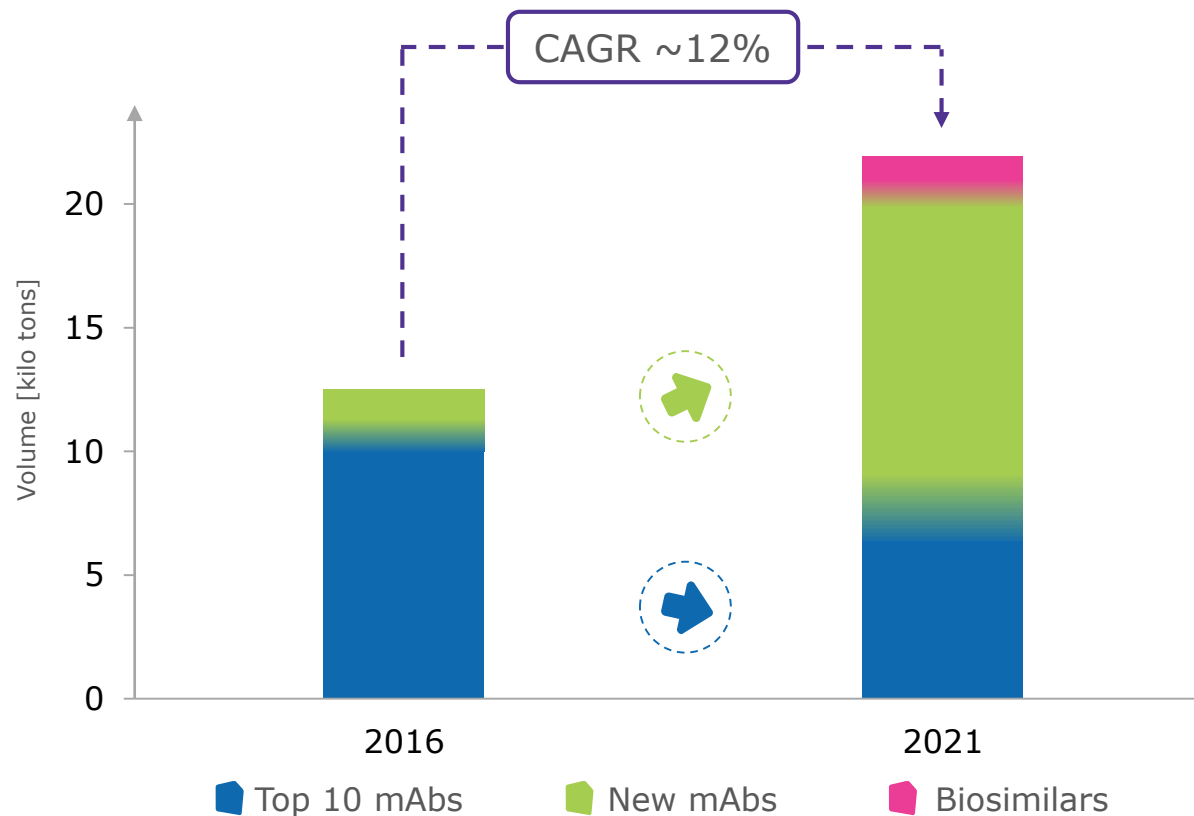
### Long-term growth drivers

- **Research activity:** >3,000 projects in research pipelines<sup>2</sup>, rising number of experiments and newly emerging therapies/technologies backs healthy growth in biotech and CROs<sup>3</sup>
  - **Public and private funding:** availability, access and predictability drive demand from academia and emerging biotech customers
  - **Regulation:** rising requirements foster long-term customer partnerships
- 
- **Biologics:** mAbs production<sup>5</sup> growing by ~12% p.a. for 2016-2021 driven by new molecules and biosimilars
  - **Diversification:** contribution by top 10 molecules will decline to ~30% until 2021 from 80% today<sup>6</sup>
  - **Noval modalities:** innovation in complex-to-deliver therapies, e.g. gene and cell therapy, will drive demand for single-use, end-to-end and new technology solutions
- 
- **Regulation:** testing volumes overall are rising globally rise in quality standards and increased demand for testing across customer segments
  - **Population and economic growth:** demand for access to more sophisticated products and services rises, e.g. in emerging markets
  - **Speed:** need for fast testing results raises requirements for Applied customers, esp. in clinical testing and food & beverage testing

<sup>1</sup>Source: Merck KGaA, Darmstadt, Germany Factbook; <sup>2</sup>Source: PhRMA; <sup>3</sup>CRO = Contract Research Organization; <sup>4</sup>Indicative only; <sup>5</sup>mAbs = monoclonal antibodies; <sup>6</sup>Source: EvaluatePharma April 2017

## Democratization of mAbs market will drive diversification, change, variability

### mAb volume projections 2016 to 2021



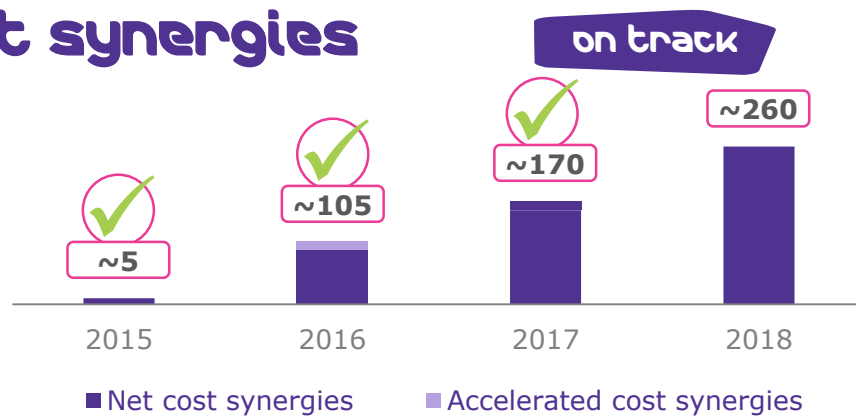
### Market development

- Overall mAbs market will grow ~12% CAGR
- Top 10 originator mAbs represent ~80% of market volume
- In 2021 ~90% of the volume will be shared between Top 35 mAbs
- Biosimilars will gain share, but remain a minority mid-term

## Integration of Sigma and synergy generation progressing well

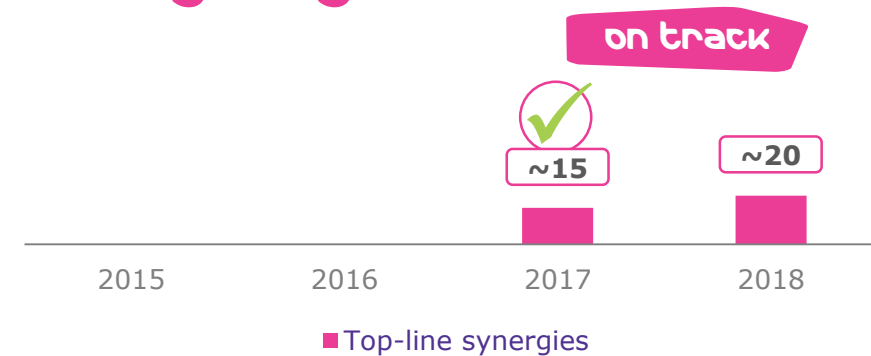
on track to deliver planned synergies of ~ €280 M until 2018

### cost synergies



- **Network consolidation and operational transformation ongoing**
  - Consolidated 10 manufacturing and distribution sites
  - Announced consolidation of 5 further sites
- **Combination of customer service centers and offshoring of transactional tasks**

### topline synergies



- **Continued integration of sigmaaldrich.com**
  - ~80% of relevant products in U.S. and EU are available online
  - >1/3 of Merck KGaA, Darmstadt, Germany eCommerce orders now contain products from both legacy companies
- **Complete offering in Process Solutions**

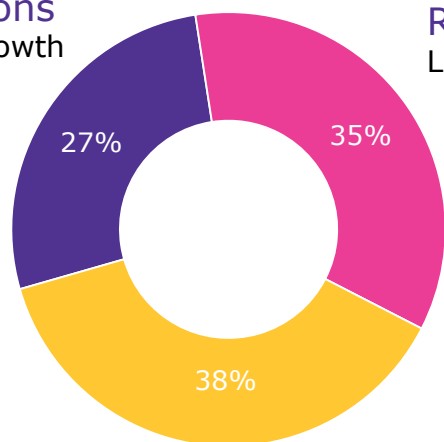


## Life Science

**We aim to be the profitability champion of the sector**

### Sales breakdown as of FY 2017

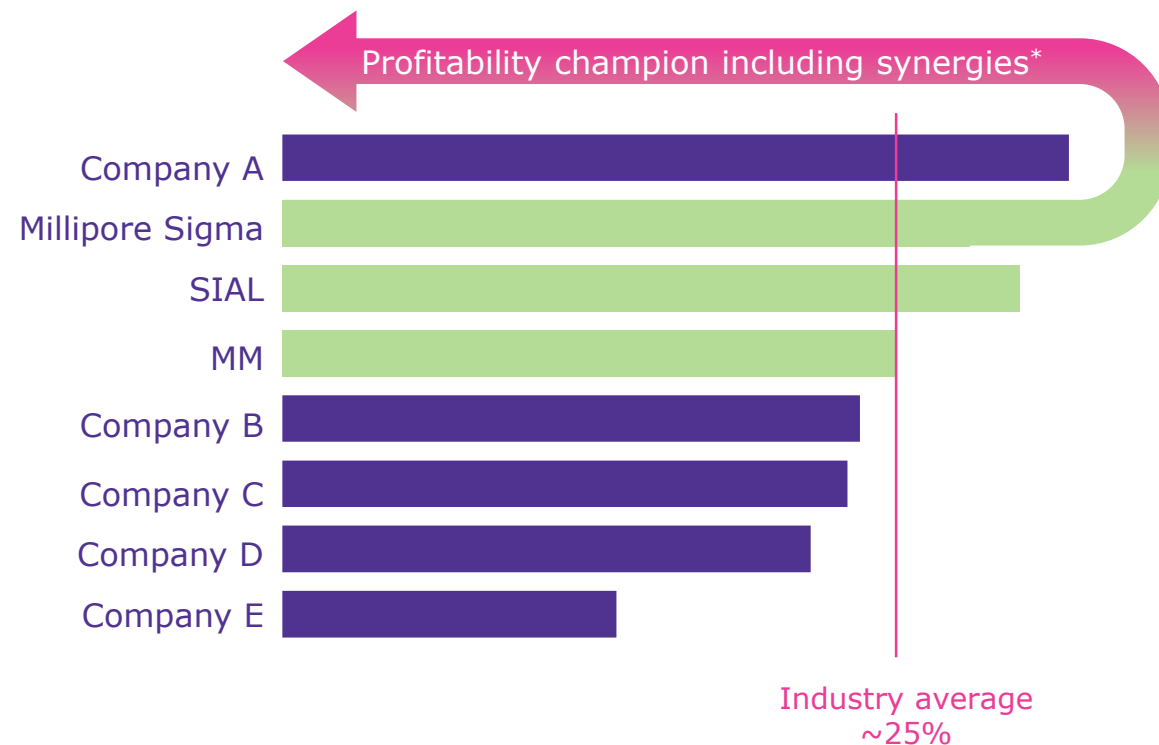
Applied Solutions  
Mid single digit growth



Research Solutions  
Low single digit growth

Process Solutions  
High single digit growth

### Above industry margin levels



**Life Science is well set for sustainable growth and profitability**

\*Pro-forma combination based on 2015 financials including 100% of targeted synergies



05

## **PERFORMANCE MATERIALS**

Maintaining leadership and innovation

# Performance Materials

## A leader in the electronic materials market

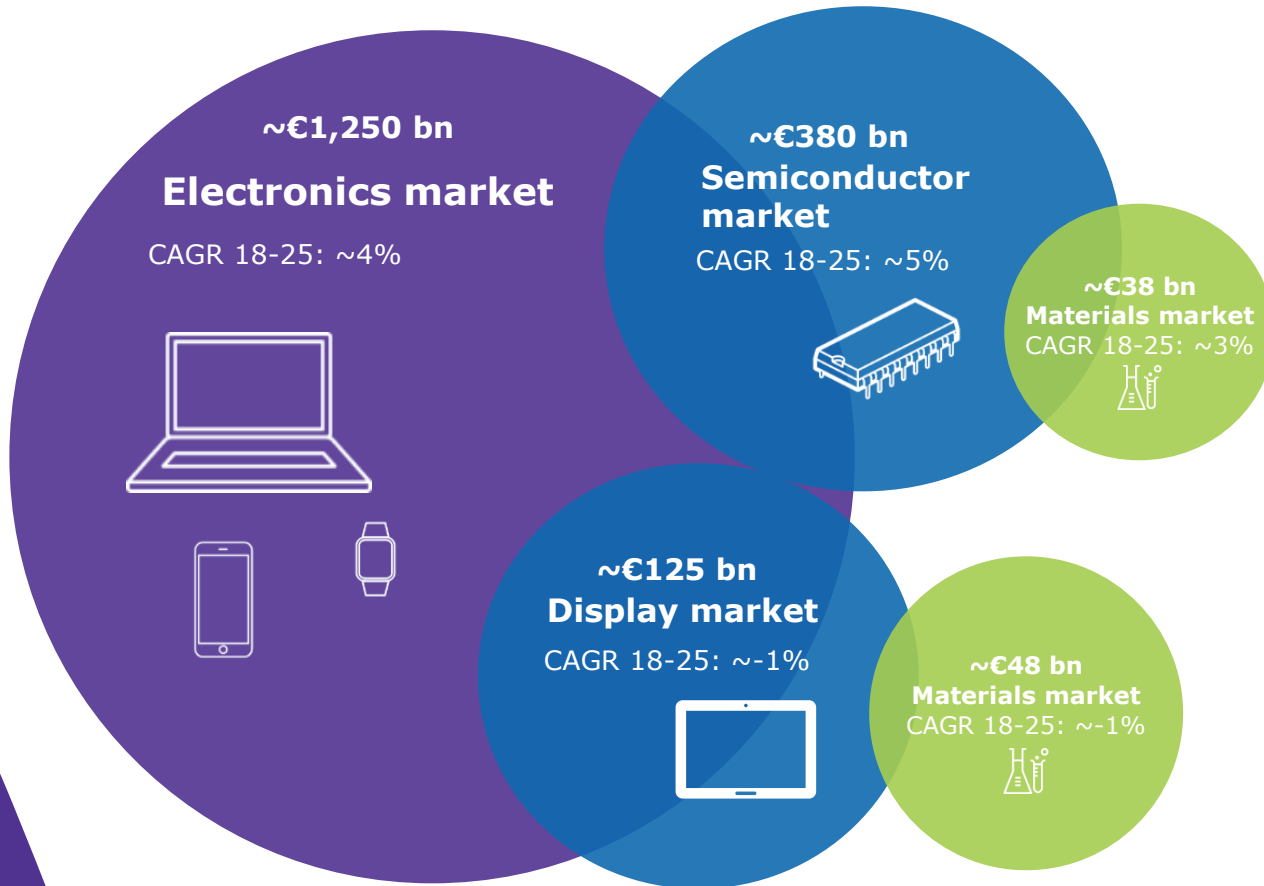
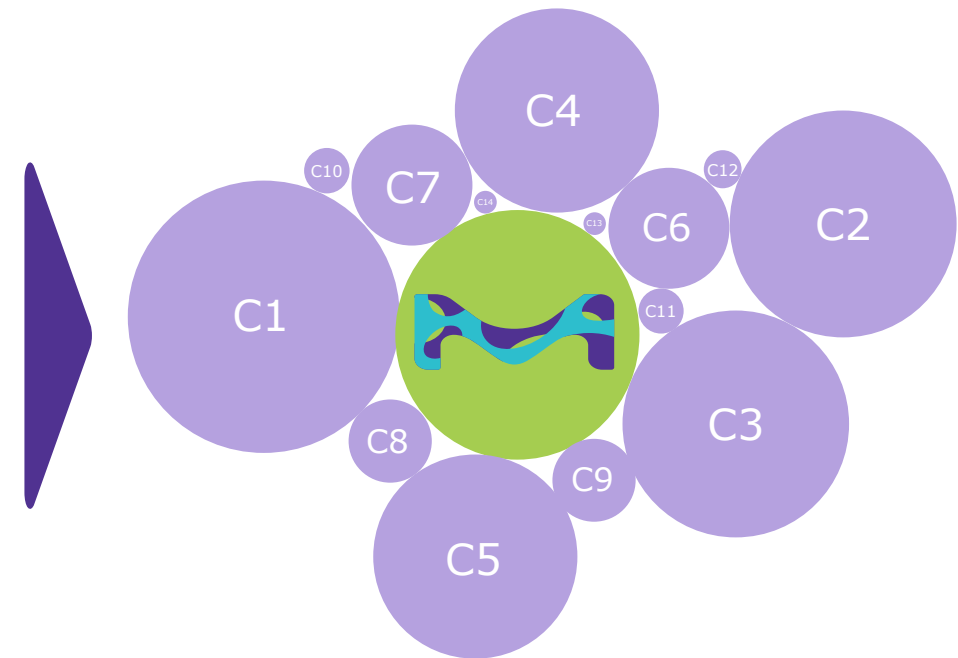


Illustration of the electronics market and thereof its selected sub markets

## Electronic materials competitor landscape<sup>1</sup>

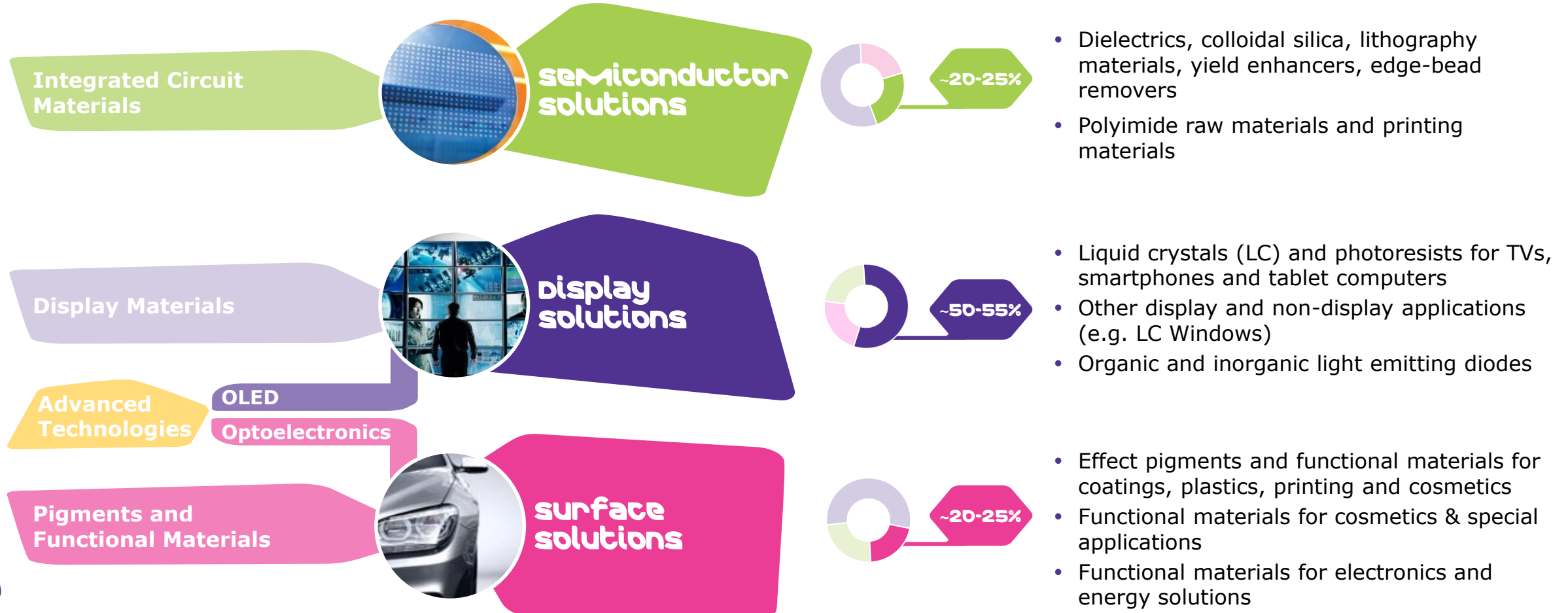


<sup>1</sup>Bubble size in competitive landscape illustrates share of semiconductor and display material sales of indicated competitors (C1 – C14)

<sup>1</sup>Source: Linx 2018, Research & Markets 2017, Semi 2015, McClean/IC Insights 2018, IC insights, Gartner 2017, Prismark 2018, FujiChimera, IHS, Market size as of 2017

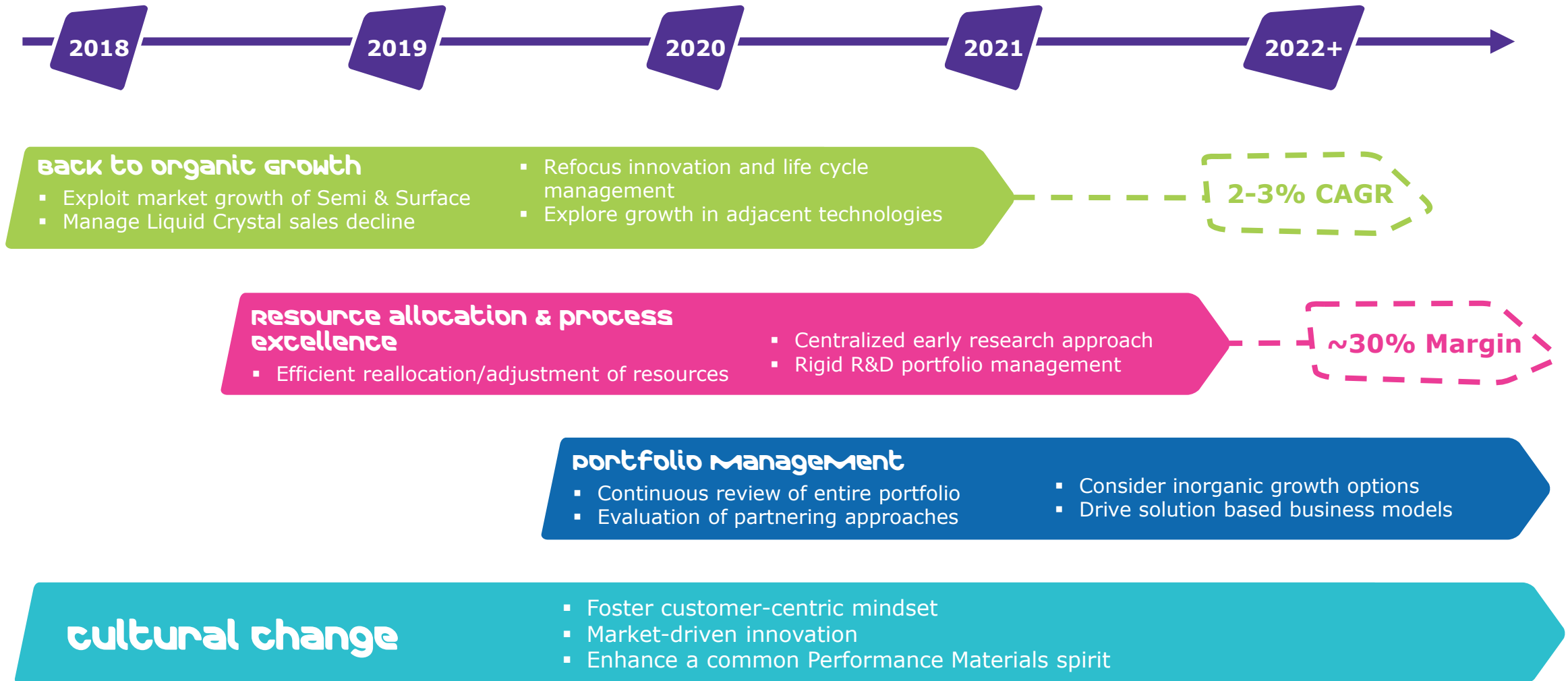
# Performance Materials: New structure combines LC with OLED, serving same customer group

## Business allocation within Performance Materials

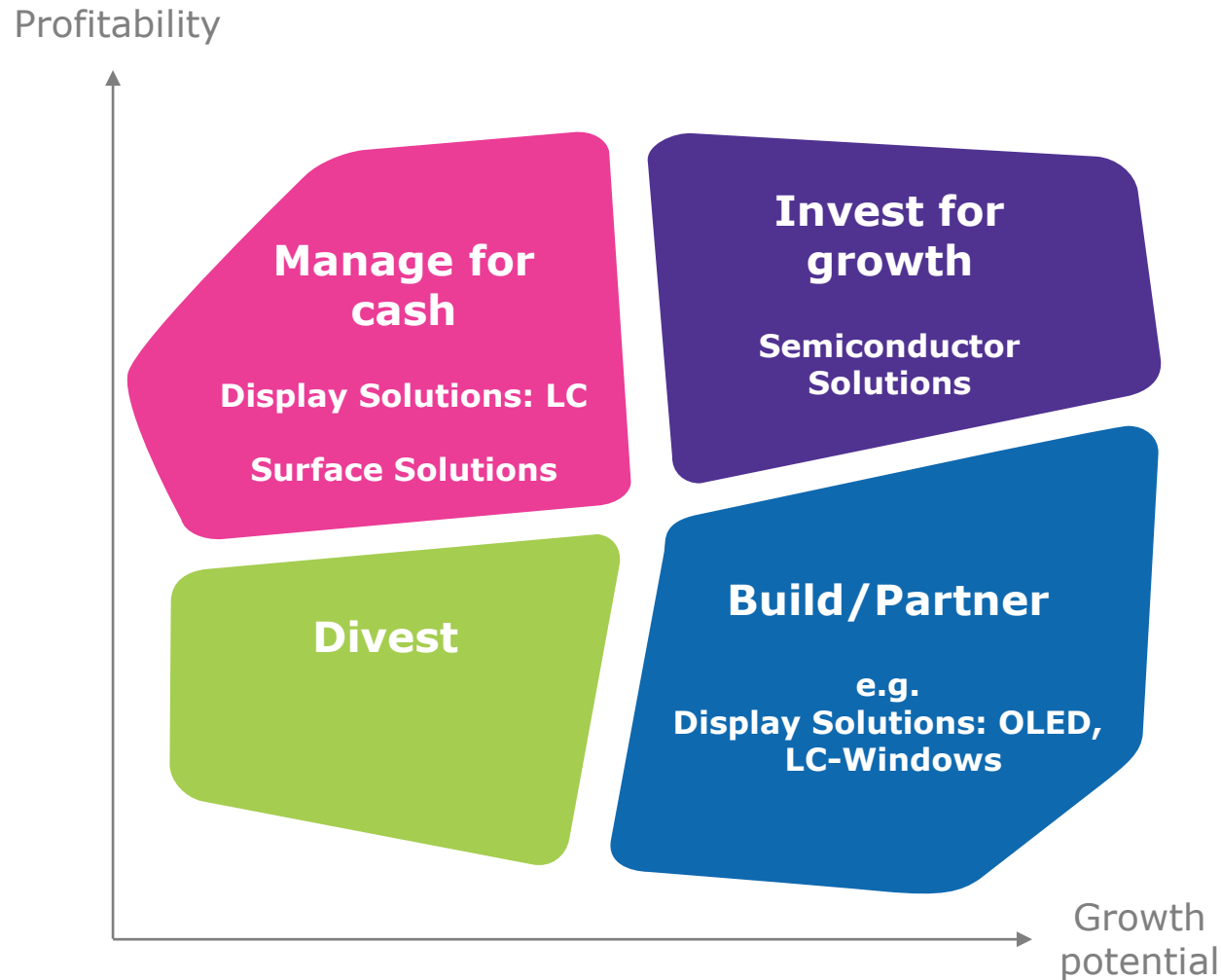


## "Bright Future"

### 5-year transformation program drives long-term performance



# Business portfolio management drives capital allocation and enables future value creation



## Invest for growth

- Strong and sustainable market growth
- Leading positions and attractive growth opportunities

## Manage for cash

- Mature and lucrative market segments
- Invest in extension, while managing for profit

## Build or Partner

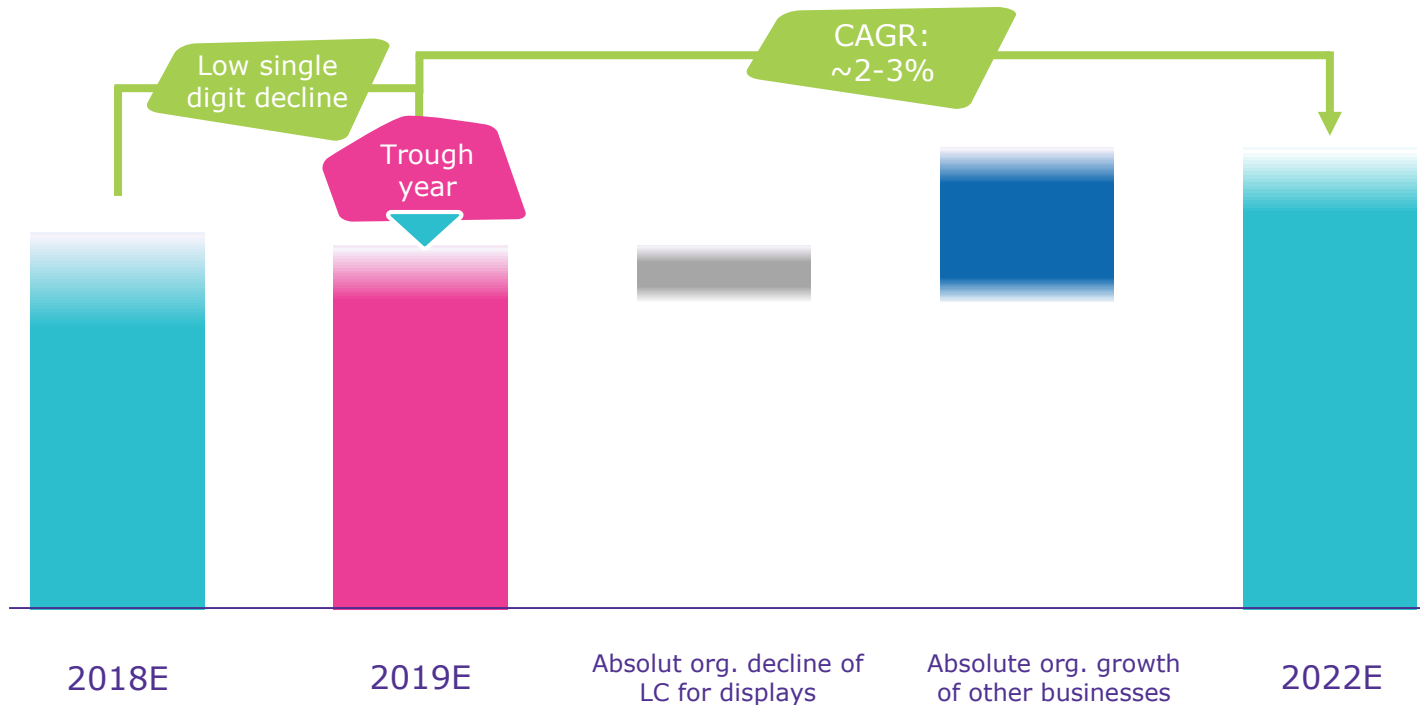
- Early industry cycles with strong potential
- Strictly prioritize and diversify risk

## Divest

- Regular review for better strategic owner

# Performance Materials will return to sales growth after 2019

Performance Materials sales development,  
in €m



2019-2022 sales growth trajectory



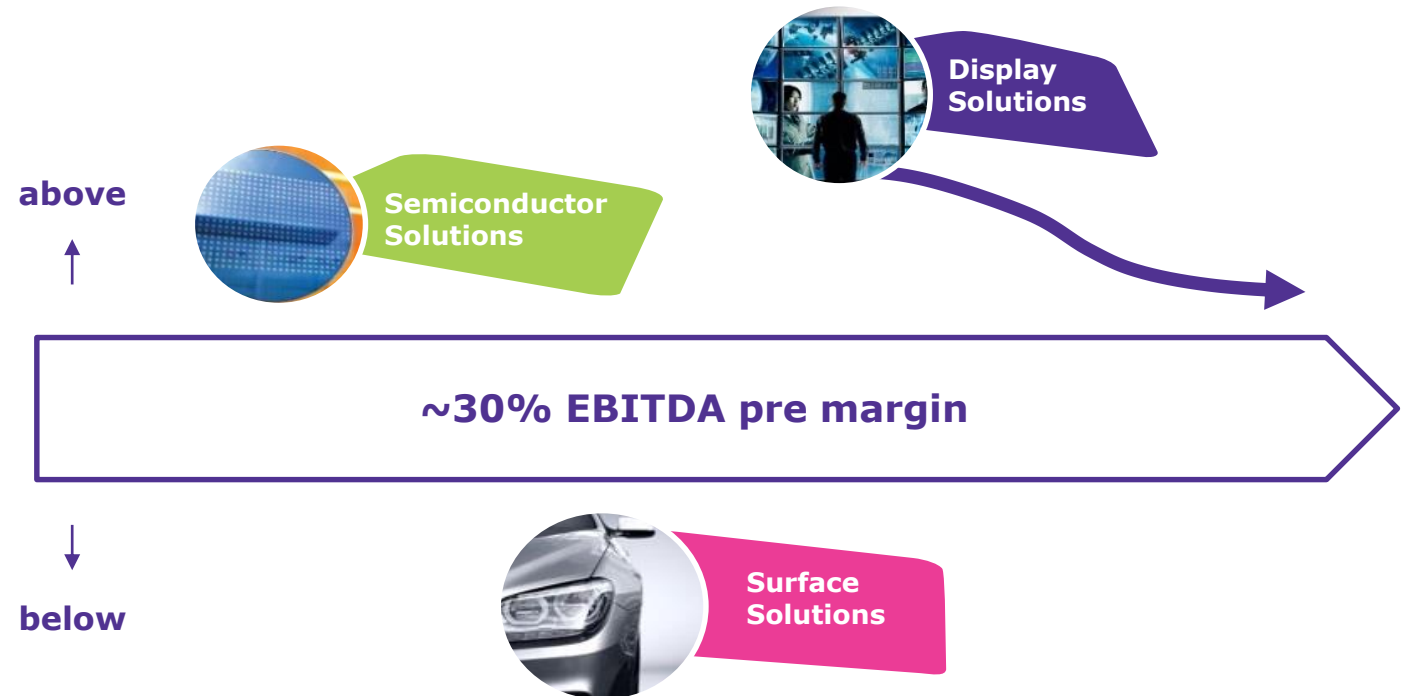
**After 2019 sales growth of Semiconductor & Surface Solutions, OLED and Photoresists will overcompensate the decline of Liquid Crystals for displays**

# Margins of PM will remain around 30% in the long-run

## profitability indication

- Display Solutions will adjust towards PM average margin
- Bottom-line management to support margin
- Strong FX exposure will cause fluctuations

EBITDA pre margin indication by business







06

## EXECUTIVE SUMMARY AND GUIDANCE

# Key EBITDA pre\* drivers



## EBITDA-supporting factors

- Organic net sales growth by Healthcare and Life Science
- Sigma-Aldrich incremental cost and revenue synergies  
~+€95 m YoY
- Biosimilars divestment frees up R&D budget  
(2017: mid to high double-digit million R&D costs)
- First full-year sales contribution from newly launched pipeline products Mavenclad® and Bavencio®
- BioMarin milestone payment of €50 m



## EBITDA-reducing factors

- Underlying R&D costs in Healthcare are budgeted above 2017, but actual development will be subject to clinical data outcome of priority projects and prioritization decisions
- Healthcare margins negatively impacted by product mix
- 2017 special gains of ~€200 m will not recur
- Performance Materials sales and earnings continuously affected by decline in Liquid Crystals
- First launch preparations for Mavenclad® U.S., driving M&S costs
- FX remains a strong headwind, esp. in H1 2018, and is slightly stronger than anticipated so far; expected EUR/USD 1.19-1.22 for FY 2018

# Group

## Full-year 2018 guidance\*

### Net sales:

Organic +4% to +6% YoY

FX ~ -3% to -5% YoY

~ € 14.4 – 14.8 bn

### EBITDA pre:

Organic -1% to -3% YoY

FX -8 to -10% YoY

~ € 3,700 – 3,900 m

### EPS pre:

~ € 5.00 – 5.30

# Group on a growing and profitable trajectory

## 2019 Group EBITDA pre increase confirmed

2019		2018
Sales	>	Sales
EBITDA pre	>	EBITDA pre
Margin	>	Margin

### Merck to return to profitable growth track from 2019 onwards



FY 2017 results presentation



Healthcare and Life Science will compensate for Performance Materials' trough year



# Group

## 2018 business sector guidance\*



### Healthcare

#### Net sales

- Sound organic growth of +4% to +5%: ongoing organic Rebif® decline offset by growth in other franchises
- Full-year contributions from 2017 launches

#### EBITDA pre

- Organic -1% to -2% YoY
- FX -9% to -11% YoY
- ~ €1,540 – 1,600 m (excl. CH)



### Life Science

#### Net sales

- Organic growth ~+7% to 8%: slightly above market; all businesses contributing; main driver Process Solutions
- Full realization of expected topline synergies

#### EBITDA pre

- Organic ~+8% YoY
- FX -3% to -5% YoY
- ~ €1,830 - 1,880 m



### Performance Materials

#### Net sales

- About stable with -1% to +1% YoY
- Volume increases in major businesses
- Liquid Crystals temporarily benefiting from China capacity ramp-up

#### EBITDA pre

- Organic -14% to -16% YoY
- FX -6% to -8% YoY
- ~ €745 – 785 m

# Additional financial guidance 2018

## Further financial details

Corporate & Other EBITDA pre	~ -€360 – -400 m
Interest result	~ -€230 – -250 m
Effective tax rate	~ 24% to 26%
Capex on PPE	~ €900 – 950 m
Hedging/USD assumption	<b>Q4/2018 – FY 2019 hedge ratio ~60% at EUR/USD ~1.20</b>
2018 Ø EUR/USD assumption	~ 1.18 – 1.21

Group

## Merck KGaA, Darmstadt, Germany has clear financial priorities



Focus on **cash flow and deleveraging**



**Ongoing cost discipline**



**Efficient capital allocation**

**Near-term financial priorities will secure Merck KGaA, Darmstadt, Germany's profitable growth path**

- **Strong cash flow** will be used to drive down gearing to <2x net debt / EBITDA pre in 2018
- **Larger acquisitions (>€500 m) ruled out** for 2018 (or financed by divestments)
- **Dividend policy** that ensures a sustainable and resilient development
- **Synergy generation** is utmost priority
- **Cost discipline** continues in all business sectors
- **Further efficiency gains** from ongoing improvement and harmonization of processes and systems
- **All our businesses** have growth potential
- **Decisions on growth investments** are based on sound business cases and robust clinical data

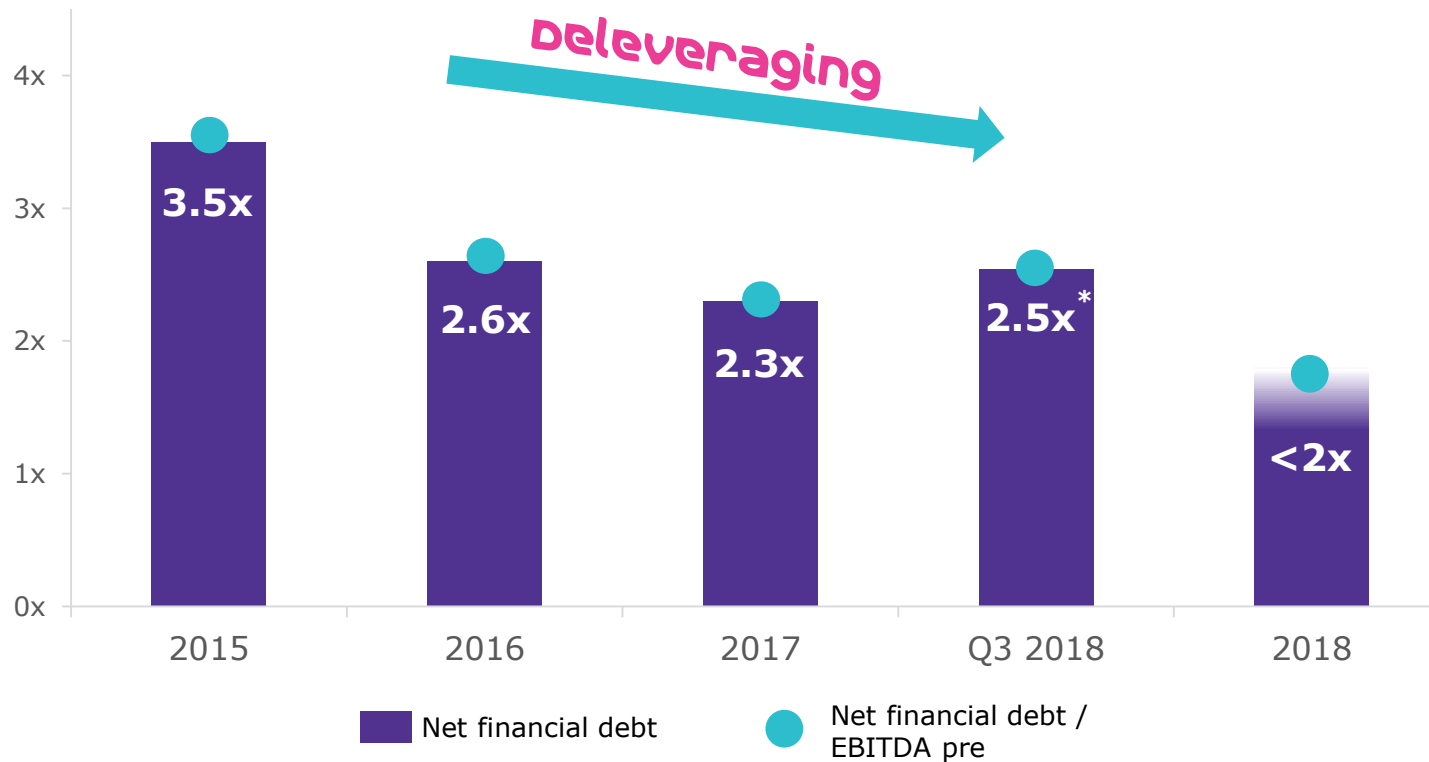


## Group

# Strong focus on cash generation to ensure swift deleveraging

## Net financial debt<sup>1</sup> and leverage development

[Net financial debt/  
EBITDA pre]



## Focus on deleveraging

- Commitment to swift deleveraging to ensure a strong investment grade credit rating and financial flexibility
- Cash flow will be used to drive down leverage to expected <2x net debt/EBITDA pre in 2018
- Larger acquisitions (>€500 m) remain ruled out 2018

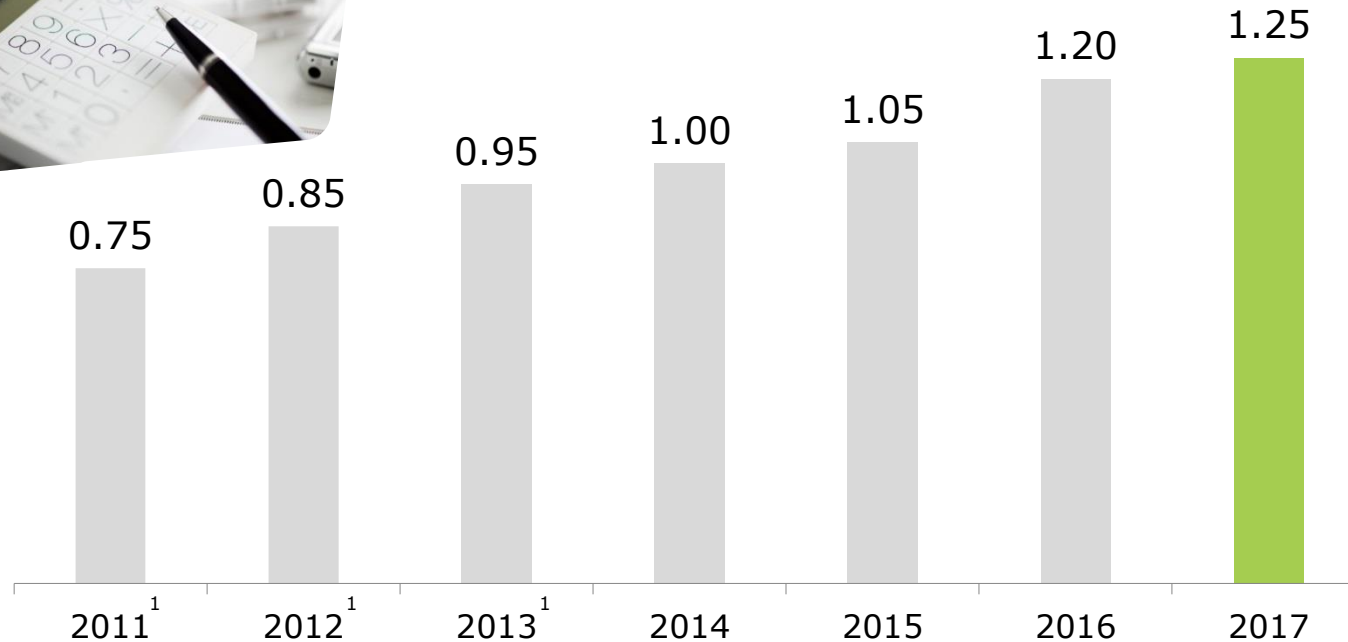
<sup>1</sup>Net financial debt (without pensions);

\*EBITDA pre (except FY) reflects last twelve months value including CH EBITDA pre (Q3 2018: €61 m)

# Group

## Dividend growth sustained

### Dividend<sup>1</sup> development 2011-2017



### 2017 dividend

- Dividend of €1.25 (+4% YoY) per share approved for 2017
- 20.3% of EPS pre
- Sustainable dividend growth
- Dividend yield<sup>2</sup> of 1.4%

<sup>1</sup>Adjusted for share split, which has been effective since June 30, 2014; <sup>2</sup>Calculated with 2017 year-end share price of 89.75€ per share

# Healthcare Strategy

## The Healthcare Pipeline continues to deliver

November 5, 2018

### Phase I

**M2698**  
**p70S6K & Akt inhibitor**  
Solid tumors

**M3814**  
**DNA-PK inhibitor**  
Solid tumors

**M6620 (VX-970)**  
**ATR inhibitor**  
Solid tumors

**M4344 (VX-803)**  
**ATR inhibitor**  
Solid tumors

**M3541**  
**ATM inhibitor**  
Solid tumors

**M8891**  
**MetAP2 inhibitor**  
Solid tumors

**M7583**  
**BTK inhibitor**  
Hematological malignancies

**avelumab**  
**anti-PD-L1 mAb**  
Solid tumors

**avelumab**  
**anti-PD-L1 mAb**  
Hematological malignancies

**M9241 (NHS-IL12)**  
**Cancer immunotherapy**  
Solid tumors

**M7824**  
**anti-PD-L1/TGFbeta trap**  
Solid tumors

**M6495**  
**anti-ADAMTS-5 nanobody**  
Osteoarthritis

**M5049**  
**Immune receptor inhibitor**  
Immunology

**M5717**  
**PeEF2 inhibitor**  
Malaria

### Phase II

**tepotinib**  
**MET kinase inhibitor**  
Non-small cell lung cancer

**tepotinib**  
**MET kinase inhibitor**  
Hepatocellular cancer

**avelumab**  
**anti-PD-L1 mAb**  
Merkel cell cancer 1L<sup>1</sup>

**avelumab**  
**anti-PD-L1 mAb**  
Solid tumors<sup>2</sup>

**avelumab**  
**anti-PD-L1 mAb**  
Non-small cell lung cancer<sup>2</sup>

**avelumab**  
**anti-PD-L1 mAb**  
Urothelial cancer<sup>2</sup>

**abrituzumab<sup>3</sup>**  
**pan-av integrin inhibiting mAb**  
Colorectal cancer 1L<sup>1</sup>

**M7824**  
**anti-PD-L1/TGFbeta trap**  
Non-small cell lung cancer 1L<sup>1</sup>

**sprifermin**  
**fibroblast growth factor 18**  
Osteoarthritis

**atacept**  
**anti-BlyS/APRIL fusion protein**  
Systemic lupus erythematosus

**atacept**  
**anti-BlyS/APRIL fusion protein**  
IgA nephropathy

**evobrutinib**  
**BTK inhibitor**  
Rheumatoid arthritis

**evobrutinib**  
**BTK inhibitor**  
Systemic lupus erythematosus

**M1095 (ALX-0761)<sup>4</sup>**  
**anti-IL-17 A/F nanobody**  
Psoriasis

**evobrutinib**  
**BTK inhibitor**  
Multiple sclerosis

### Phase III

**avelumab - anti-PD-L1 mAb**  
Non-small cell lung cancer 1L<sup>1</sup>

**avelumab - anti-PD-L1 mAb**  
Gastric cancer 1L-M<sup>1M</sup>

**avelumab - anti-PD-L1 mAb**  
Ovarian cancer platinum resistant/refractory

**avelumab - anti-PD-L1 mAb**  
Ovarian cancer 1L<sup>1</sup> and 1L-M<sup>1M</sup>

**avelumab - anti-PD-L1 mAb**  
Ovarian cancer 1L<sup>1,5</sup>

**avelumab - anti-PD-L1 mAb**  
Urothelial cancer 1L-M<sup>1M</sup>

**avelumab - anti-PD-L1 mAb**  
Renal cell cancer 1L<sup>1</sup>

**avelumab - anti-PD-L1 mAb**  
Locally advanced head and neck cancer

### Registration

**cladribine tablets**  
**lymphocyte-targeting agent**  
Relapsing multiple sclerosis<sup>6</sup>

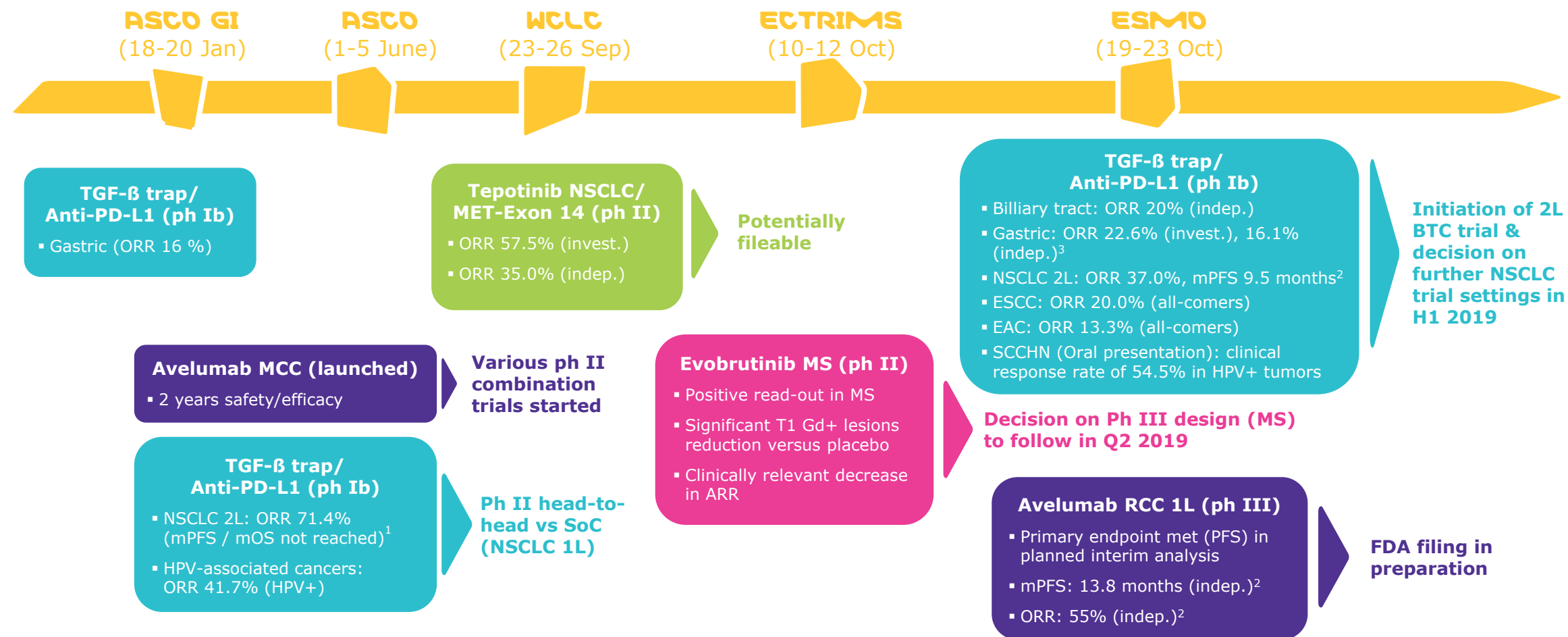
- Oncology
- Immuno-Oncology
- Immunology
- Neurology
- Global Health

<sup>1</sup> First-line treatment; <sup>1M</sup> First-line maintenance treatment. <sup>2</sup> Avelumab combination studies with talazoparib, axitinib, ALK inhibitors, chemotherapy, or novel immunotherapies. <sup>3</sup> As announced on May 2 2018, in an agreement with SFJ Pharmaceuticals Group, abrituzumab will be developed by SFJ for colorectal cancer through Phase II/III clinical trials. <sup>4</sup> 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 Merck KGaA, Darmstadt, Germany. <sup>5</sup> Avelumab in combination with talazoparib. <sup>6</sup> As announced on July 30 2018, the US Food and Drug Administration (FDA) has accepted the resubmission of the New Drug Application (NDA) for cladribine tablets.

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.

# Healthcare Strategy

## Continuous newsflow of data throughout 2018 triggered next phases for our key assets



<sup>1</sup>PD-L1 high; <sup>2</sup>PD-L1 ≥ 1%; <sup>3</sup>Update from ASCO GI; Abbreviations: 2L = second line therapy; PR = partial response; ORR = objective response rate; NSCLC = Non-small-cell lung carcinoma; (m)PFS = (median) progression-free survival; (m)OS = (median) Overall survival; HPV = human papillomavirus; SoC = standard of care; MCC = Merkel cell carcinoma; RCC = Renal cell carcinoma; RR = lesion rate ratio; ARR = annualised relapse rate; SCCHN = squamous cell carcinoma of the head and neck; ESCC = Esophageal squamous cell carcinoma; EAC = Esophageal adenocarcinoma; CRC = Colorectal Cancer

# Oncology Strategy

## Strategy anchored on five foundational pillars

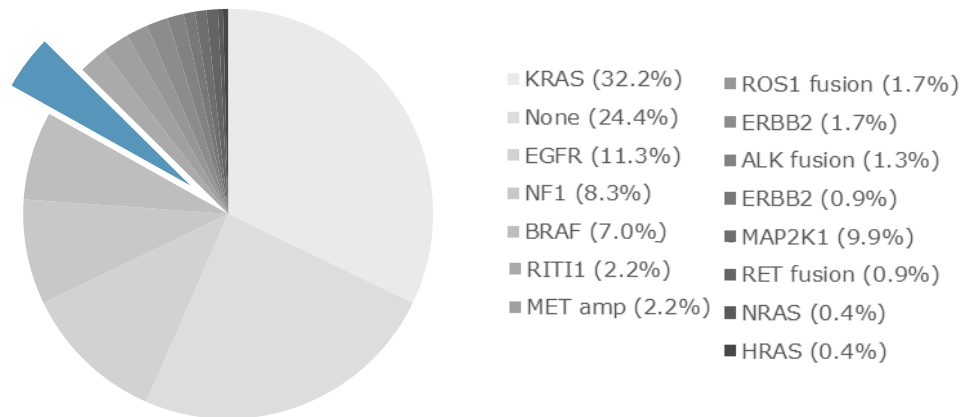
1	<b>Targeted Oncology</b>	<ol style="list-style-type: none"> <li>1. Erbitux: continued leadership in CRC and SCCHN</li> <li>2. Tepotinib: c-met driven cancers</li> </ol>	<ol style="list-style-type: none"> <li>1. Numerous Erbitux ISTs incl. combination with Avelumab</li> <li>2. Tepotinib in NSCLC, HCC</li> </ol>
2	<b>Avelumab</b>	<ol style="list-style-type: none"> <li>1. Monotherapy as a basis for combinations</li> <li>2. Establish immunogenic priming in combination or sequence with CT/RT<sup>1</sup></li> <li>3. Novel combinations</li> <li>4. Establish value of unique molecular characteristics (ADCC)</li> </ol>	<ol style="list-style-type: none"> <li>1. NSCLC 1L (high intensity)</li> <li>2. Maintenance in UC 1L, gastric 1L, ovarian 1L</li> <li>3. Avelumab + Inlyta (RCC 1L)</li> <li>4. Unique combinations leveraging ADCC</li> </ol>
3	<b>IO bi-functionals</b>	Engineer or access platforms where biology is best addressed by a bi-functional approach	<ul style="list-style-type: none"> <li>• TGF-beta trap/anti-PD-L1</li> <li>• Anti-LAG-3/anti-PD-L1</li> <li>• NHS-IL 12</li> </ul>
4	<b>DNA Damage Response inhibitors</b>	Establish leadership in DDR and leverage synergies across portfolio (immuno-oncology plus emerging platforms)	<ul style="list-style-type: none"> <li>• DNA-PK-i</li> <li>• ATR-i</li> <li>• ATM-i</li> </ul>
5	<b>Emerging Platforms</b>	Invest in complementary technologies within focus discovery areas	<ul style="list-style-type: none"> <li>• Antibody-Drug-Conjugates (ADC, e.g. partnership with Mersana/Sutro)</li> </ul>

# Tepotinib: Highly selective c-met inhibitor

## Currently no approved therapy targeting METex14 and/or c-met amplification

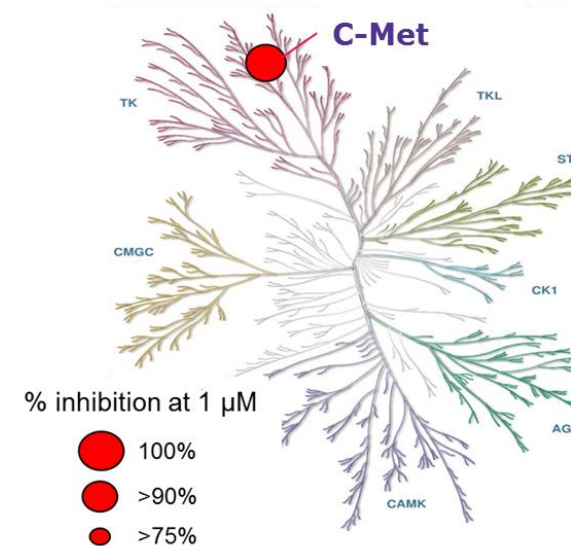
### Oncogenic drivers in lung adenocarcinoma<sup>1</sup>

- MET-mutations are clinically **unique molecular subtypes** of NSCLC
- MET exon 14 alteration confer oncogene addiction in **~3-4 % of NSCLC**
- **No approved therapy** specifically targeting METex14 and/or c-Met amplification



### Selectivity Profile<sup>2</sup>

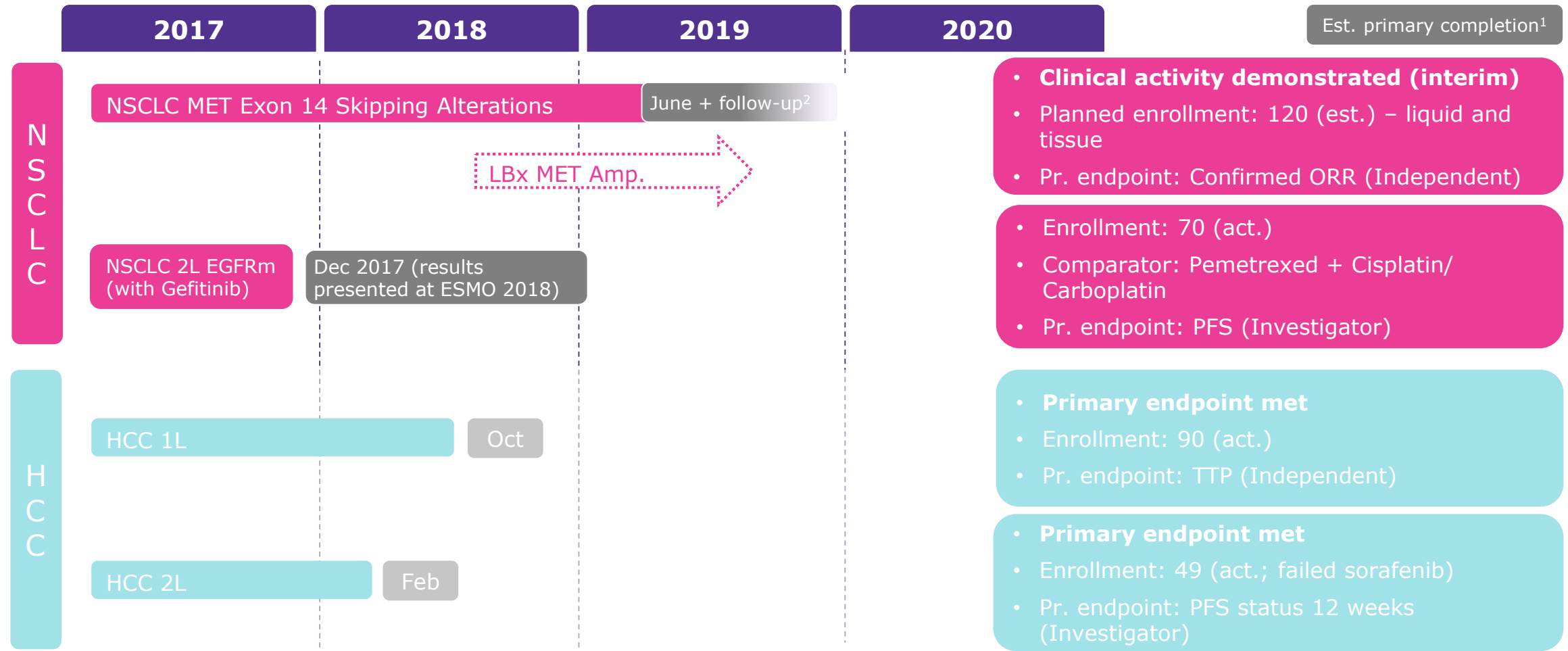
- ATP competitive, **reversible small molecule** c-Met inhibitor<sup>3</sup>
- **Highly selective** according to preclinical benchmarking<sup>2</sup>
  - In panel of >240 kinases, only c-Met inhibited at 1  $\mu$ M
  - >90% inhibition of phospho-c-Met levels (tumor biopsy)



<sup>1</sup> Cancer Genome Atlas Nature 2014;511:543-50; <sup>2</sup> Merck KGaA, Darmstadt, Germany data on file; <sup>3</sup> Blatt et al, 2013

# Tepotinib: Program overview

## Development focus on biomarker enriched patient populations



<sup>1</sup> Timelines are event-driven and may be subject to change; <sup>2</sup> Confirmed ORR expected approx. in June 2019, subsequent durability of response/follow-up period pending outcome of discussions with health authorities

# Tepotinib: Interim Phase II results

## Encouraging signs of activity in patients with advanced NSCLC harboring METexon14-skipping mutations

VISION  
Study Design<sup>1</sup>

- Patient population:**
  - Patients with advanced/metastatic NSCLC (all histologies) that are METexon 14-skipping mutation-positive
  - 46 patients treated
  - Based in EU, US and Japan
  - 1L, 2L and 3L treatment
- Treatment:** Tepotinib 500mg QD
- Primary endpoint:** ORR (IRC)
- Secondary endpoints:** ORR (investigator assessed), safety, duration of response, progression-free survival and overall survival

Interim results presented at the  
World Conference on Lung Cancer (WCLC) 2018<sup>1,2</sup>

- Encouraging signs of activity**
- ORR to date** based on independent review (35.0%) and investigator assessment (57.5% incl. two CR)
- Median duration of response** based on investigator assessment is 14.3 months (95% CI: 3.7, nd)
- Safety:** well tolerated, most common side effects were peripheral edema and diarrhea

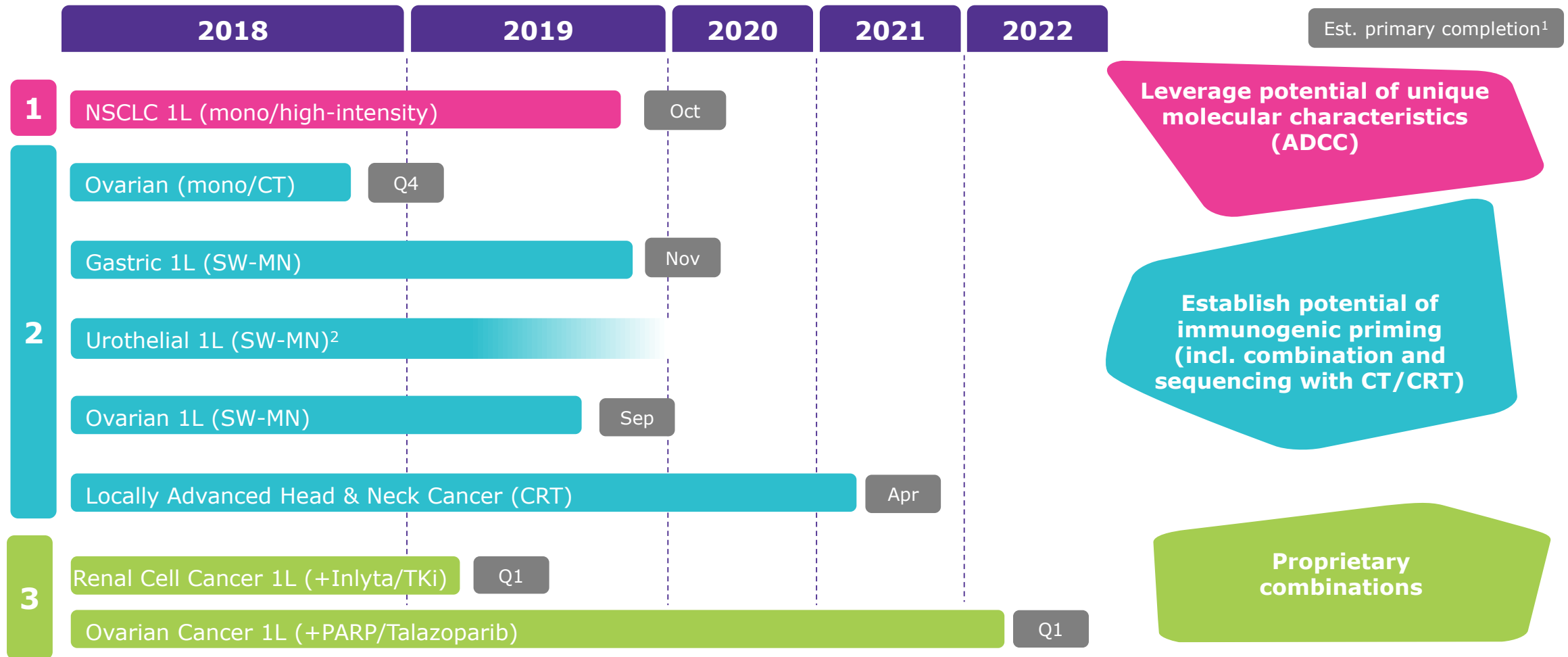
Tepotinib 500 mg <sup>2</sup>	Investigator	Independent
Complete response	2 (5.0)	0 (0)
Partial response	21 (52.5)	14 (35.0)
Stable disease	6 (15.0)	11 (27.5)
Progressive disease	5 (12.5)	8 (20.0)
Non-evaluable	6 (15.0)	7 (17.5)
ORR n (%)	23 (57.5)	14 (35.0)
DCR: n (%)	29 (72.5)	25 (62.5)

<sup>1</sup> Felip E et al., "Phase II Data for the MET Inhibitor Tepotinib in Patients with Advanced NSCLC and METexon14-Skipping Mutations", presented at WCLC 2018; <sup>2</sup> Combined analysis (n=40); efficacy analysis includes patients having at least 2 post-baseline assessments or who discontinued treatment for any reason (n=40)



# Avelumab: Program overview

## Ongoing studies – Seven Phase III trials, more than 15 tumor types



<sup>1</sup> Estimated primary completion date according to Clinicaltrials.gov as of October 26, 2018; timelines are event-driven and may be subject to change; <sup>2</sup> Estimated primary completion date being reprojected; Acronyms: NSCLC: Non Small Cell Lung Cancer, CT: Chemotherapy, CRT: Chemoradiotherapy, Plat. Res./Ref.: Platinum Resistant/Refractory, MN: Maintenance; SW: Switch

# Avelumab: Renal Cell Carcinoma 1L

## Alliance will pursue US regulatory submission following positive Interim Analysis (PFS)

### Study Design<sup>1</sup>

- **Study:** PhIII JAVELIN Renal 101
- **Patient population:** 886 patients with advanced RCC across all risk groups, 63% PD-L1+
- **Comparator:** BAVENCIO (avelumab) + INLYTA (axitinib) vs SUTENT (sunitinib) as 1L therapy
- **Breakthrough Therapy Designation** granted by the FDA in December 2017

### Interim Analysis<sup>1</sup> results presented at ESMO 2018

#### Primary endpoints (PFS and OS in patients with PD-L1+ tumors):

- mPFS Avelumab + Axitinib: 13.8 months
- mPFS Sunitinib: 7.2 months

#### Key secondary endpoints (PFS and OS in overall population):

- mPFS Avelumab + Axitinib: 13.8 months
- mPFS Sunitinib: 8.4 months

#### Confirmed Objective Response Rate:

- ORR Avelumab + Axitinib: 55.2%
- ORR Sunitinib: 25.5%

**Safety profile:** favourable safety profile

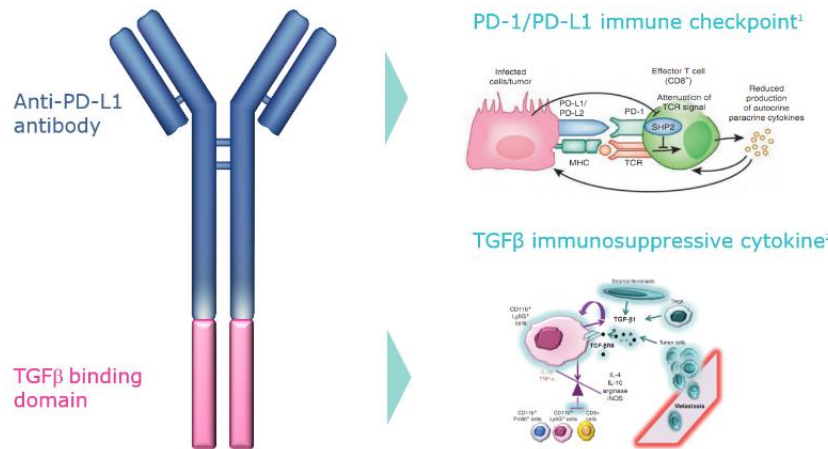
#### Next steps

- Alliance plans to pursue a regulatory submission in the US and discussions with other health authorities
- Renal 101 will continue as planned to the final analysis (OS)

<sup>1</sup> Motzer et al., „JAVELIN Renal 101: Randomized Phase 3 Trial of Avelumab + Axitinib vs Sunitinib as First-Line Treatment of Advanced Renal Cell Carcinoma“, presented at ESMO 2018; Avelumab plus axitinib significantly improve progression-free survival in untreated renal cell carcinoma [ESMO 2018 Press Release], published on 21 October 2018 at <https://www.esmo.org/Press-Office/Press-Releases/Javelin101-renal-cancer-immunotherapy-Motzer>

# Anti-PD-L1/TGF- $\beta$ trap (M7824) The first Phase II trial, evaluating M7824 monotherapy vs. pembrolizumab, was started in October 2018

## Mode of Action



- Innovative **first-in-class bifunctional fusion protein** designed to simultaneously target two immune suppressive pathways (blocking PD-L1 and reducing TGF- $\beta$  signaling)
- Bifunctional mode should result in broader application vs. respective mono-functional agents

## Study Results & Next Steps

- **Manageable safety profile<sup>1</sup>**
- Saturated peripheral PD-L1 and sequestered all released plasma TGF- $\beta$ 1, - $\beta$ 2, and - $\beta$ 3<sup>1</sup>
- Great potential when combined with Standard of Care, immunotherapy and internal pipeline drug candidates
- **Status Quo & Next Steps:**
  - ✓ Dose level finding of Phase I completed
  - ✓ Tested in 14 Phase Ib expansion cohorts across >700 patients
  - **PhII study M7824 monotherapy versus pembrolizumab 1L**, advanced NSCLC high PD-L1-tumor expressers started in October 2018
  - **Additional studies** to be started in the course of 2019
- **Criteria allowing timely decisions:**
  1. Expand cohort and/or explore single-arm path-to-registration
  2. Expand cohorts to confirm signal and/or follow with randomized comparative trial
  3. Explore biomarker driven pan-tumor opportunities
  4. De-prioritize cohort

<sup>1</sup> As presented by J. L. Gulley at ASCO Annual Meeting 2017, June 5, 2017.

# Anti-PD-L1/TGF- $\beta$ trap (M7824): Focus areas NSCLC & BTC

## Updated data presented at ESMO 2018 defined next steps

### NSCLC 2L

- **Need:** NSCLC accounts for 80-85% of all cases of lung cancer<sup>1</sup>
- **Results: Encouraging efficacy comparing favorably** to established PDx-inhibitor monotherapy (IRC)<sup>2,3</sup>:
  - **ORR (all-comers):** 27.0%
  - **ORR (PD-L1-positive):** 37.0%
  - **ORR (PD-L1-high):** 85.7%
- **Progression free survival by IRC (PD-L1  $\geq$  1%):**
  - M7824: **mPFS = 9.5 months**, competitor: 4.0 months<sup>2,3</sup>
- **Overall Survival by IRC (PD-L1  $\geq$  1%):**
  - M7824: **mOS not reached**, competitor: 12.7 months<sup>2,3</sup>

#### Next steps

**Further trial settings** to be decided on in **H1 2019**

### Biliary Tract Cancer (BTC)

- **Need:** Few available treatment options (no 2L standard of care)<sup>4</sup>
- **Results: Encouraging activity<sup>5</sup>** in 30 Asian patients with pretreated biliary tract cancer
- **ORR<sup>5</sup>:** 20% (IRC assessment). Median DoR was NR (range, 8.3–13.9 months) with confirmed responses ongoing in all patients
- **Overall Survival by IRC:**
  - **mOS:** 12.7 months (6.7 – NR), comparing favorably with historical data in pretreated patients receiving second- or later line treatment (<7 months mOS in 2L<sup>4</sup>)
- Responses observed **irrespective of PD-L1 expression levels<sup>5</sup>**

#### Next steps

**2L BTC study** to be initiated in **H1 2019**

<sup>1</sup> Jemal A et al., Cancer statistics, 2007, CA Cancer J Clin 2007;57:43-66; <sup>2</sup> Paz-Ares et al., Poster presented at the 43<sup>rd</sup> European Society for Medical Oncology Annual Meeting, Munich, October 19–23, 2018, data shown for 1200mg Q2W dose; <sup>3</sup> Herbst et al.; Pembrolizumab versus docetaxel for previously treated, PD-L1-positive, advanced non-small-cell lung cancer (KEYNOTE-010): a randomised controlled trial (www.thelancet.com Published online December 19, 2015 [http://dx.doi.org/10.1016/S0140-6736\(15\)01281-7](http://dx.doi.org/10.1016/S0140-6736(15)01281-7)); <sup>4</sup> Lamarca A, et al. Ann Oncol. 2014;25(12):2328–2338; <sup>5</sup> Yoo et al., Poster presented at the 43<sup>rd</sup> European Society for Medical Oncology Annual Meeting, Munich, October 19–23, 2018

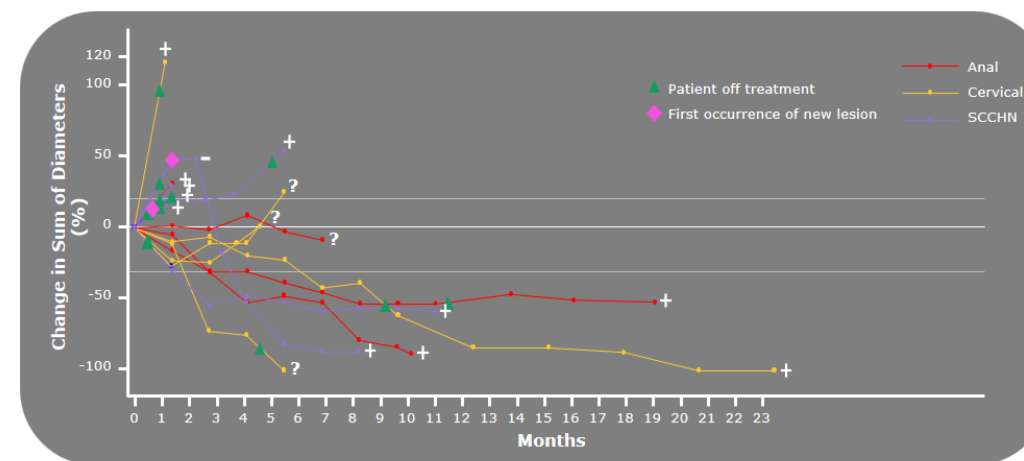
# Anti-PD-L1/TGF- $\beta$ trap (M7824): Phase Ib results (HPV cohort at NCI)

## HPV-assoc. cancers as potential pan-tumor therapy – prospective study ongoing at NCI

### Patients with HPV-assoc. cancers

- Analyses of HPV+ cervical/SCCHN tumor samples from TCGA/Oncomine show frequent dysregulation of TGF- $\beta$ R1 signaling – suggesting this **pathway plays a role in HPV-mediated carcinogenesis**
- HPV associated** with almost all anal and cervical cancer, and some SCCHN<sup>2-4</sup>
- Retrospective subgroup analysis incl. 17 patients with HPV-associated cancers<sup>1</sup>:
  - Activity in all three tumor types
  - Confirmed ORR = 41.7% (HPV+)**<sup>1</sup>
  - Clinical activity of anti-PD-1 monotherapies in **range of 17–26%**<sup>5-8</sup>
- Phase II study by NCI** specifically accruing patients with HPV-associated malignancies

### BOR as confirmed by independent radiologist<sup>1</sup>

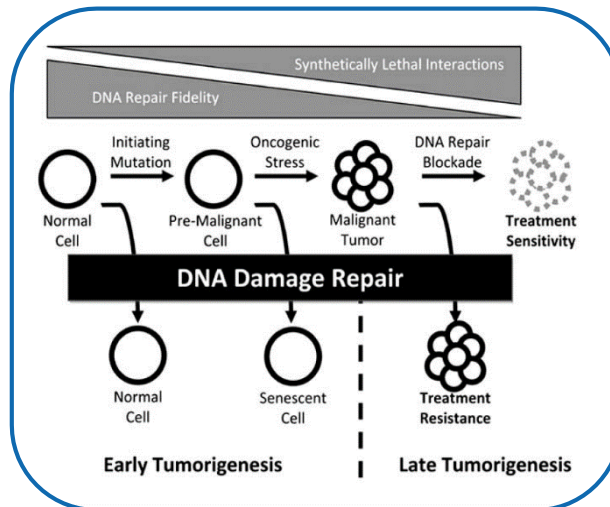


BOR, n (%)	N=17 (all HPV associated tumors)	N=12 (all HPV-positive)
ORR	6 (35.3) <sup>10</sup>	5 (41.7) <sup>10</sup>
CR	2 (11.8) <sup>9</sup>	1 (8.3)
PR	4 (23.5) <sup>10</sup>	4 (33.3) <sup>10</sup>
SD	4 (23.5)	1 (8.3)
PD	7 (41.2)	6 (50.0)
DCR	10 (58.8) <sup>10</sup>	7 (50.0) <sup>10</sup>

<sup>1</sup> J.L. Gulley et al, ASCO, Jun 2018 (presentation); <sup>2</sup> De Vuyst et al. Int J Cancer. 2009;124:1626–36; <sup>3</sup> Ihloff et al. Oral Oncol. 2010;46:705–11; <sup>4</sup> Mehanna et al. Head Neck. 2013;35:747–55; <sup>5</sup> Bauml et al. J Clin Oncol. 2015;33 (suppl; abstr TPS3094); <sup>6</sup> Ferris et al. N Engl J Med. 2016;375(19):1856; <sup>7</sup> Frenel et al. J Clin Oncol. 2017;35(36):4035; <sup>8</sup> Ott et al. Ann Oncol. 2017;28(5):1036; <sup>9</sup> 1 patient had a confirmed BOR or PR and an unconfirmed BOR of CR; <sup>10</sup> 1 PR did not meet the RECIST criteria

# DNA damage response (DDR)

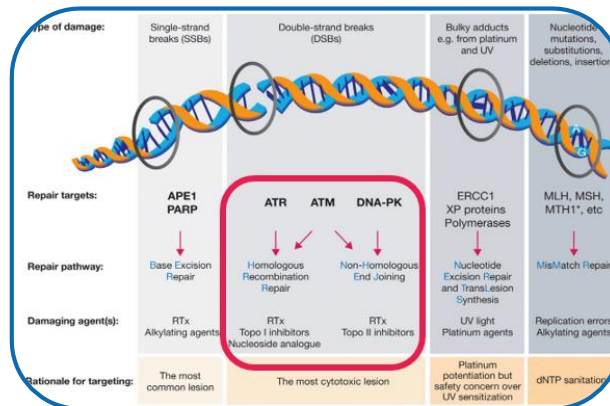
## Complete portfolio supporting leadership in a potentially disruptive class



### Genomic instability: a hallmark of late stage cancers<sup>1</sup>

- DNA damage response (DDR) keeps genetic information intact
- In many cancers DDR pathways are defected, leading to greater dependency on remaining functional DDR pathways
- Preferentially inhibiting remaining DDR pathways can result in cancer cell death ("synthetic lethality")

### Amplifying cytotoxic effects of conventional and novel cancer treatments potentially bears combination potential



1. Inhibitor portfolio targets all three leading pathways of double stranded breaks – enabling unique synergies
2. ASCO 2017: leading DNA-PK-I (M3814) found safe and tolerable in a phase I study, with limited single-agent activity (20% of patients with stable disease for at least 18 weeks)<sup>2</sup>

<sup>1</sup> Sources: O'Connor, Molecular Cell, 2015 | Benjamin et al., Current Drug Targets, 2010, 11, 1336-1340; <sup>2</sup> "A multicenter phase I trial of the DNA-dependent protein kinase (DNA-PK) inhibitor M3814 in patients with solid tumors", Mark van Bussel, ASCO 2017; Acronyms: ATM: ataxia-telangiectasia mutated | ATR: ataxia telangiectasia and Rad3 | DNA-PK: DNA-dependent protein kinase |



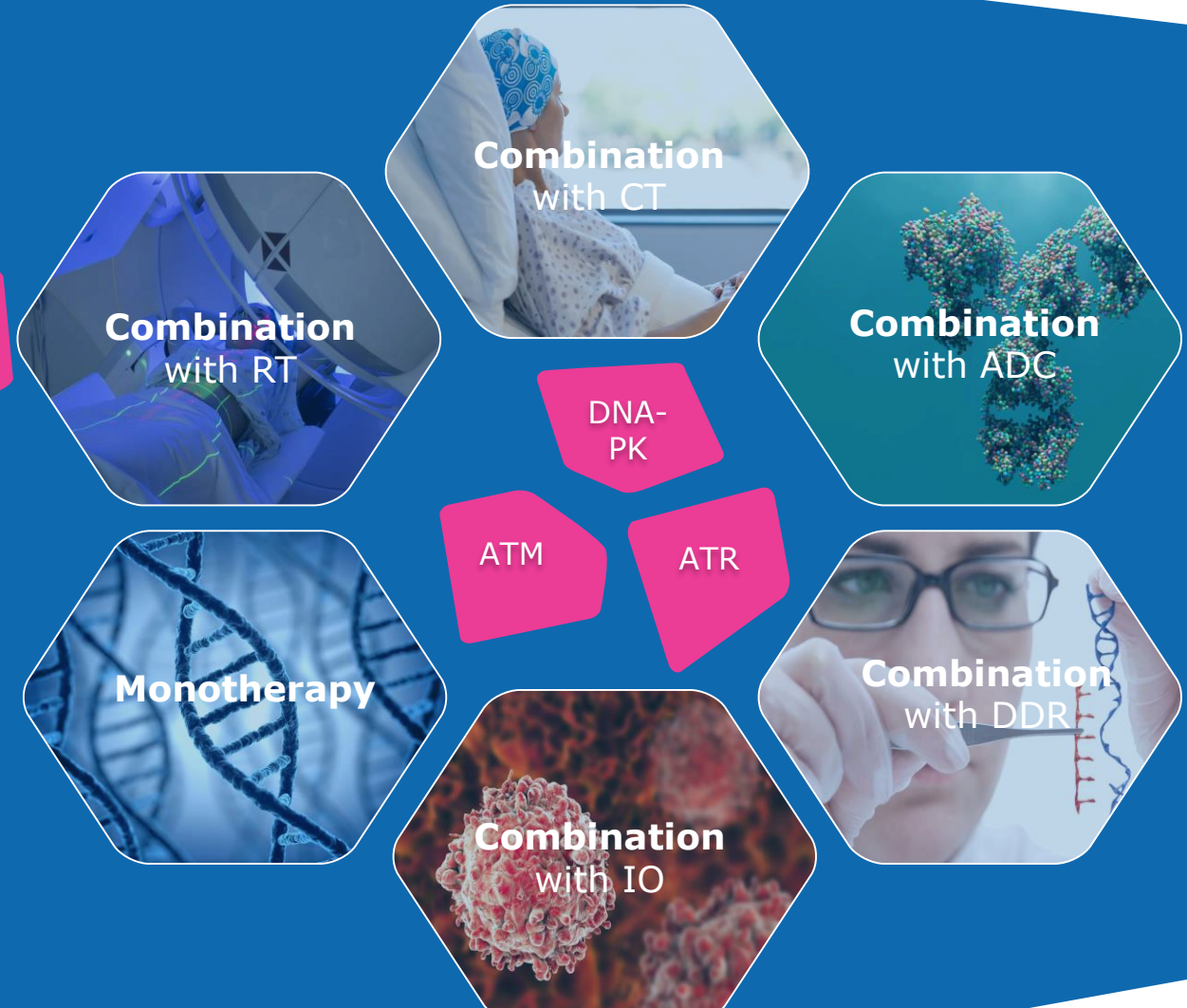
# DNA damage response (DDR)

## Broad combination potential across multiple mechanisms

At least **50%** of all cancer patients receive some type of **RADIATION** therapy (NCI 2016)

At least **70%** of all cancer patients receive some type of **CHEMOTHERAPY** (NCI 2016)

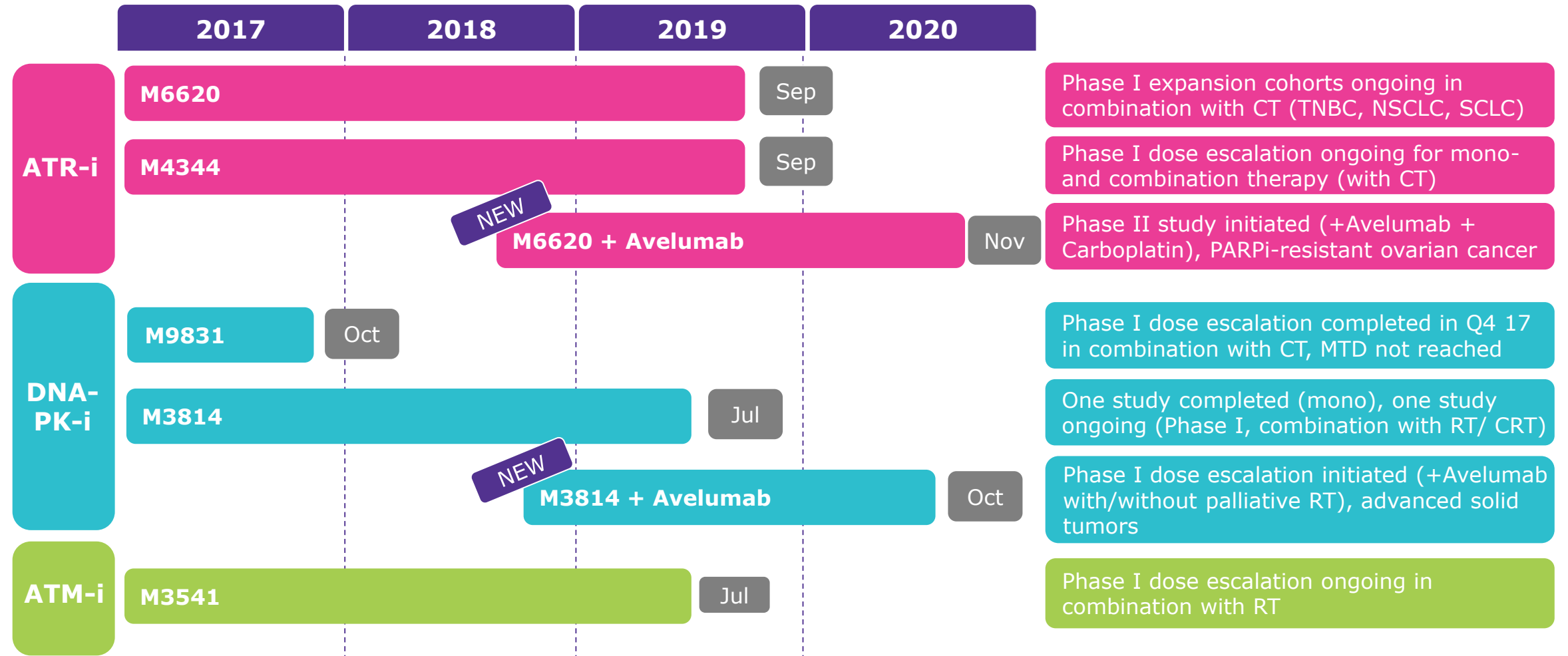
Significant share of patients to be treated with **CHECKPOINT INHIBITORS**



# DNA damage response (DDR)

## Clinical program targets three major DDR pathways, in mono- and combination (incl. Avelumab)

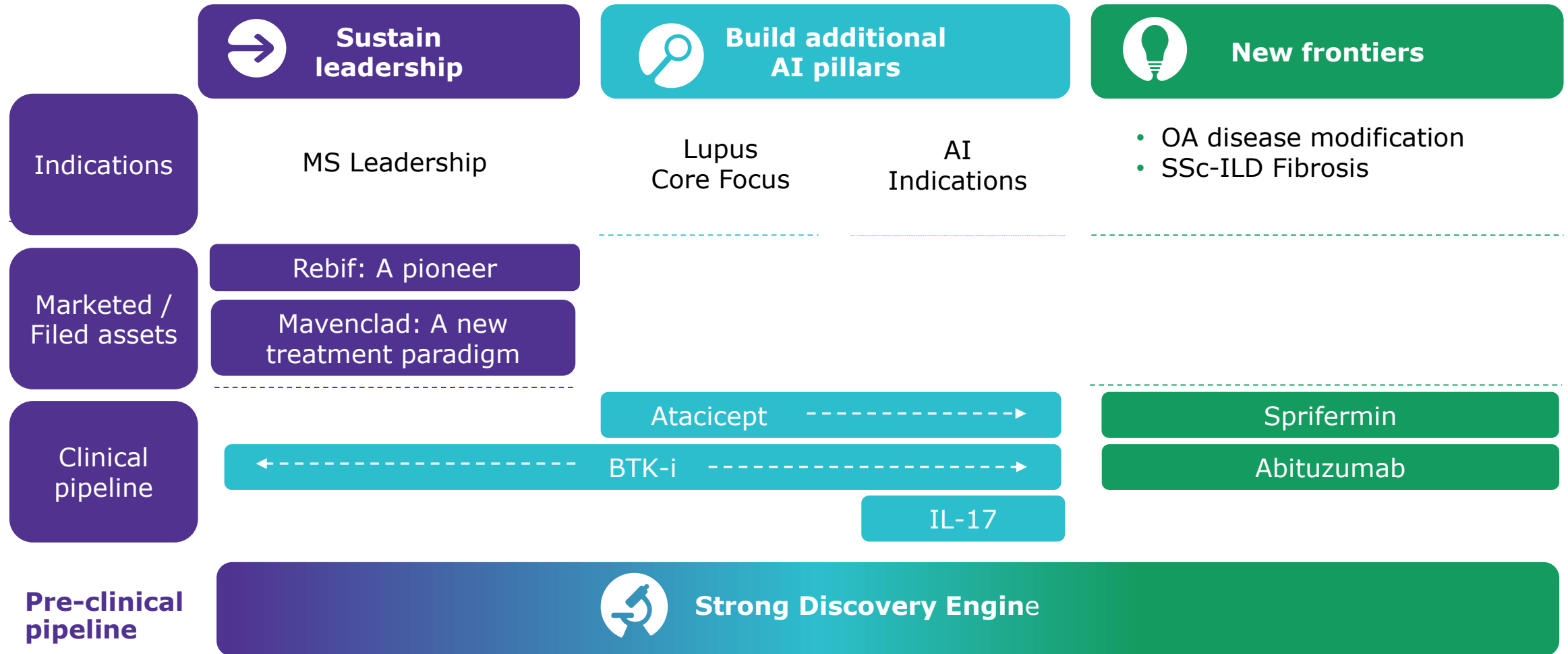
Estimated primary completion<sup>1</sup>



<sup>1</sup> Estimated primary completion date according to Clinicaltrials.gov as of October 26, 2018; Acronyms: ATM: ataxia-telangiectasia mutated | ATR: ataxia telangiectasia and Rad3 | DNA-PK: DNA-dependent protein kinase | CT: Chemotherapy | RT: Radiotherapy | CRT: chemoradiotherapy | NSCLC: non-small cell lung cancer | SCLC: small cell lung cancer | TNBC: triple negative breast cancer | MTD: Maximum Tolerated Dose; Note: timelines are event-driven and may change



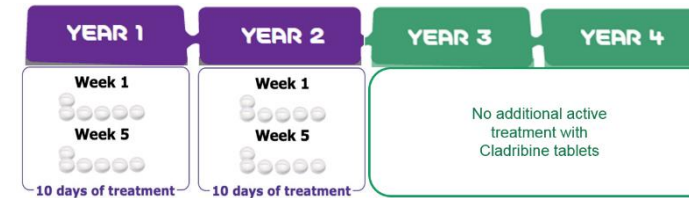
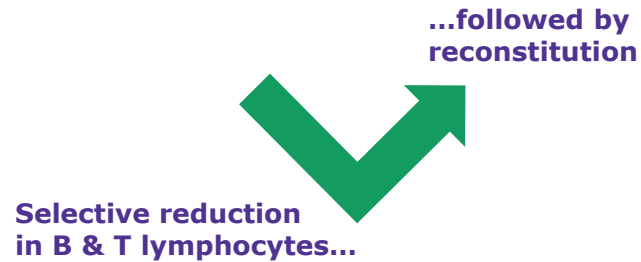
## Immunology

**Strategy is anchored on leadership in selected disease areas**

## Immunology

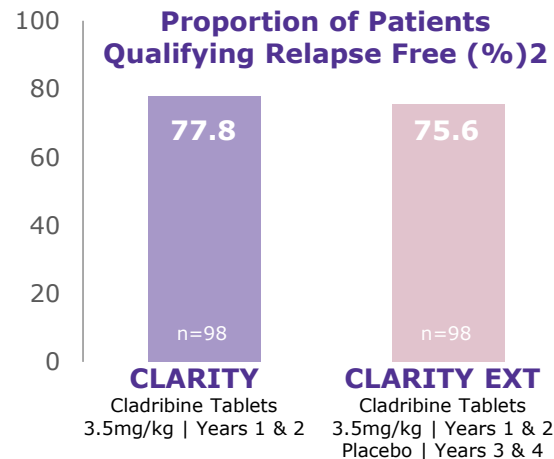
## Mavenclad could change the MS treatment paradigm

**Selective immune reconstitution therapy (SIRT)<sup>1</sup>**



**Unique posology: max. 20 days of oral treatment<sup>3</sup>**

**4 years disease control with treatment over 2 years<sup>2</sup>**



		Key											
		Lymphocyte count			Treatment			MRI					
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Prior to treatment initiation													
Year 1	TB/HBV/HCV screening <sup>4</sup>	5 days of treatment	5 days of treatment										
Year 2	TB/HBV/HCV screening <sup>4</sup>	5 days of treatment	5 days of treatment										

**Low monitoring requirements<sup>4</sup>**

<sup>1</sup> Giovannoni G. Neurotherapeutics 2017; Nov 22 [Epub ahead of print] | Wiendl H et al. Neurology 2017;89:1098–100 | Wiendl H. Nat Rev Neurol 2017; Sept 8 [Epub ahead of print]

<sup>2</sup> Giovannoni G et al. N Engl J Med 2010;362:416–26 | Giovannoni G et al. Mult Scler Aug 1 [Epub ahead of print] <sup>3</sup> Maximum of 20 days of oral dosing over 2 years with no further treatment required in the next 2 years. For important safety information, refer to the abbreviated Prescribing Information | Oral, weight-based dosing. For an average patient weighing 67 kg. Recommended treatment over 2 years. One treatment course per year, followed by observation for another 2 years. Each treatment course consists of two treatment weeks, one at the beginning of the first month and one at the beginning of the second month of the respective year | MAVENCLAD® EU SmPC, September 2017 | Giovannoni G et al. N Engl J Med 2010;362:416–26 <sup>4</sup> MAVENCLAD® EU SmPC September 2017 | Screening must be performed prior to initiation of therapy in Year 1 and Year 2. Vaccination of antibody-negative patients is recommended prior to initiation of Cladribine Tablets. AE, adverse event; HBV, hepatitis B virus; HCV, hepatitis C virus; MRI, magnetic resonance imaging; NEDA, no evidence of disease activity; TB, tuberculosis

## Immunology

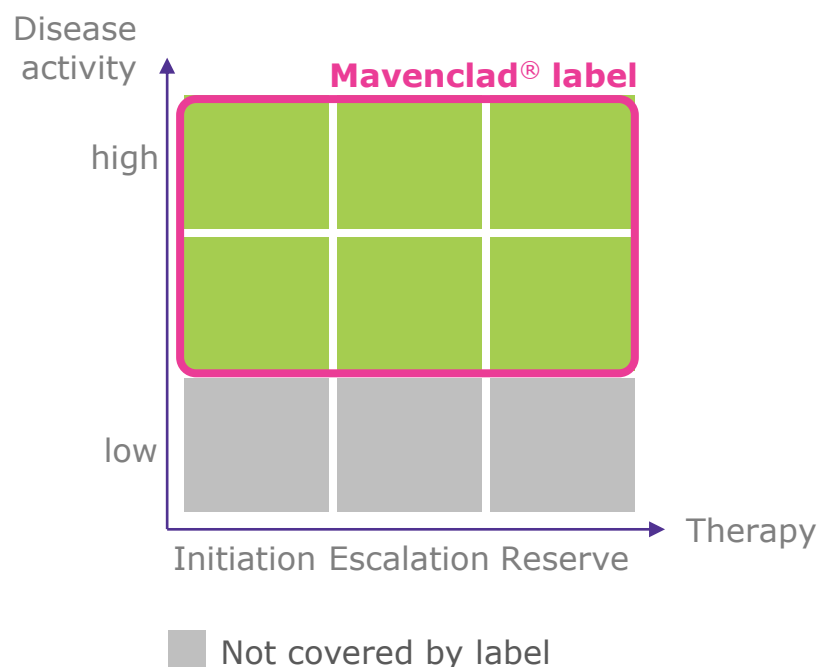
# Mavenclad®'s attractive label<sup>1</sup> in Europe supports integrated franchise strategy

**Mavenclad® label covers 60-70% of patients with RRMS<sup>2</sup> within the MS<sup>1</sup> patient population in Europe**

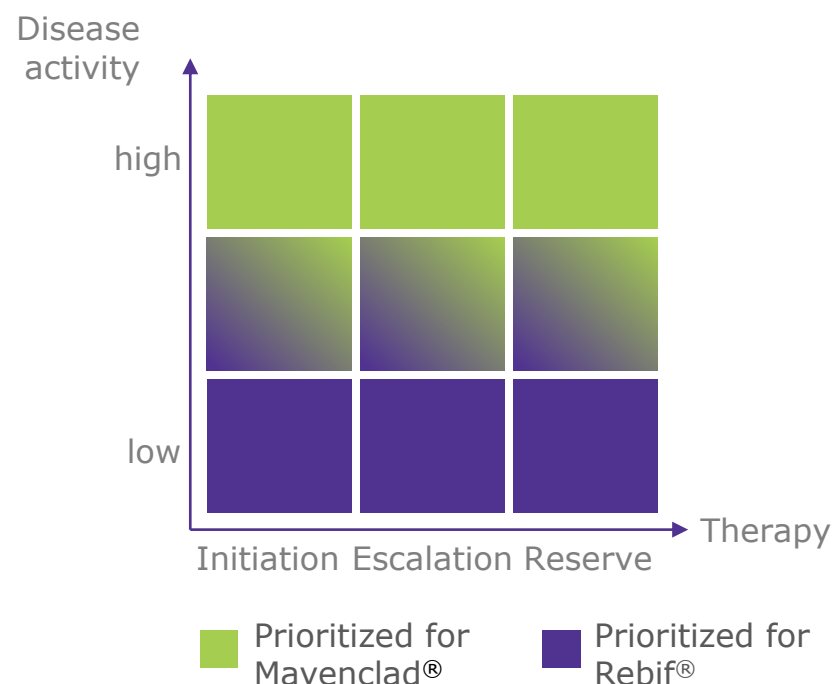
**Our overall NDD franchise will cover a broad MS patient pool**

**Integrated franchise strategy**

## MS patient population<sup>3</sup>



## RRMS patients, EU-5<sup>4</sup>



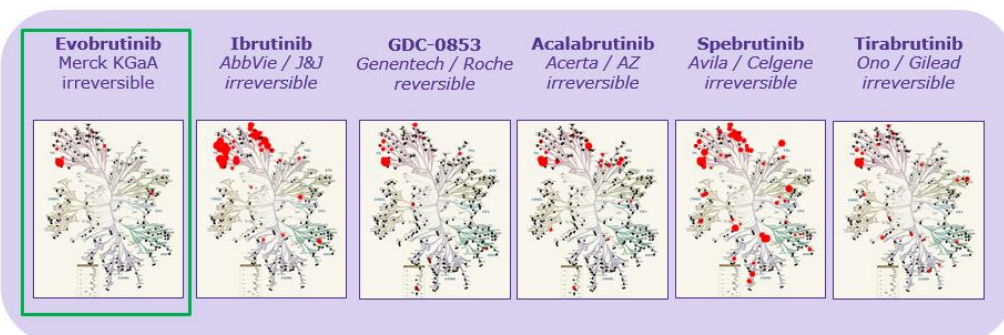
- ✓ At patient level: Rebif® and Mavenclad® are **highly complementary**
- ✓ At physician level: High overlap
- ✓ Franchise infrastructure investment benefits both brands

<sup>1</sup>Mavenclad® label covers: RRMS+rSPMS+rPPMS; <sup>2</sup>Abbreviations: RRMS = relapsing-remitting multiple sclerosis, MS = multiple sclerosis, rSPMS = relapsing secondary progressive MS, rPPMS = relapsing primary progressive multiple sclerosis; <sup>3</sup>Source: Merck KGaA, Darmstadt, Germany; <sup>4</sup>Source: Merck KGaA, Darmstadt, Germany, Ipsos; As of September 2018, Mavenclad was reimbursed in 22 countries globally

# Evobrutinib

## Highly selective BTK-i to be explored as chronic therapy

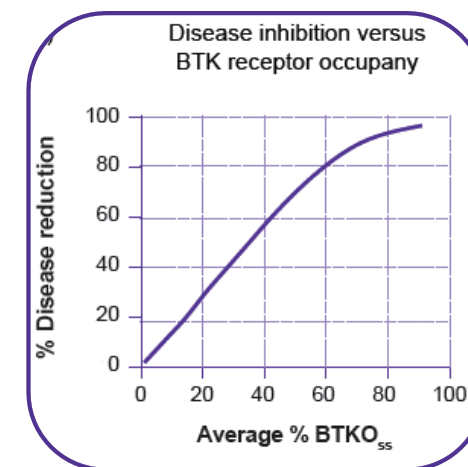
### Safety: Promising kinase selectivity minimizing off-target effects<sup>1</sup>



- Greater selectivity vs. in-class competitors in kinase screen (>270 kinases)
- Besides BTK, two more kinases inhibited (vs. 25 off-target kinases by others)
- Kinase selectivity may result in lower AE rate vs. existing treatments

### Efficacy: Oral, highly efficacious in pre-clinical models<sup>1</sup>

- Evobrutinib (irreversible antagonist) inhibiting signal transduction until protein is naturally degraded (no B-cell depletion)
- Occupancy/efficacy correlation: average BTK occupancy of >80% correlated with near complete inhibition of disease activity<sup>1</sup>
- Clinical benefit of addressing B cell biology demonstrated by anti-CD20 targeting agents
- Insights from phase IIa trial (RA) leveraged in broad clinical development program (three phase IIb trials in MS, SLE, and RA)



<sup>1</sup> "Pharmacodynamic Modelling of BTK Occupancy versus Efficacy in RA and SLE Models Using the Novel Specific BTK Inhibitor M2951" Abstract #4342; EULAR 2016

## Evobrutinib

**First BTKi demonstrating clinical proof-of-concept in relapsing multiple sclerosis (RMS)<sup>1</sup>****Study Design**

- **Design:** Randomized, double-blind, placebo-controlled study in patients with RMS
- **Patient population:** 267 patients
- **5 arms:** placebo vs. 3 drugs-arms (low, mid, high dose<sup>2</sup>) incl. open-label reference arm (dimethyl fumarate, 240 mg BID)
- Gadolinium enhancing T1 (T1 Gd+) lesions measured at weeks 12, 16, 20 and 24 in comparison to patients receiving placebo

**Study Outcome presented at ECTRIMS 2018:  
Significant reduction of T1 Gd+ lesions vs placebo****Primary endpoint (T1 Gd+ lesions, wks 12-24, endpoint met):**

- T1 Gd+ lesion rate ratio vs placebo:
  - Evobrutinib 25 mg QD: 1.45
  - Evobrutinib 75 mg QD: 0.30
  - Evobrutinib 75 mg BID: 0.44

**Key secondary endpoint (ARR, wk 24, clinically relevant decrease):**

- Annualized Relapse Rate (ARR):
  - Placebo: 0.37
  - Dimethyl fumarate: 0.20<sup>3</sup>
  - Evobrutinib 25 mg QD: 0.57
  - Evobrutinib 75mg QD: 0.13
  - Evobrutinib 75mg BID: 0.08

**Safety:**

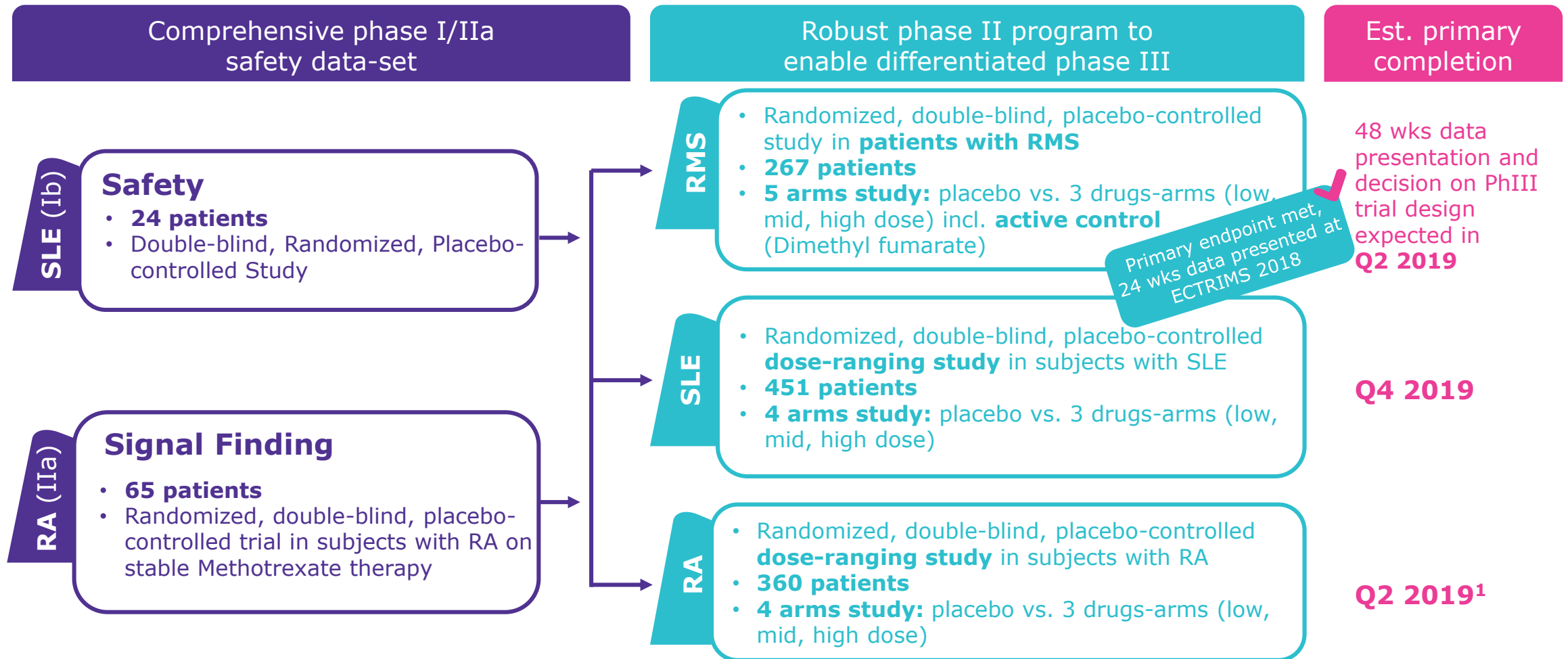
- Well tolerated, no treatment associated infections, infestations or lymphopenia observed
- Elevated ALT, AST and lipase levels observed were reversible and patients were asymptomatic

**Next  
steps**

**48 wks data**, informing **Ph III trial design**, to be presented at an upcoming medical congress in 2019

## Evobrutinib

## Comprehensive development plan across immune-mediated diseases



<sup>1</sup> Data presentation not expected until Q3 2019.  
All timelines are event-driven and may be subject to change.

# Process Solutions

## Next-generation bioprocessing on the cards

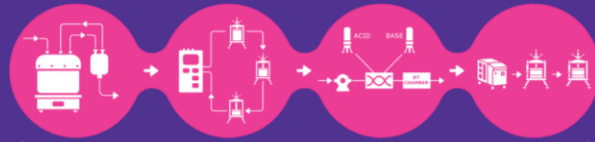
**Make**

**purify**

Today's  
process & portfolio



**MAb process intensification 2017 - 2020+**



**continuous processing >2025**



**Continuous bioprocessing will ...**

- be an evolution in mAb bioprocessing
- take time to establish
- leverage the present
- lead to hybrid solutions

Tomorrow's  
process

## Process Solutions

### Our single-use technologies drive flexibility in modern bioprocessing

30,000 l  
stain-less  
steel tank



500 l  
single-use  
tank

#### Traditional Multi-use facility

CAPEX* required	~\$500 m to \$1 bn
Time to construct	5 to 10 years
Change over time	4 weeks
Footprint	~>70,000 m <sup>2</sup>

#### Innovative single-use facility

CAPEX required	\$20 m to \$100 m
Time to construct	1.5 years
Change over time	0.5 days
Footprint	~11,000 m <sup>2</sup>

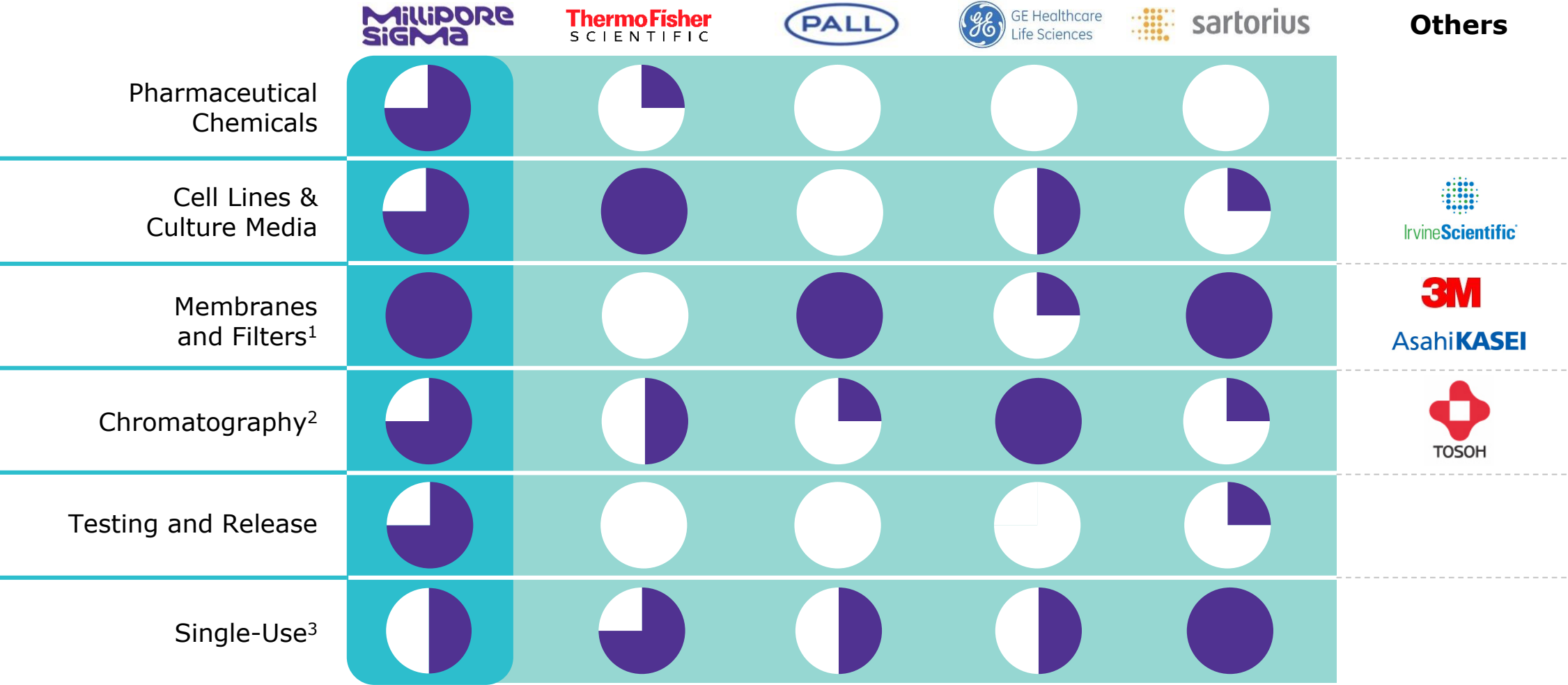
**Strong demand for single-use technologies and Process Solutions' broad offering was and will remain a key source of growth for Life Science**

\*CAPEX = Capital Expenditure



# Process Solutions

## We are the only company to span the entire value chain of our customers



Pie Charts represent completeness of product offering; <sup>1</sup>Includes Aseptic, Virus, Clarification, TFF; <sup>2</sup>Includes resins, columns and hardware for separation and purification; <sup>3</sup>Includes assemblies, bioreactors and components

# Research Solutions

## Leading e-Commerce and operational excellence to serve customers

### unique customer Experience



Hundreds of thousands of products

SEARCH



Articles, protocols and peer reviewed papers



SCIENTIFIC  
CONTENT



Real-time pricing and availability

ORDER

### Highly reputable e-COMMERCE platform

**#1** in Life Science for web traffic

Ranking of websites:\*



<b>sigmaaldrich.com</b>	<b>No. 1</b>
thermofisher.com	No. 2
fishersci.com	No. 3
vwr.com	No. 4
<b>emdmillipore.com</b>	<b>No. 5</b>

**>100 M** unique visits

**>€ 1.5 Bn** sales

**>30%** of our eCommerce orders contain products from former Sigma AND Millipore

### Impeccable supply chain

**>300K** products

**~13 M** lines shipped per year

**~90%** fill rate globally

**>80%** of lines shipped within 24-48 hours in Western Europe and North America

\*Alexa report, global, all sectors – Web traffic ranking June 2018: sigmaaldrich.com = Rank 3,361, thermofisher.com = Rank 3,935, fishersci.com = Rank 17,473, vwr.com = Rank 27,061, emdmillipore.com = Rank 29,637

# Semiconductor Solutions

## Key enabler for digital trends

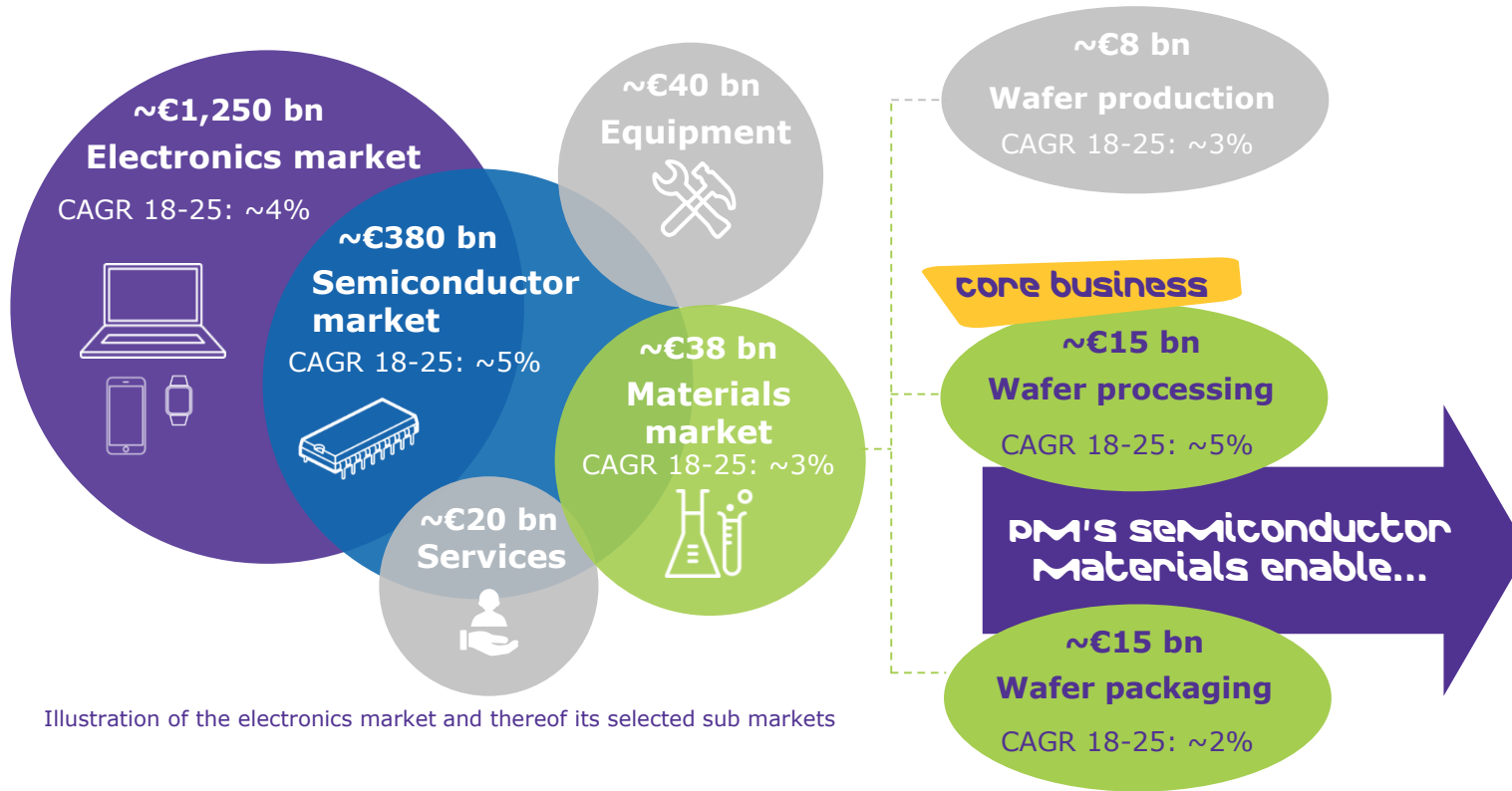


Illustration of the electronics market and thereof its selected sub markets

### ...customer needs

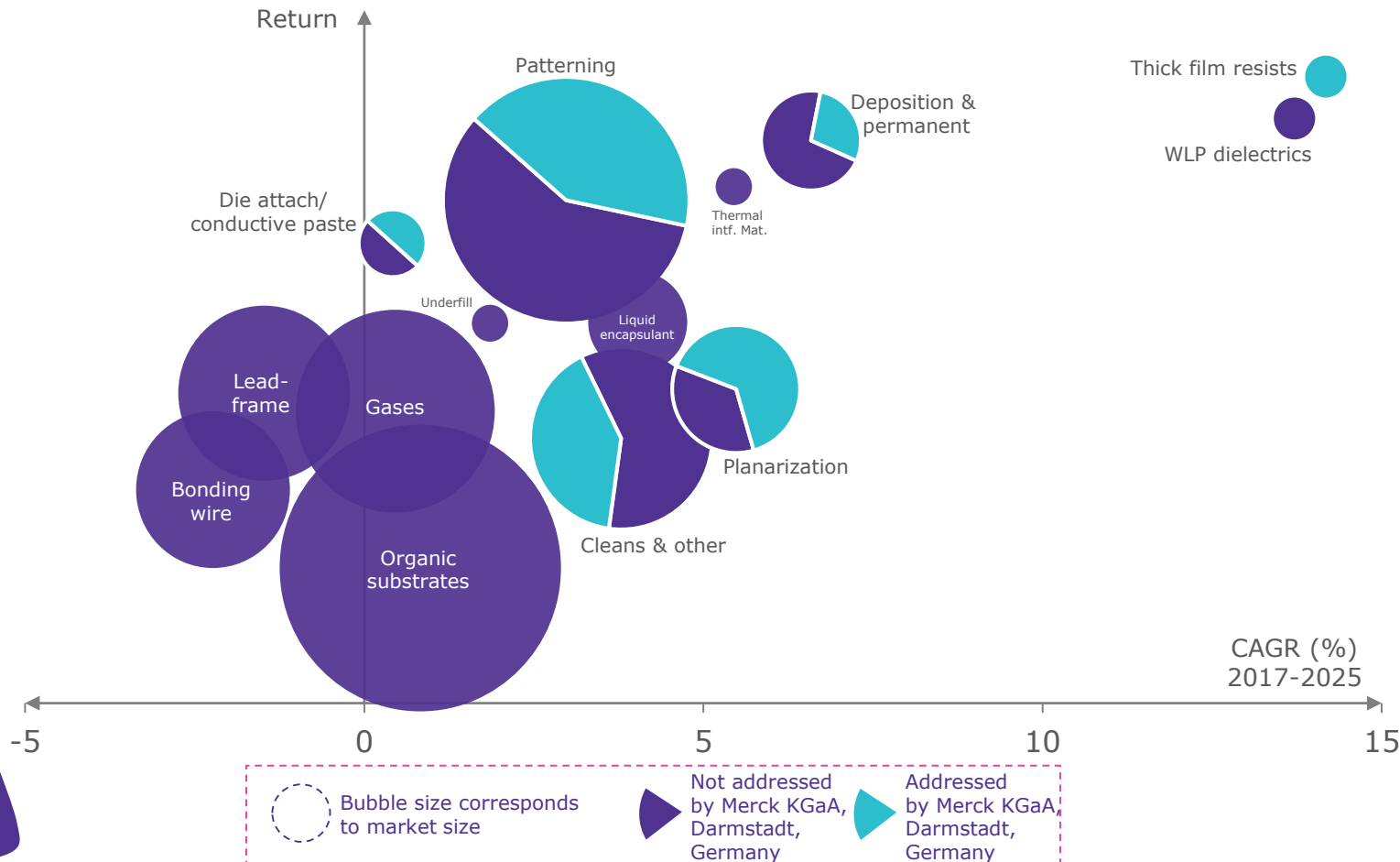
- Smaller structures beyond limitations of existing technologies
- Higher memory capacity, faster processing speed, less power consumption
- Improved yield and lower processing costs

**Performance enhancing materials will benefit over-proportionately from attractive semiconductor growth rate of 5% CAGR**

# Semiconductor Solutions

## Well positioned in highly attractive market segments

Market landscape of wafer processing and packaging materials

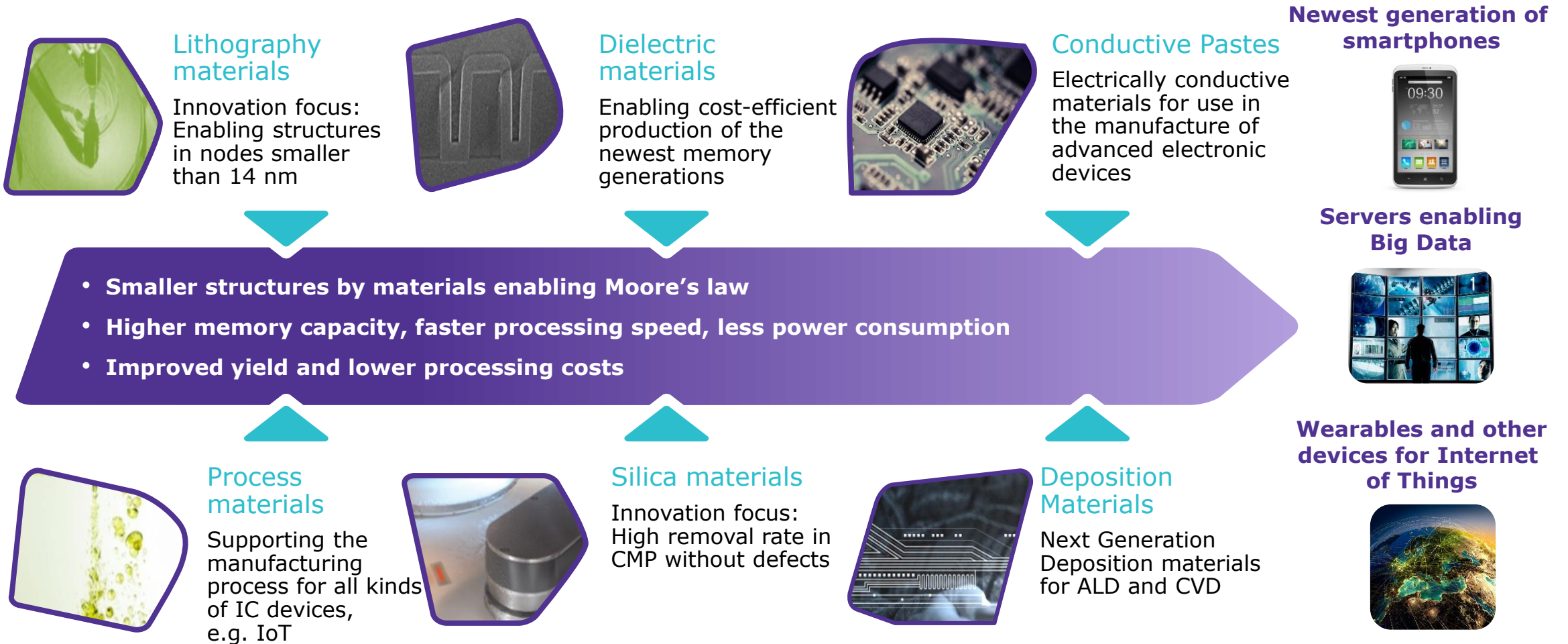


### Market positioning

- Positioned in attractive sub-segments
- Focus on enabling material solutions with small part in bill of materials
- Address innovative technologies through collaborative R&D
- Above-market growth
- Opportunities to increase footprint

# Semiconductor Solutions

## Enabler of key technology trends



# Semiconductor Solutions

## Overcoming technology barriers – supporting continued progression of technological mega trends

### Market drivers and technological trends

**Miniaturization:** Devices are becoming smaller with better performance

- Need for enabling materials to reduce size (Moore's law)

**Mobility:** Everyone is continuously connected without direct power supply

- More chips needed for local energy production
- Energy storage → smaller batteries with higher density

**Internet of Things:** Everything is continuously connected

- More gadgets and devices that include chips
- Increasing amount of communication and sensor chips

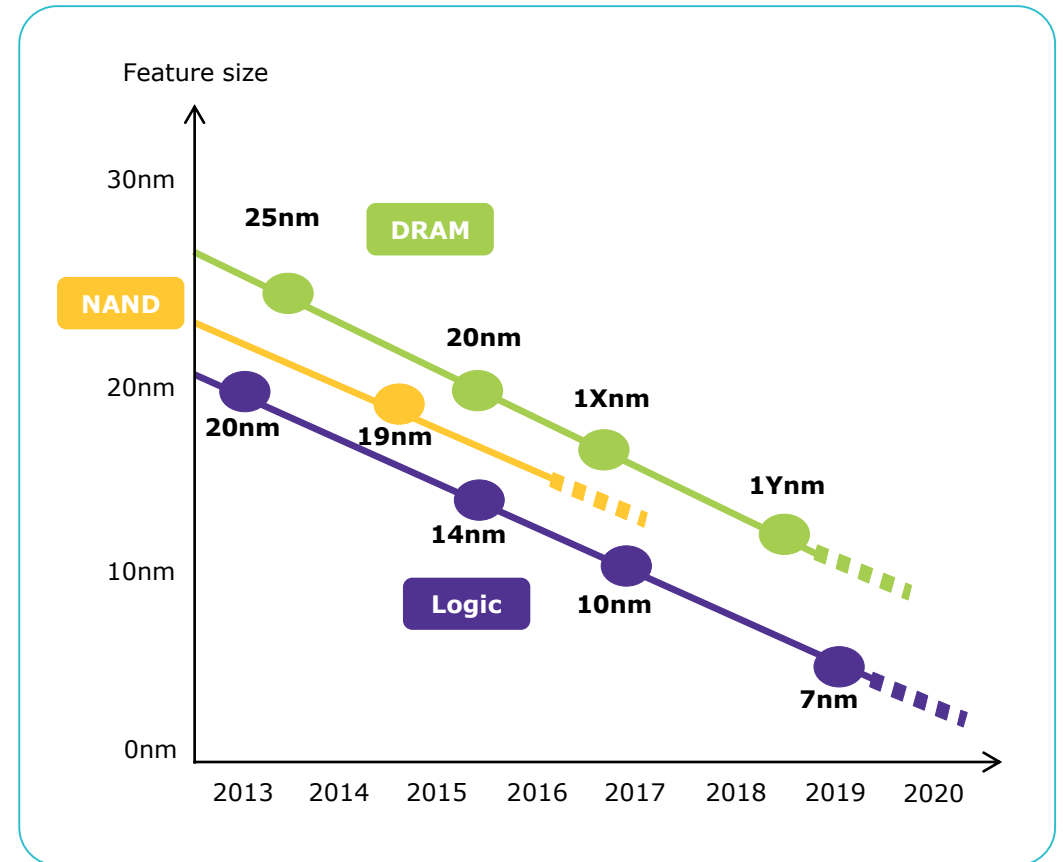
**Big Data:** Increasing need for intelligent data storage

- Switch from hard disk drives (HDD) to solid state drives (SSD)

### Selected competitors

- Tokyo Ohka Kogyo
- Dow Electronic Materials
- Nissan Chemicals
- JSR

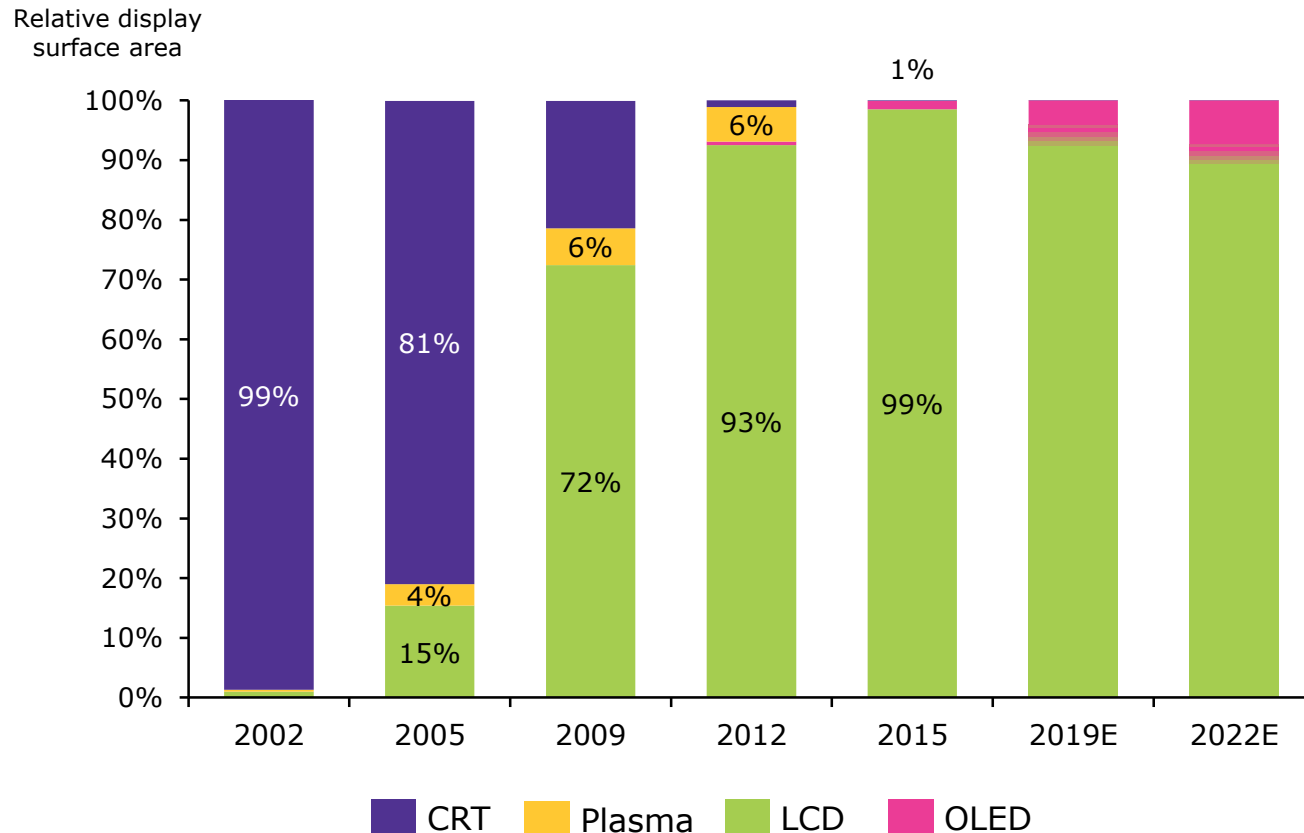
### Feature sizes develop as predicted by Moore's law



# Display Solutions

## Liquid crystals are clearly the dominant display technology

### Market share by display technology



### Rationale for LCD leadership

#### For consumers:

- Price
- Thinner frames
- Higher resolution in all sizes
- Proven track record of extreme reliability

#### For manufacturers:

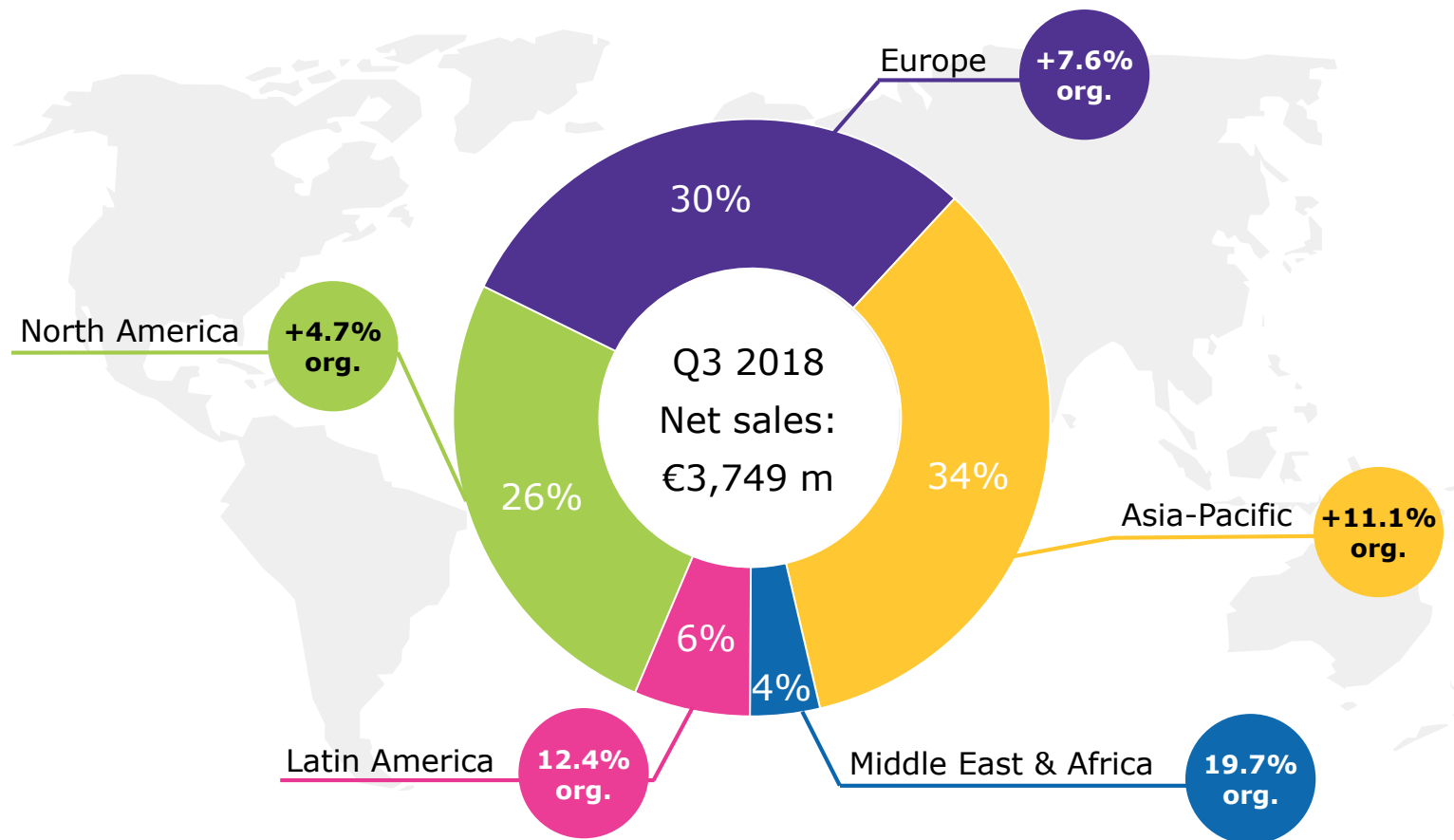
- Price and scalability
- Production costs and capacities

**LCD progress creates higher technological and commercial entry barriers**

**OLED share will increase in mobile applications**

# Organic growth in all regions

## Regional breakdown of net sales [€ m]



## Regional organic development

- Strong growth in Europe reflects strong demand in Life Science, Mavenclad<sup>®</sup> ramp up, and continued resilience of Fertility
- Solid growth in North America due to Life Science; Fertility and Bavencio<sup>®</sup> more than offset ongoing decline of Rebif<sup>®</sup>
- Solid growth in APAC across all major businesses, driven by double-digit growth in Life Science, Healthcare and PM
- Very strong performance in LATAM driven by Healthcare and Life Science
- MEA reflects strong demand of Healthcare's core business, mainly Glucophage<sup>®</sup> and tender phasing of Erbitux<sup>®</sup>



## Q3 2018: Overview

### Key figures

[€m]	Q3 2017	Q3 2018	Δ
Net sales	3,517	<b>3,749</b>	6.6%
EBITDA pre	1,023	<b>963</b>	-5.9%
Margin (in % of net sales)	29.1%	25.7%	
EPS pre	1.43	<b>1.32</b>	-7.7%
Operating cash flow	758	<b>731</b>	-3.5%

[€m]	Dec. 31, 2017	Sept. 30, 2018	Δ
Net financial debt	10,144	<b>10,168</b>	0.2%
Working capital	3,387	<b>3,784</b>	11.7%
Employees*	52,941	<b>54,756</b>	3.4%

\*Thereof CH Headcount ~3.400;  
Totals may not add up due to rounding

### Comments

- EBITDA pre & margin reduction driven by FX effects & hedging losses, investments in LS, PM business mix and LY milestone payments in HC
- Lower EPS pre in line with EBITDA pre decline
- Net financial debt reduced by €506 m vs. June 30<sup>th</sup> 2018
- Working capital reflects strong organic sales growth
- Higher headcount related to growth initiatives in Life Science and launch activities in Healthcare

# Healthcare: Strong organic growth overcompensates FX headwinds; Profitability burdened by LY's favorable one-time effects

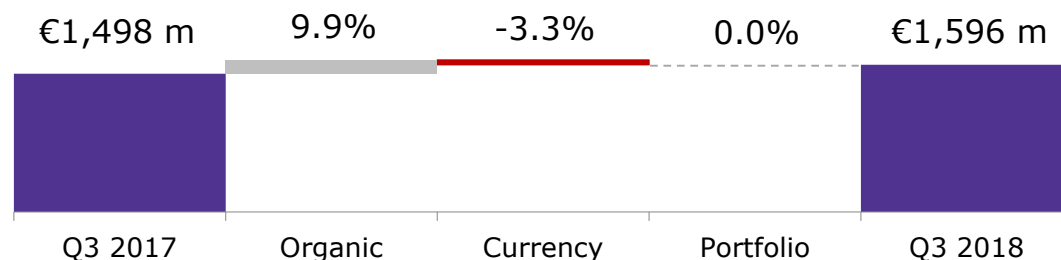
## Healthcare P&L

[€m]	Q3 2017	Q3 2018
Net sales	1,498	<b>1,596</b>
Marketing and selling	-583	<b>-571</b>
Administration	-64	<b>-72</b>
Research and development	-416	<b>-409</b>
EBIT	539	<b>191</b>
EBITDA	707	<b>372</b>
EBITDA pre	397	<b>381</b>
Margin (in % of net sales)	26.5%	<b>23.9%</b>

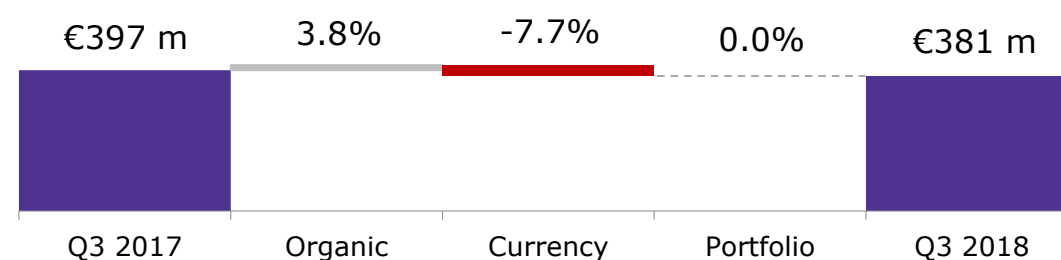
## Comments

- Strong organic growth fueled by double-digit growth of Fertility and Glucophage<sup>®</sup>; Mavenclad<sup>®</sup> and Bavencio<sup>®</sup> launches on track
- Erbitux<sup>®</sup> benefitting from phasing, still facing ongoing competition and price pressure in major markets
- Ongoing decline of Rebif<sup>®</sup> due to competition in U.S. & EU
- FX offsetting M&S investments for Mavenclad<sup>®</sup>
- EBITDA pre reflects FX headwinds (mainly BRL\* & ARS\*) strong topline contribution offsets unfavorable prior year effect (two Bavencio<sup>®</sup> milestones of ~€50 m)

## Net sales bridge



## EBITDA pre bridge



Totals may not add up due to rounding;  
\* BRL = Brazilian real; ARS = Argentine peso

# Healthcare: Strong organic growth overcompensates FX headwinds; Profitability burdened by LY's favorable one-time effects

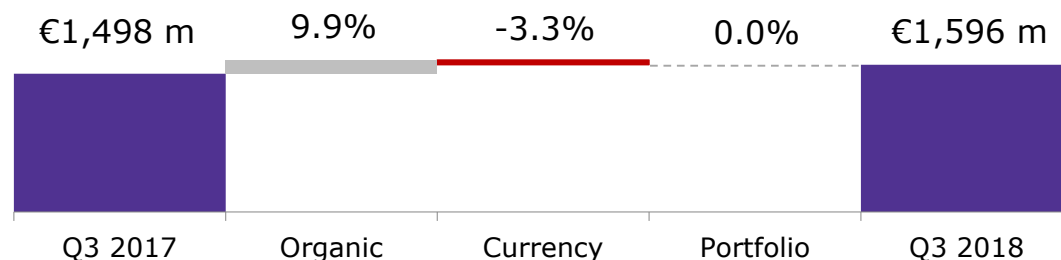
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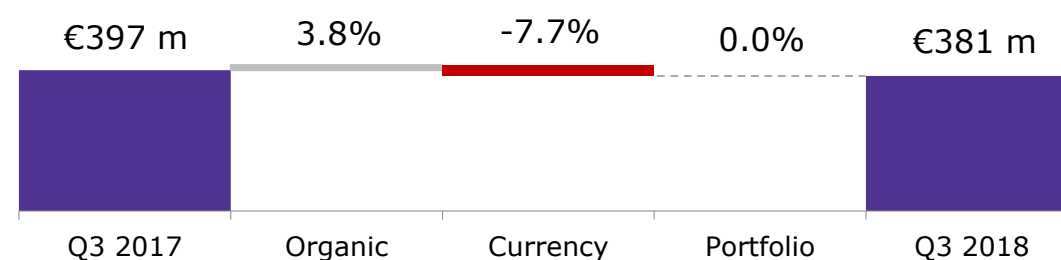
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## Net sales bridge



## EBITDA pre bridge



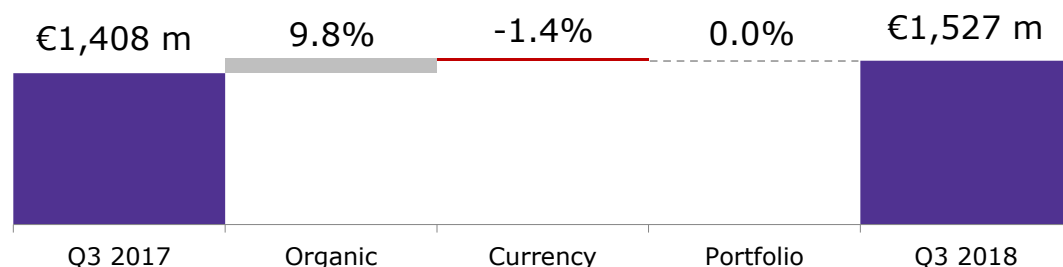
Totals may not add up due to rounding;  
\* BRL = Brazilian real; ARS = Argentine peso

# Life Science: Strong organic sales growth across all businesses drives EBITDA pre

## Life Science P&L

[€m]	Q3 2017	Q3 2018
Net sales	1,408	<b>1,527</b>
Marketing and selling	-412	<b>-443</b>
Administration	-59	<b>-69</b>
Research and development	-60	<b>-59</b>
EBIT	220	<b>277</b>
EBITDA	401	<b>449</b>
EBITDA pre	426	<b>460</b>
Margin (in % of net sales)	30.2%	<b>30.1%</b>

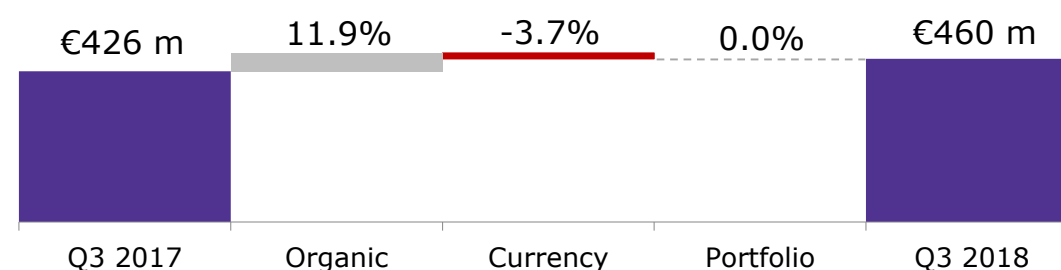
## Net sales bridge



## Comments

- Process Solutions posts double digit growth driven by all businesses, especially strong demand for filtration and single-use
- Applied Solutions shows high-single digit growth, reflecting continued strong demand for lab water
- Research Solutions benefits from positive demand trends across all businesses and regions, especially reagents and laboratory chemicals
- Strategic investments in viral vector manufacturing, single-use bioprocessing and China expansion start to impact topline growth
- M&S increase in line with previous quarters and topline growth
- EBITDA pre reflects strong topline growth, offset by investments in eCommerce and strategic initiatives as well as FX headwinds

## EBITDA pre bridge

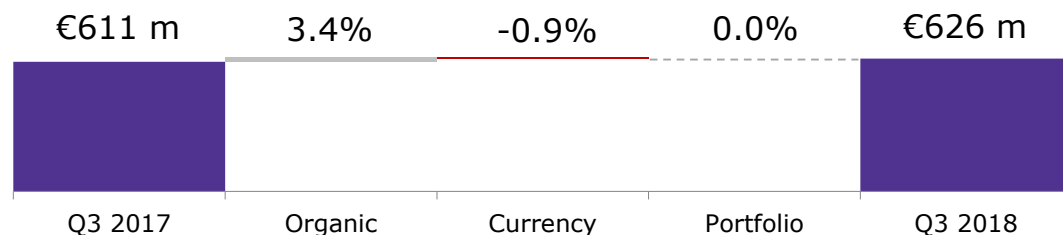


# Performance Materials: Organic growth mainly driven by Semiconductor Solutions

## Performance Materials P&L

[€m]	Q3 2017	Q3 2018
Net sales	611	<b>626</b>
Marketing and selling	-56	<b>-62</b>
Administration	-18	<b>-22</b>
Research and development	-57	<b>-65</b>
EBIT	191	<b>142</b>
EBITDA	246	<b>202</b>
EBITDA pre	249	<b>203</b>
Margin (in % of net sales)	40.7%	<b>32.5%</b>

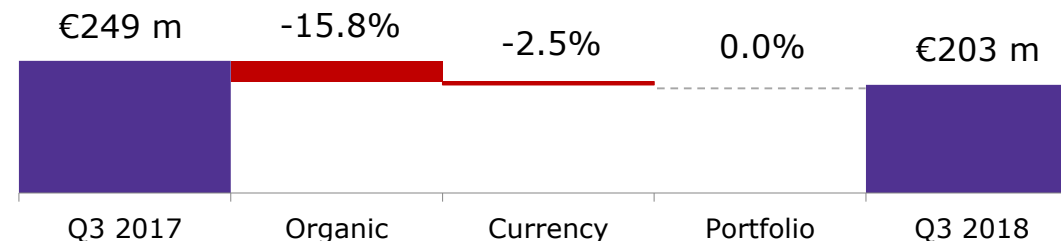
## Net sales bridge



## Comments

- Moderate organic growth in PM driven by growth of Semiconductor Solutions & OLED; LC benefited from new panel plant ramp up projects in China
- Above-market growth of Semiconductor Solutions reflects strong demand of dielectrics, silica and lithography materials
- Ongoing strong demand for innovative UB-FFS technology
- M&S in line with topline growth and with previous quarters
- Increased R&D due to Semiconductor Solutions related projects
- Profitability reflects negative business mix and ongoing LC price decline

## EBITDA pre bridge



# Performance Materials: Strong quarter benefitting from continued demand in Semiconductor Solutions

Net sales by BU,  
in %

Q3 2018  
Net Sales  
€ 626 m

## Semiconductor Solutions

- High single-digit growth above market driven by volume and market share wins
- Increasing demand for patterning and dielectric materials at 3D NAND and DRAM customers
- Spin-on dielectrics driving double digit growth with market share gains
- Strong consumption of deposition and CMP\* materials at customers

## Surface Solutions

- Flat automotive market in China
- Lateral development of overall surface solutions business

## Display Solutions

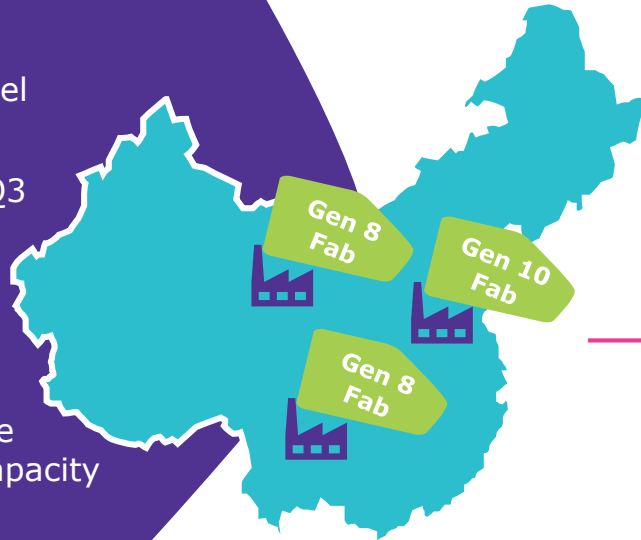
- Continued increasing demand in UB-FFS for small devices
- Partner of choice for bringing new capacity online (limited time frame)
- Underlying trend of declining LC materials market still valid
- LC related materials < 50% of total PM net sales
- OLED participating in capacity expansion with double digit growth

\*CMP = chemical mechanical planarization

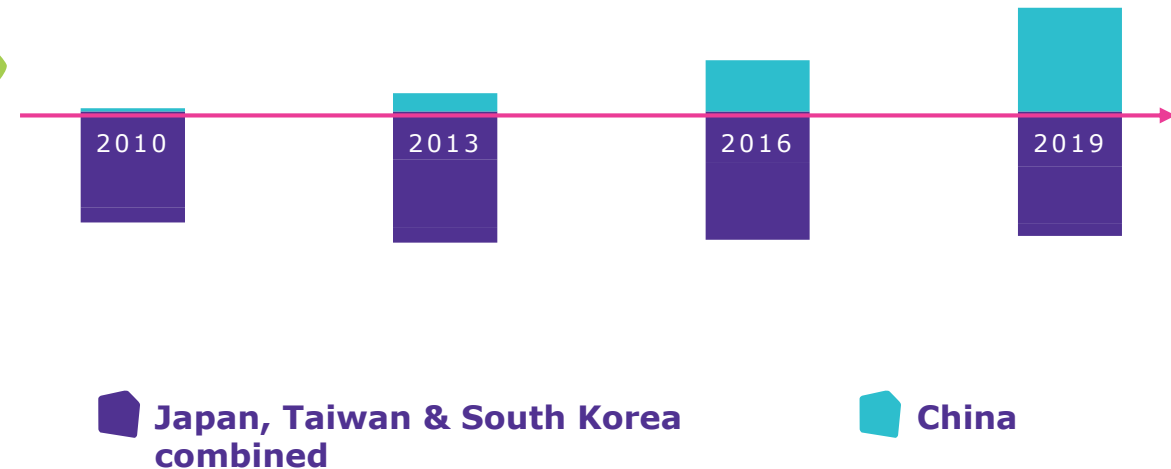
# Performance Materials: Liquid crystals currently benefitting from new display-panel plant capacity ramp up projects

## Temporary nature

- Accelerated ramp up of Chinese panel production facilities
- Projects supporting LC business in Q3 and expected to last until H1 2019
- Increased market share during ramp up phase, but dual sourcing afterwards highly probable
- Overcapacity in 2018 due to massive capacity ramp up in China, global capacity is expected to consolidate in 2019
  - Some manufacturing capacity might be converted to OLED or might be taken off



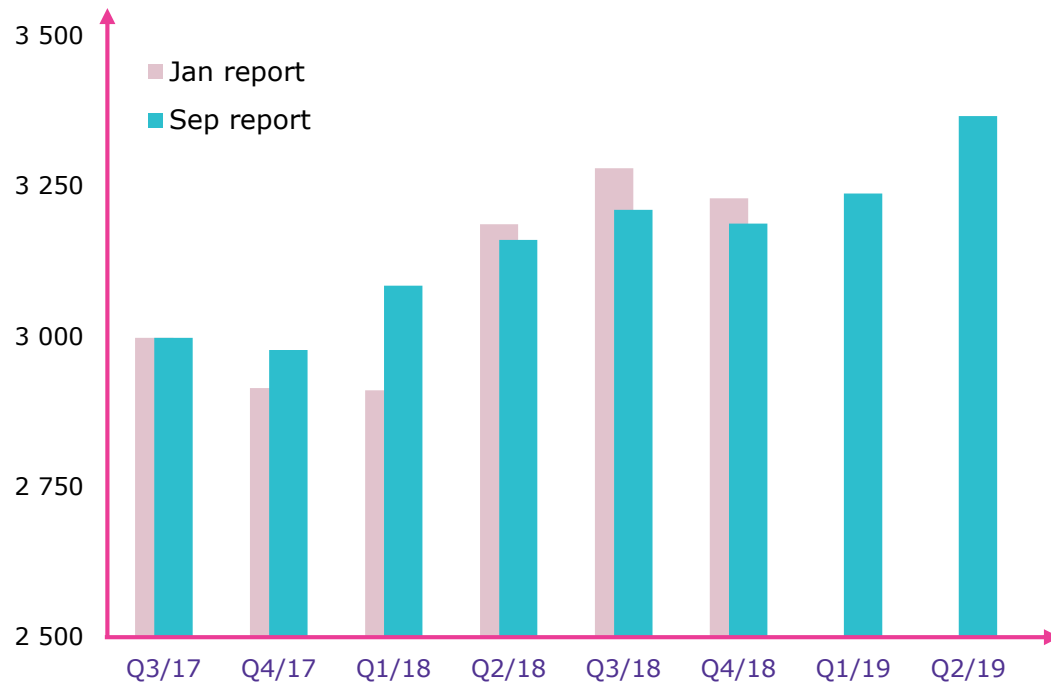
Share of global display production capacities by region [km<sup>2</sup>]\*



**Overall LC materials market decline in value with mid- to high-single digit CAGR until 2025 confirmed**

# Performance Materials: Semiconductor market outlook

Wafer shipments forecast,  
in [MSI\*]



## Market development

- Semiconductor market (revenue) is heavily influenced by the prices in the memory segment
- The material suppliers are relatively independent from this memory price trend
- Wafers shipments (in million square inches, MSI) is a better indicator of volume growth for material suppliers
- MSI is independent of the volatile memory prices and reflects end user demand
- MSI is expected to grow at 7% in 2018 and slightly softer at 5.2% in 2019

**Total Semiconductor Market is strongly influenced by memory pricing, while the Materials Market is correlated with the wafer area**



# Reported figures

## Reported results

[€m]	Q3 2017	Q3 2018	Δ
EBIT	862	<b>491</b>	-43.1%
Financial result	-65	<b>-56</b>	-14.5%
Profit before tax	797	<b>435</b>	-45.4%
Income tax	-177	<b>-112</b>	-36.9%
<i>Effective tax rate (%)</i>	22.2%	<b>25.7%</b>	
Net income <sup>*</sup>	644	<b>340</b>	-47.2%
EPS (€) <sup>*</sup>	1.48	<b>0.78</b>	-47.3%

## Comments

- Lower EBIT reflects LY effects of Biosimilars disposal gain (~€321 m) and Bavencio<sup>®</sup> milestone payments (~€50 m)
- Profit before tax in line with EBIT decrease
- Effective tax rate within guidance range of ~24-26%

<sup>\*</sup>From continuing and discontinued operations;  
Totals may not add up due to rounding

# Cash flow statement

## Q3 2018 – cash flow statement

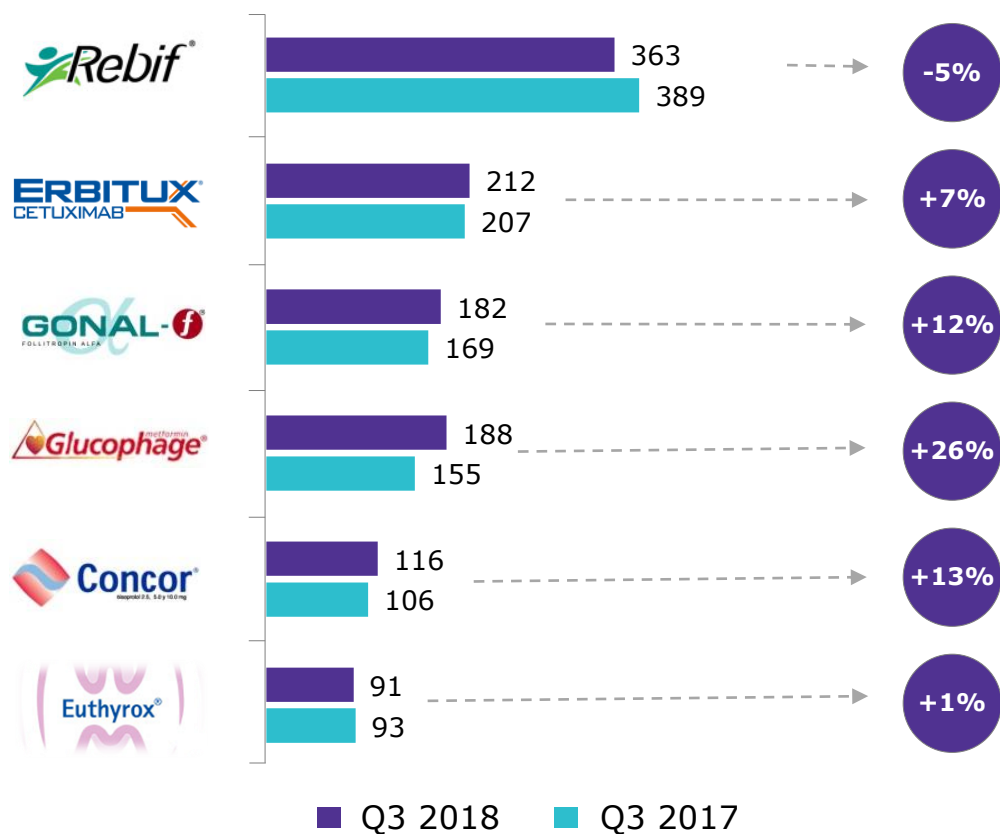
[€m]	Q3 2017	Q3 2018	Δ
Profit after tax	648	<b>345</b>	-303
D&A	419	<b>428</b>	9
Changes in provisions	-50	<b>69</b>	119
Changes in other assets/liabilities	99	<b>6</b>	-93
Other operating activities	-327	<b>-9</b>	318
Changes in net working capital	-31	<b>-107</b>	-76
Operating cash flow	758	<b>731</b>	-27
Investing cash flow	-90	<b>-218</b>	-128
thereof Capex on PPE	-197	<b>-215</b>	-18
Financing cash flow	-844	<b>-287</b>	557

## Cash flow drivers

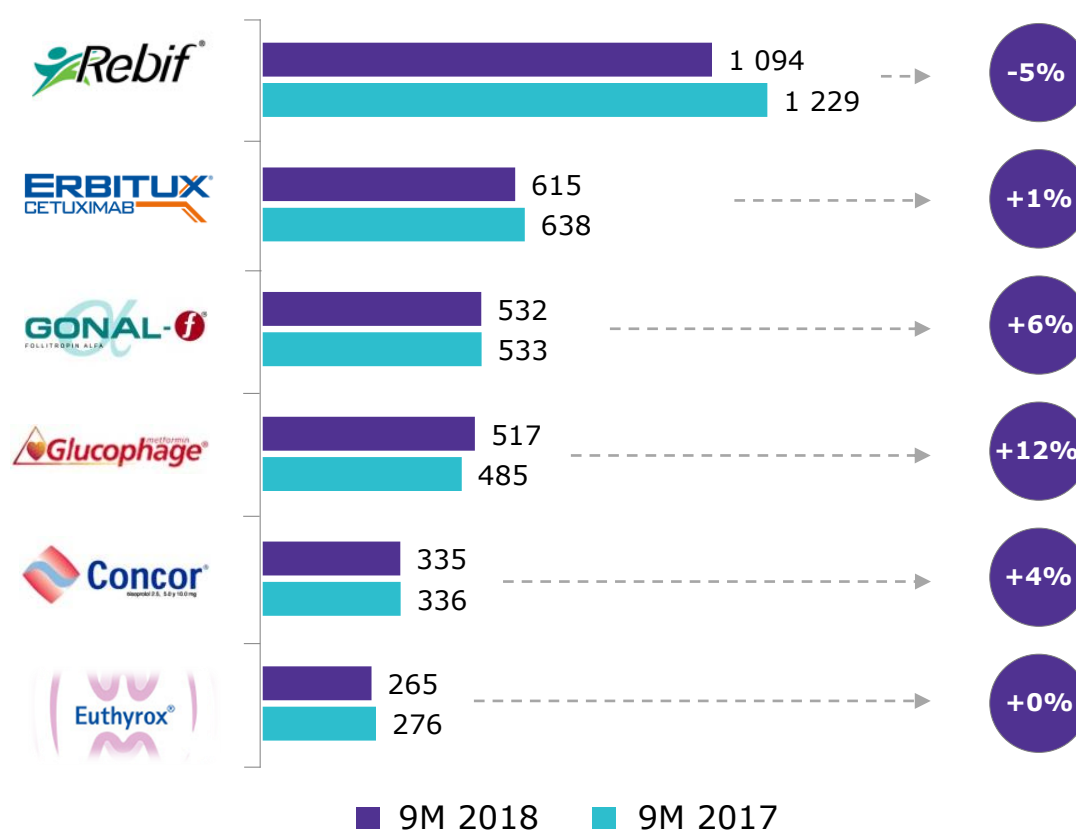
- LY profit after tax reflects gain from Biosimilars divestment, which is neutralized in other operating activities
- Changes in provisions driven by pension provisions and LTIP
- Changes in other assets/liabilities includes LY upfront payment from Fresenius for future R&D activities
- Changes in working capital reflects higher trade account receivables mainly from HC and buildup of inventories mainly from LS and PM
- Investing cash flow reflects LY Biosimilars cash proceeds ~€150 m
- Financing cash flow reflects decrease in bank loans and commercial papers; LY includes bond repayment ~€700 m

# Healthcare organic growth by franchise/product

Q3 2018 organic sales growth [%]  
by key product [€ m]



9M 2018 organic sales growth [%]  
by key product [€ m]

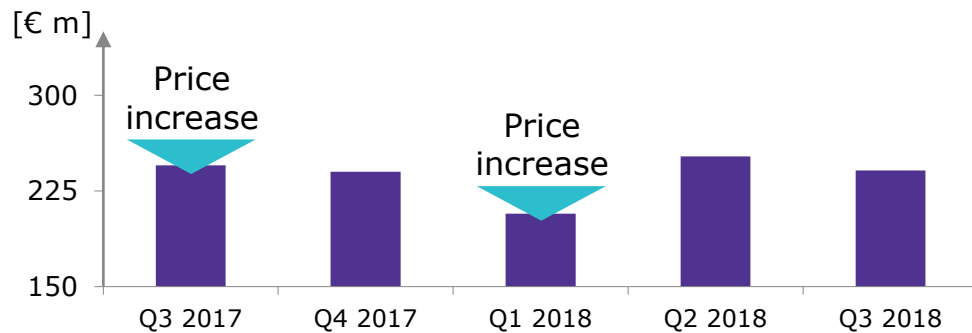


Totals may not add up due to rounding

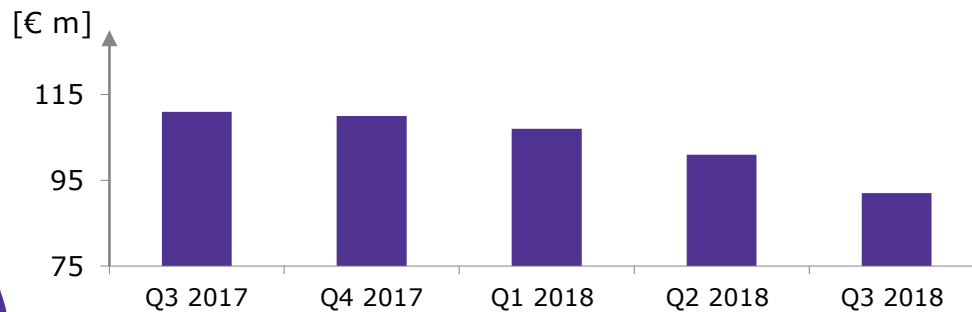
# Rebif<sup>®</sup>: Ongoing decline in line with interferon market

## Rebif<sup>®</sup> sales evolution

### North America



### Europe



### Q3 drivers

-1.8% org.

- Price
- Volume
- FX

### Q3 drivers

-15.5% org.

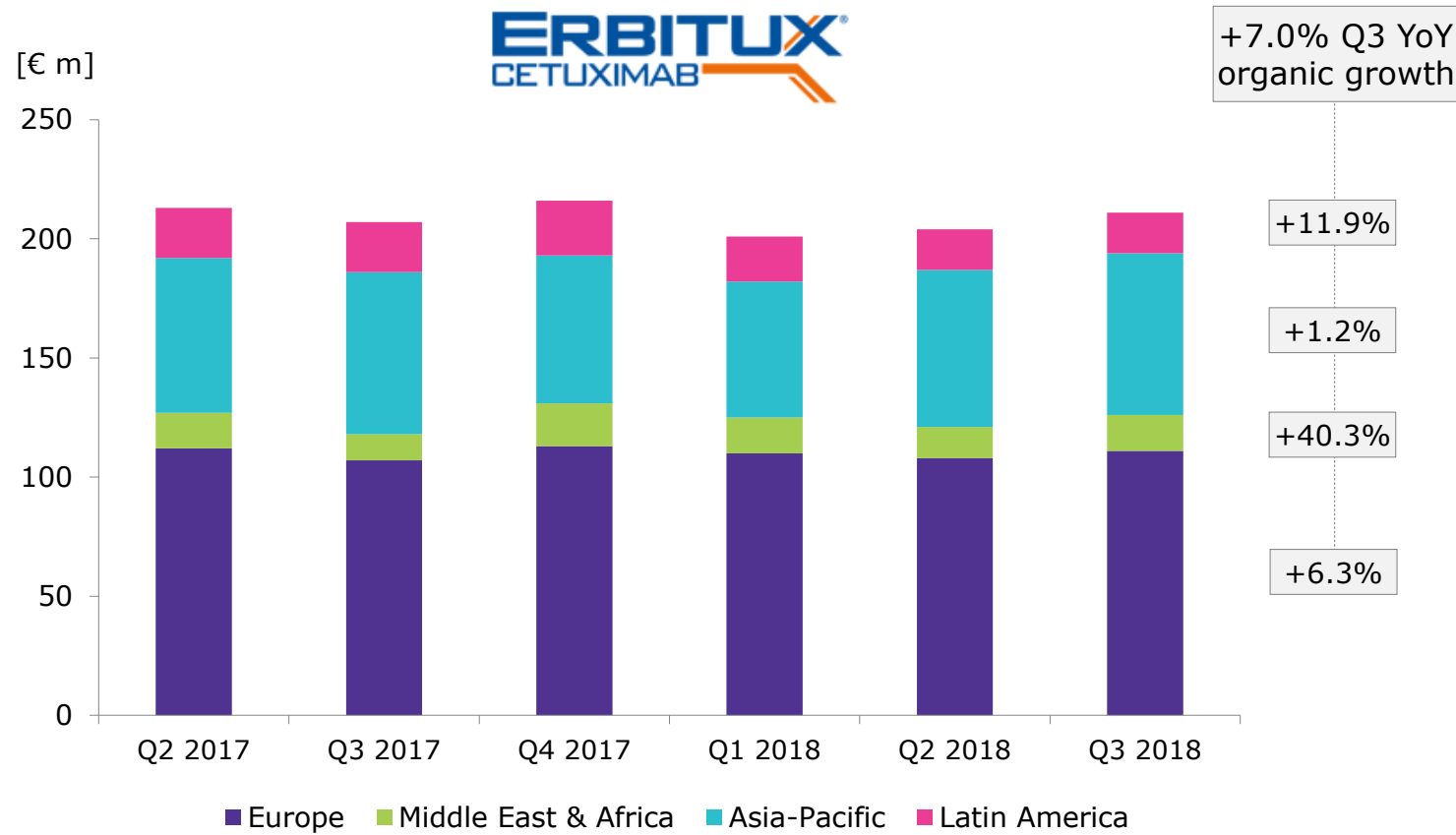
- Price
- Volume
- FX

## Q3 2018 Rebif<sup>®</sup> performance

- Rebif<sup>®</sup> sales of €363 m in Q3 2018 reflect organic decline of -5.2% and negative FX effect of -1.5% mainly from LATAM
- Market shares within interferons stable due to high retention rates and known long-term track record
- Competitive environment in Europe incl. competition from orals driving ongoing organic decline

# Erbitux<sup>®</sup>: A challenging market environment

## Erbitux<sup>®</sup> sales by region



## Q3 2018 Erbitux<sup>®</sup> performance

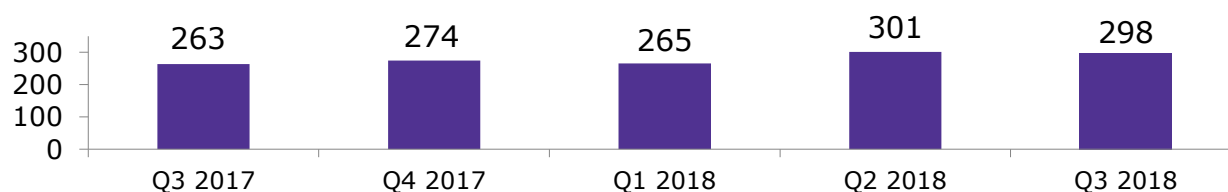
- Absolute sales increase to €212 m due to organic sales growth of +7.0%, mitigated by FX headwinds of -5.0% mainly from LATAM and EU
- Growth in Europe due to tender phasing; still impacted by ongoing competition, price reductions and shrinking market size due to increasing i-onc trials
- APAC about stable mainly driven by increased demand in China
- LATAM strong, and MEA driven by tender phasing due to importation permit

# Solid organic growth of Fertility, General Medicine and Endocrinology

## Sales evolution

### Fertility

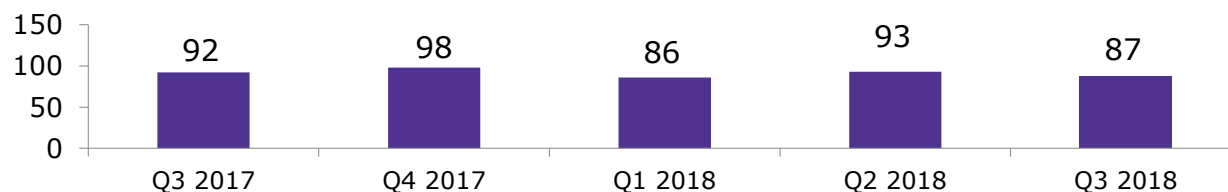
[€ m]



Organic  
+17.9% org.

### Endocrinology

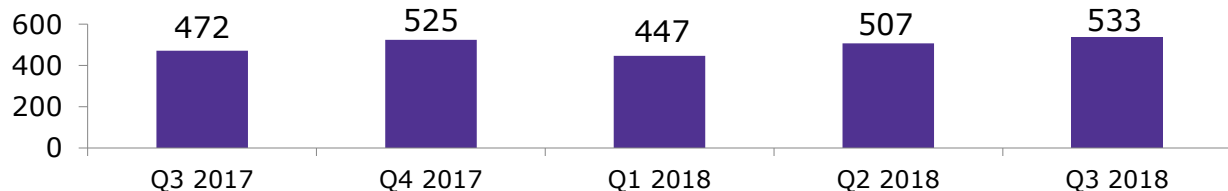
[€ m]



Organic  
-1.1% org.

### General Medicine\*

[€ m]



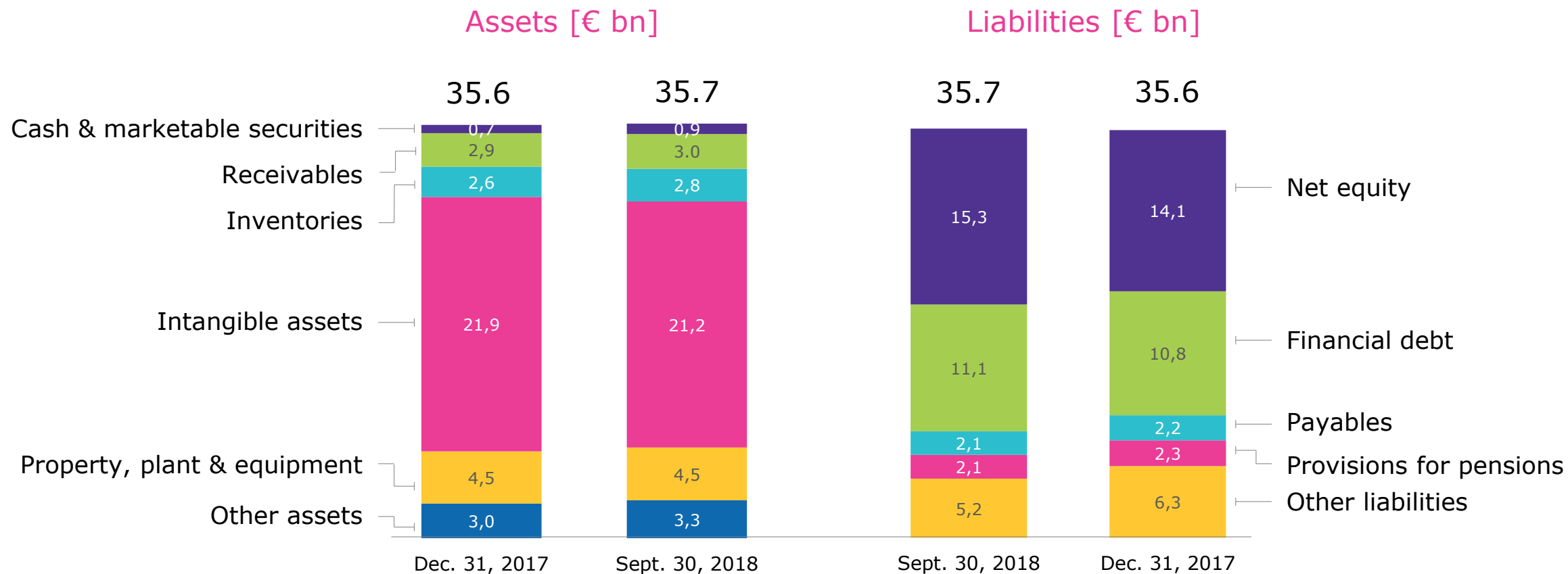
Organic  
11.9% org.

## Q3 2018 organic drivers

- Fertility with double digit growth across all regions, especially in North America, APAC and Europe
- Gonal-f<sup>®</sup> shows double digit growth, supported by increasing demand in North America and APAC
- Rest of Fertility portfolio shows ongoing strong increases, especially in China and Europe
- General Medicine reflects double digit growth of Glucophage<sup>®</sup> (China & MEA)
- Endocrinology posts slight decline driven by lower demand in U.S., mitigated by growth in APAC, LATAM and EU

\*includes "CardioMetabolic Care & General Medicine and Others

## Balance sheet – deleveraging remains focus



- Total assets about stable, with an increased equity ratio of 42.9%
- Decrease in intangible assets reflects D&A (~-€0.9 bn) mitigated by FX (~+€0.4 bn)

- Higher net equity reflects 9M net income (~+€0.9 bn) and FX (~+€0.3 bn)
- Other liabilities decrease mainly driven by profit transfer to E. Merck KG, Darmstadt, Germany

Totals may not add up due to rounding

# Adjustments in Q3 2018

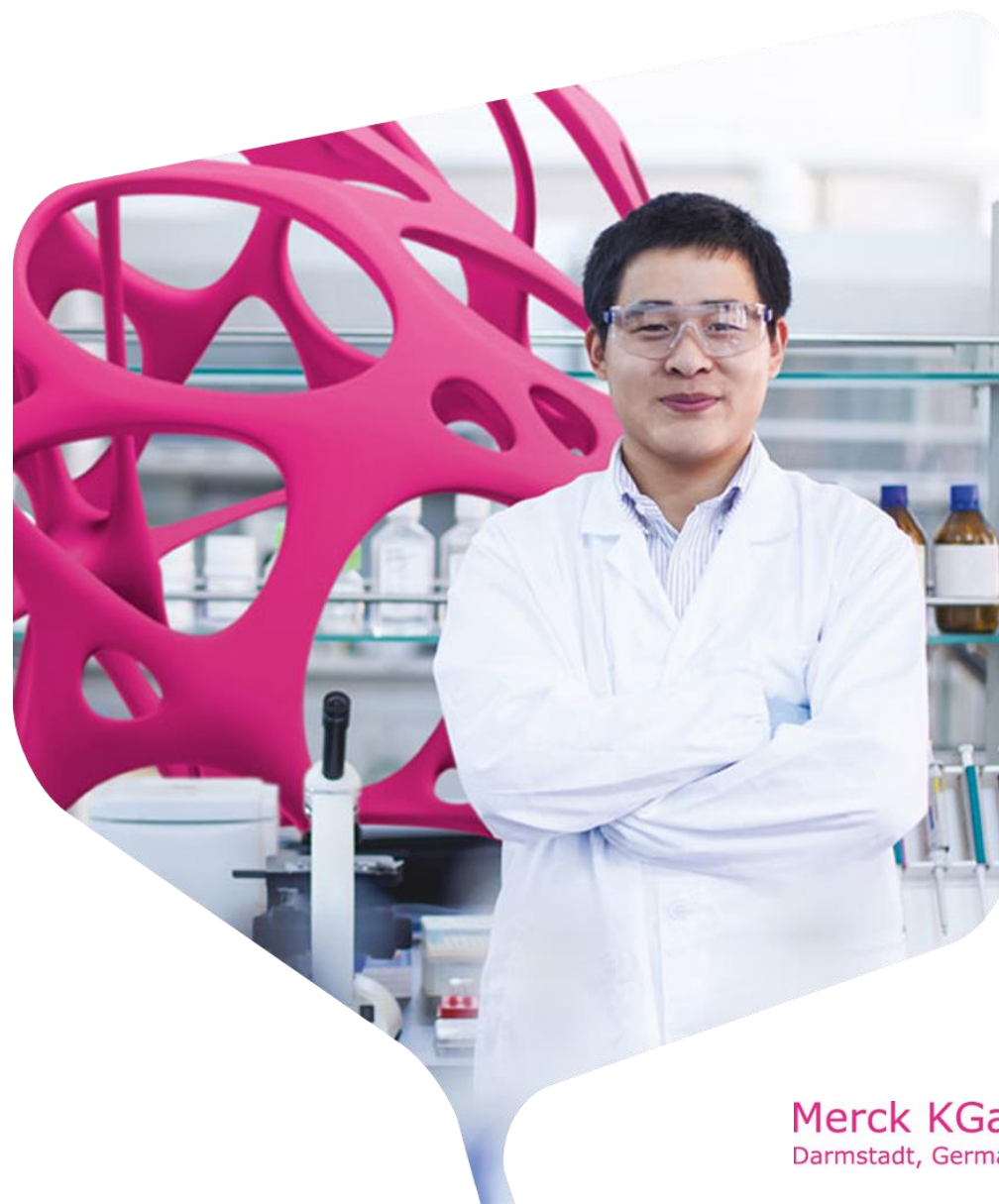
## Adjustments in EBIT

[€m]	Q3 2017		Q3 2018	
	Adjustments	thereof D&A	Adjustments	thereof D&A
Healthcare	-327	-17	9	0
Life Science	24	0	16	5
Performance Materials	2	0	1	0
Corporate & Other	29	0	23	0
Total	-271	-17	49	5



## Financial calendar

Date	Event
March 7, 2019	FY 2018 Earnings release
April 26, 2019	Annual General Meeting
May 14, 2019	Q1 2019 Earnings release
August 8, 2019	Q2 2019 Earnings release



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