

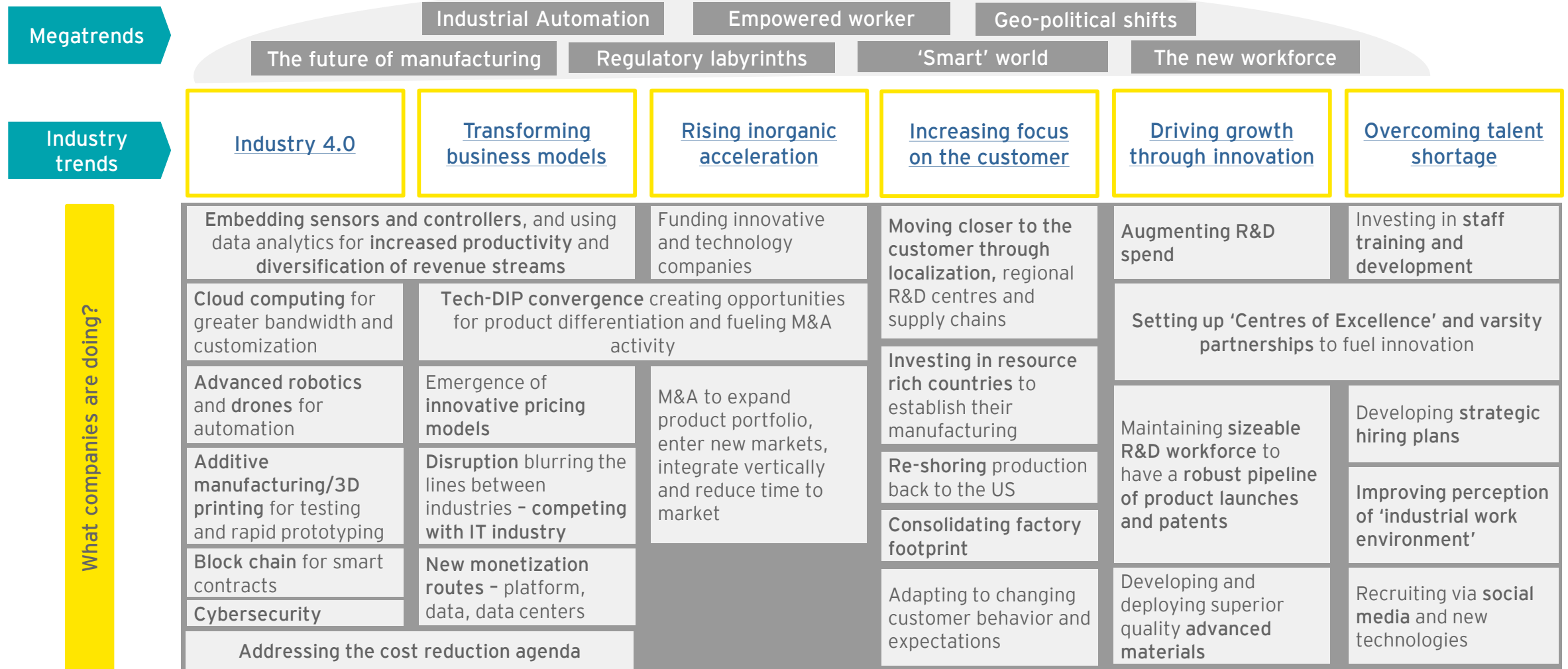
# Industrial Products (IP) – Trends Analyzer

April 2017



The better the question. The better the answer.  
The better the world works.

# Industrial Products - Trends summary







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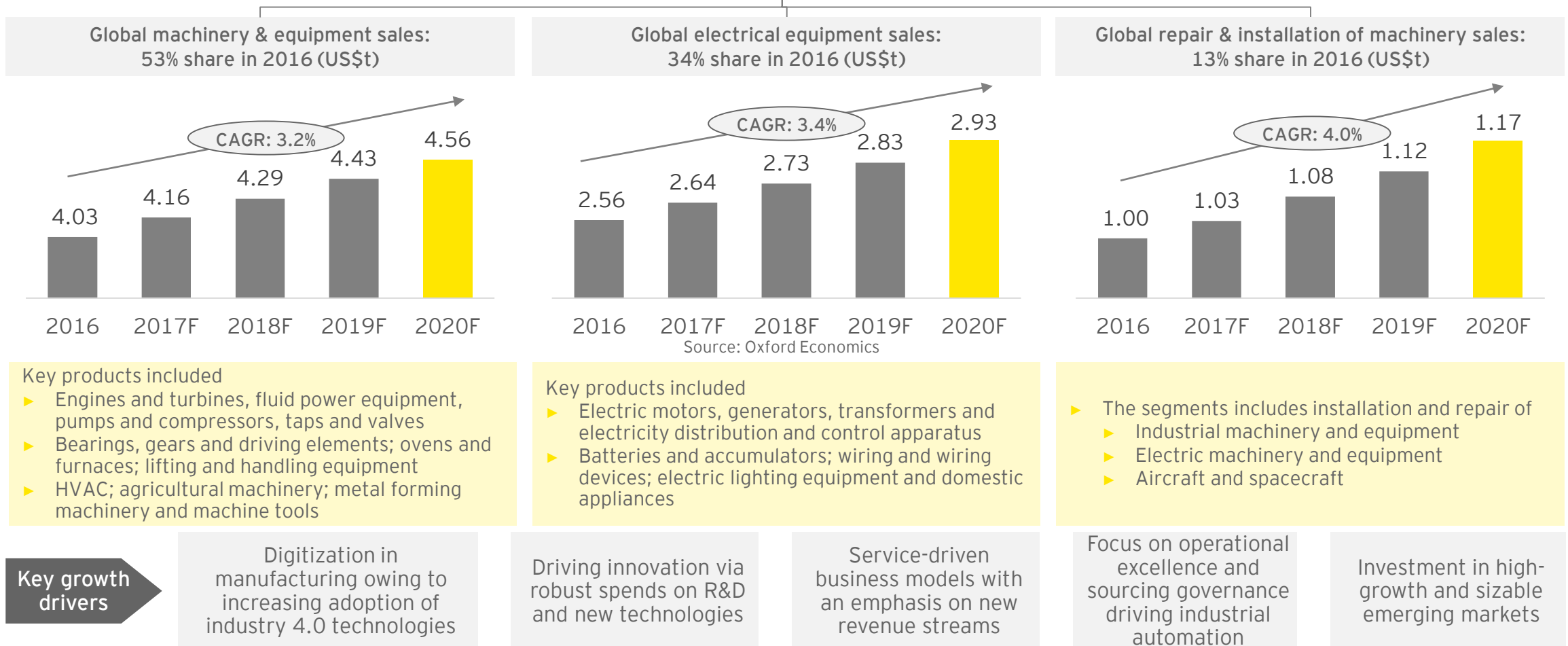


- 
- The background of the slide is a photograph of an industrial facility, likely a refinery or chemical plant. It features a complex network of stainless steel pipes, large storage tanks, and various valves and instruments. The scene is brightly lit, and the equipment appears well-maintained. A white text box is overlaid on the upper left portion of the image.
- ▶ Global IP market highlights
    - ▶ Global market outlook by segments
    - ▶ Global market outlook by regions

# Global market outlook by segments

Industrial products, a US\$7.6t market globally, is expected to reach US\$8.7t by 2020 growing at a CAGR of 3.4%

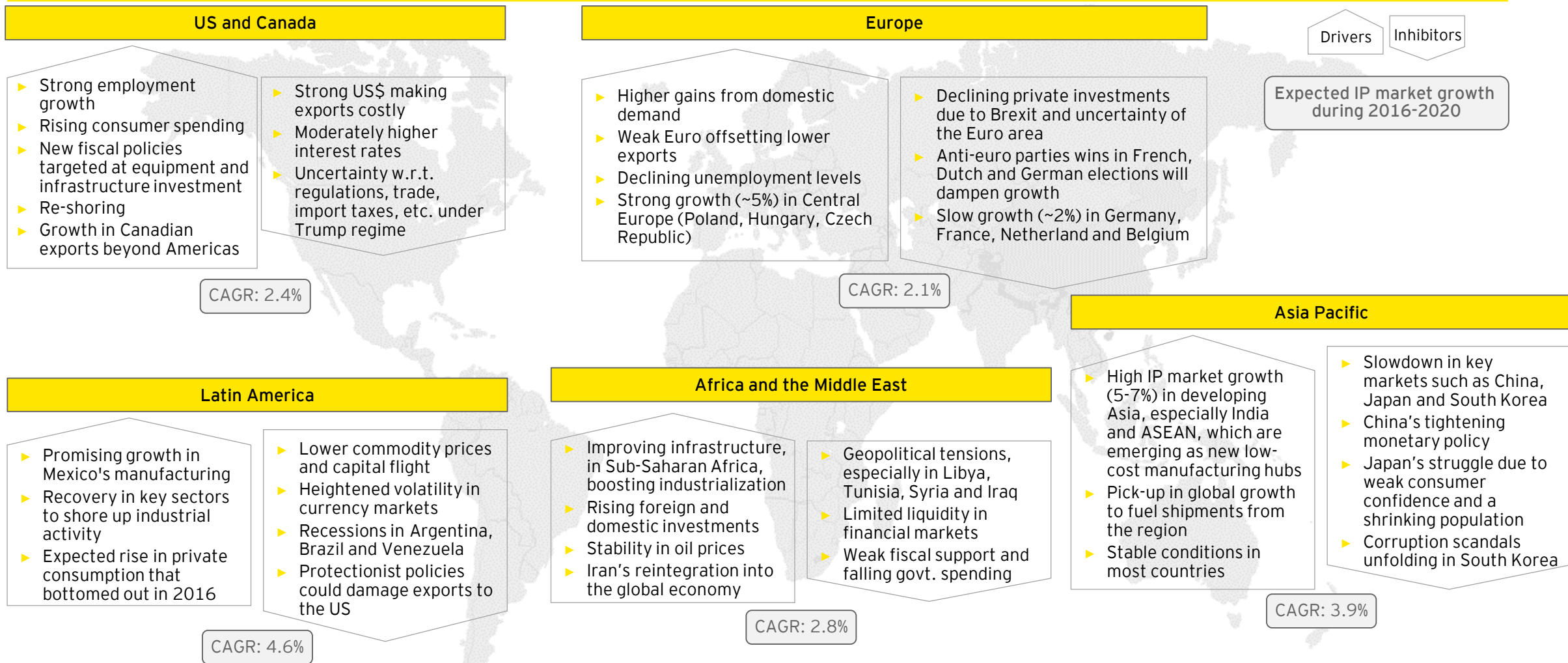
Global sales<sup>1</sup> of electrical equipment, machinery, and their repair and maintenance were estimated at **US\$7.6t** in 2016



Note: 1) IP sales is a measure of the value of all of the goods and services produced in the IP sectors expressed in constant prices (inflation and exchange rate adjusted) with the base year as 2010.

# Global market outlook by regions

Growing consumer spending, lower unemployment and new fiscal policies are likely to drive the American IP market



Source: Manufacturers Alliance for Productivity and Innovation; The World Bank; Asian Development Bank; European Commission; Trading Economics



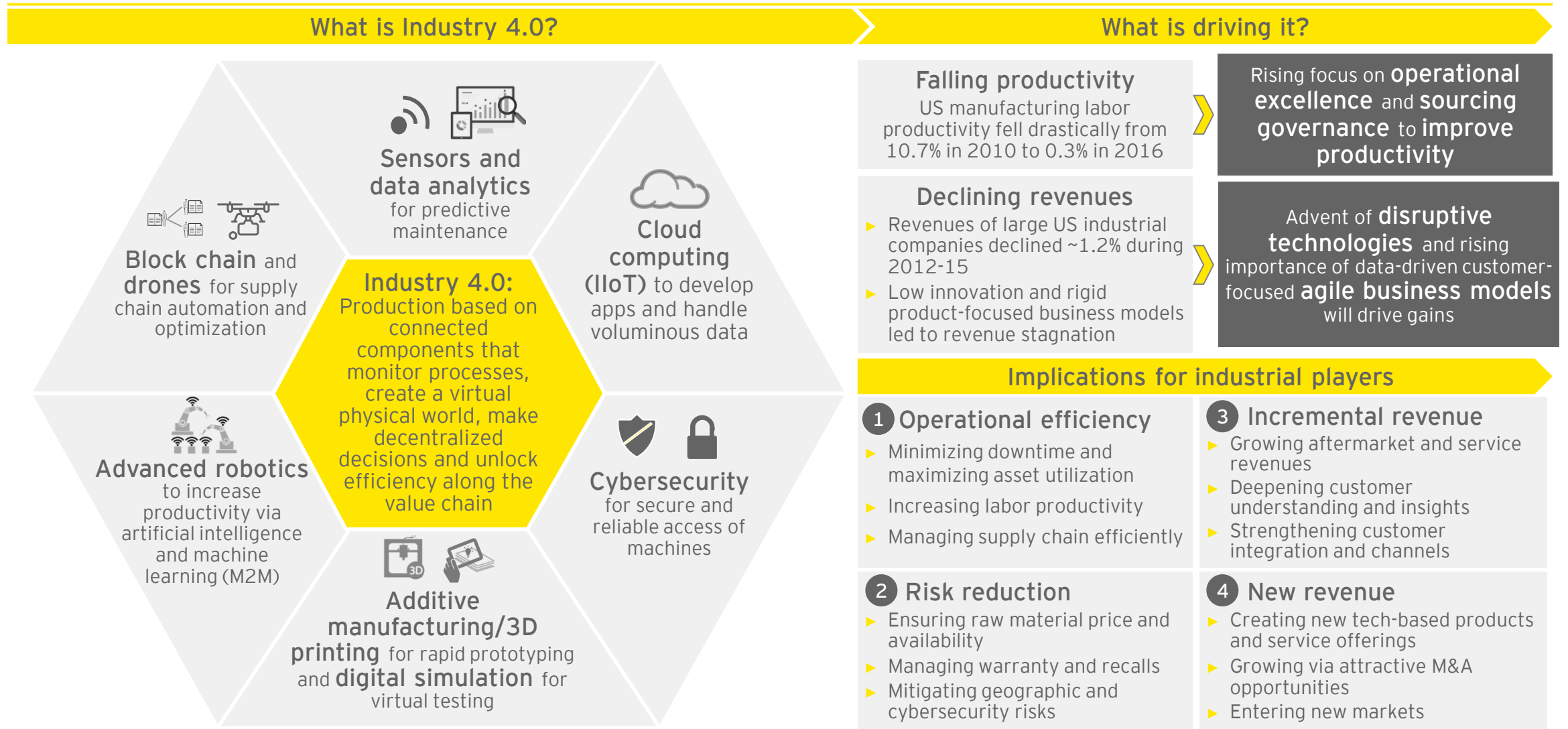
The background of the slide is a photograph of an industrial facility. It features a complex network of stainless steel pipes, valves, and large cylindrical tanks. In the foreground, there's a large horizontal tank with a vertical pipe extending from its top. To the right, a pressure gauge is visible on a vertical pipe. The overall scene is a clean, modern industrial environment.

## ▶ Key trends in industrial manufacturing

- ▶ Industry 4.0
- ▶ Transforming business models
- ▶ Driving growth through innovation
- ▶ Increasing focus on the customer
- ▶ Rising inorganic acceleration
- ▶ Overcoming talent shortage

# Industry 4.0: What is it? (1/3)

Industry 4.0 that enables connected assets & process automation will drive faster and better decisions, and lower the cost of operations





# Industry 4.0: What are the companies doing? (2/3)

Leading manufacturers are rapidly installing new technologies to automate factories, predict maintenance intervals, generate new revenue opportunities and have more secure digital operations

## Smart factory thru advanced robotics and technologies

- ▶ **ABB created a smart factory** by investing ~€30m on its breakers and switches plant in Finland
- ▶ **25 robots** work along with humans; **real time remote monitoring** indicates equipment malfunctions, inventory levels, etc.; **RFID gates, automated guided vehicles (AGVs)** guide orders to production in real time

### Impact

- ▶ 50% savings in lead time
- ▶ 2x profitability in four years
- ▶ 30% drop in sick leaves
- ▶ 50% fall in customer reclamations

## Turning data into insights for additional revenues

**John Deere's FarmSight collects data** during planting, crop care and harvesting, and delivers insights to **help farmers maximize yields**, while helping it generate additional revenue via **data monetization**.

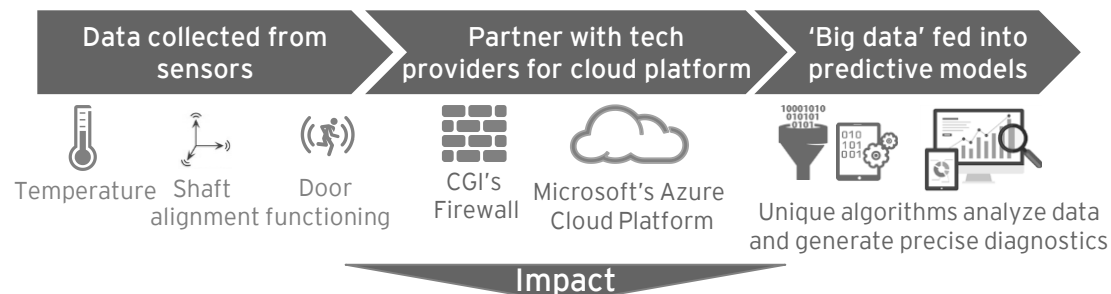
## Developing cybersecurity solutions for secure operations

In 2015, **Siemens** implemented an in-house security information and event management (SIEM) solution at its Amberg (Germany) digital factory to establish a robust cyber-attacks monitoring and overhaul system.

In 2016, **GE** implemented its SecurityST solution, for a major Middle East-based utility company, providing power plant access control, a centralized backup and recovery, network intrusion detection and secure data exchange.

## Predictive maintenance using data analytics and cloud

**ThyssenKrupp** remotely controls and maintains millions of elevators (embedded with sensors) using dynamic data analytics-based predictive models, Microsoft's cloud platform, and CGI's<sup>1</sup> firewall.



More efficient maintenance and improved uptime (+50%) of elevators

## Sensor based quality control and monitoring

**Sandvik**, a Swedish machine tools manufacturer, significantly **increased precision** in producing machine tools (**using sensors**) leading to an **80% drop in imperfections**.

**Joy Global** (an American heavy equipment manufacturer) **uses sensors to monitor equipment** and provide action-oriented data to help mining operators make real-time decisions on machine operations, reducing downtime.

Note: 1) CGI is a Canadian IT services provider

# Industry 4.0: What are the companies doing? (3/3)

Robust investments by major players will accelerate the adoption of Industry 4.0 technologies, which will in-turn lower risk and create significant cost savings

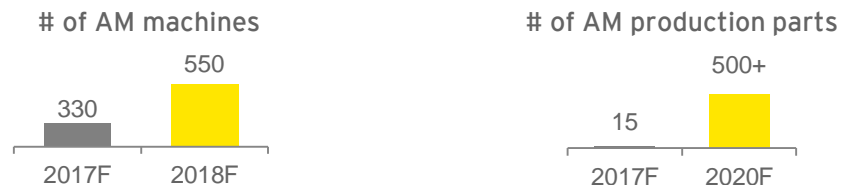


## Develop additive manufacturing/3DP capabilities for cost savings and new revenues

GE acquired three leading AM players, spending ~US\$2b in 2016 to increase productivity and generate new 3DP revenue streams

US\$3-5b cost savings by 2020 via rapid internal deployment

~US\$500m in AM revenues expected by 2018 (+67% Y-o-Y)



Source: GE Annual Outlook Investor Meeting

## 3D Printing for rapid prototyping and large-scale objects

Siemens invested EUR 21M (US\$ 23M) to open first metal 3D printing facility in Sweden for rapid prototyping and rapid repair of components. (Feb 2016)

ABB partnered with Netherlands-based 3DP company MX3D to 3D print a steel bridge without any support structure in Amsterdam expected to be completed by 2017.



## Digital simulation thru AR/VR and 3D software for accelerated R&D and increased productivity



Siemens undertook R&D in the virtual world at one of its UK factories and drastically reduced the number of prototypes per product from nine to only three. It plans eliminate prototyping in the long run. (May 2016)



Schneider Electric implemented VR in its trainings to save costs and mitigate risks by allowing employees to safely respond to hazardous situations in the virtual world.

## Block chain for an agile supply chain

- ▶ Block chain is a distributed ledger, with a decentralized consensus that enables quick and inexpensive business decisions.
- ▶ It digitally tracks materials, enables distributed transactions and creates trusted relationships without traditional processes via 'smart contracts'.

Siemens collaborated with LO3 Energy (US-based energy technology company) to develop a block chain micro-grid that allows direct monetary transactions between peers in a micro-grid in New York. (Nov 2016)

## Drones to increase productivity






Qimarox, a Netherlands-based conveyors manufacturer, uses drones for final identification and palletizing of order lines, overcoming human limitations in terms of capacity and ergonomics.



# Transforming business models (1/2)

Digitalization is rapidly triggering fundamental changes to the capital goods business model driving a shift from product-centric sales model to solution-based selling; additional monetization routes fast evolving

## How industrial manufacturers are redefining the way they operate?

 <p>Tech-DIP convergence creating opportunities for product differentiation</p>	 <p>Diversification of revenue streams</p>	 <p>Emergence of innovative pricing models</p>	 <p>Disruption blurring the lines between industries</p>	 <p>Efficient and intelligent operations</p>
<ul style="list-style-type: none"> <li>▶ Connectivity and more software functionality is opening up new avenues for product and service innovation for capital goods suppliers</li> <li>▶ Continuous augmentation of product functionality, coupled with software-based analytics is helping suppliers better understand customer needs and tailor offerings</li> </ul>	<ul style="list-style-type: none"> <li>▶ Digital embracement is helping industrial manufacturers monetize additional services on top of traditional lines of businesses</li> <li>▶ Product hardware is steadily becoming less important component of the offering while software and integrated service capabilities (embedded in the system) emerge as key selling points</li> </ul>	<ul style="list-style-type: none"> <li>▶ Increased adoption of outcome-based pricing model because of the significantly higher visibility it creates on day-to-day operating processes</li> <li>▶ Subscription-based pricing models also evolving fast</li> <li>▶ Companies like GE and Siemens are the early-adopters of the innovative pricing models</li> </ul>	<ul style="list-style-type: none"> <li>▶ Players of the IT industry (IBM's Bluemix, Microsoft's Azure IoT Suite, etc.) are competing more directly with capital goods companies (GE's Predix, ABB's Ability, etc.) to deliver the benefits of digitalisation to end-customers</li> <li>▶ However, domain and technical expertise will be key competitive advantages for capital goods players</li> </ul>	<ul style="list-style-type: none"> <li>▶ Enhanced ability to gather data from machines and process it using the cloud-based platform provides a better understanding of asset condition and deterioration, thereby improving the operational efficiency and asset utilization</li> <li>▶ Apps like remote monitoring and preventive maintenance significantly increases machine uptime and lowers maintenance costs</li> </ul>

Evolution of new monetization routes

1

Higher pricing on connected products

Product manufacturers who are investing in adding connectivity to their products are reaping the benefits by charging a higher price for their products

2

Monetizing the cloud-based platform

Capital goods players (like GE and Siemens) generate additional revenues from third-party app developers who offer services to customers over their digital platforms

3

Monetizing the data

As more data gets captured and analysed, industrial manufacturers can also look to offer it to firms for which the data might hold commercial value

4


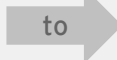


Data center solutions

Capital goods companies like Schneider, Legrand, Siemens and ABB that offer infrastructure solutions for data centres, benefitting, as more data gets stored on cloud

# Transforming business models (2/2)

Software-enabled products take center stage as manufacturers focus on selling integrated solutions and creating portfolios of digital “bets” that help companies explore beyond their own core industry

Industrial manufacturers vying to increase their digital revenues as integrated solutions hold the key to future

	Cloud-based platform	Dedicated business units	Transformation Journey	
GE	<b>Predix</b> Invested ~US\$1b in its development (launched in Aug 2015)	<b>GE Digital</b> Dedicated unit created in Sep 2015 following the integration of all software & IT capabilities to develop digital industrial solutions across all businesses	GE's software revenues <b>US\$5b</b> 2015  <b>US\$15b</b> 2020F	<b>US\$700m+</b> saved due to digital technologies from a total of 98 connected factories in 2016
			43% in 2013  <b>46%</b> in 2016 Services revenue share rising on the back of strengthening digital offerings	
Honeywell	<b>Sentience</b> Launched in July 2016	<b>HON Digital Transformation</b> Dedicated sub-unit created in May 2016 to help Honeywell Process Solutions' customers more easily leverage the IoT capabilities	HON's software revenues <b>US\$1b</b> 2015  <b>US\$4b</b> 2020F	<b>US\$4m</b> business savings realized in 2016 from Sentience (to reach US\$40m by 2020)
			Revenue from software-enabled products swell (% of total sales) <b>59%</b> in 2016  <b>63%</b> by 2020	
Siemens	<b>MindSphere</b> Launched in March 2016 in partnership with SAP	<b>Digital Factory Division</b> Dedicated unit to provide customers with a comprehensive portfolio of software-enabled products	Siemens' software revenues <sup>1</sup> <b>US\$3.6b</b> 2016 Siemens' digital services revenues <sup>1</sup> <b>US\$1.1b</b> 2016 <b>+12%</b> y-o-y	Revenues from digitally-enhanced automation and electrification products <b>US\$64.8b</b> 2016

Note: 1) All currency conversions at €1 = US\$1.08000 as of 23 March 2017

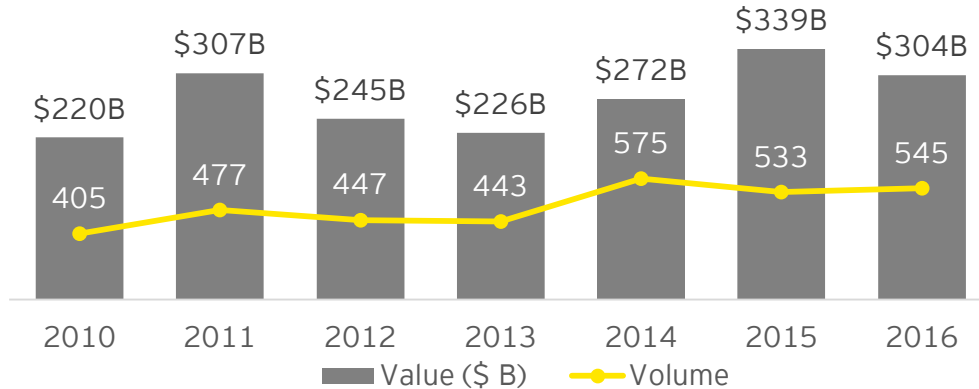


# Rising Inorganic acceleration

Acquiring and funding innovative companies, especially technology-oriented, will help industrial companies embrace Industry 4.0, integrate vertically and enter new markets

## Manufacturers can adapt to a changing environment via acquisitions and VC funding

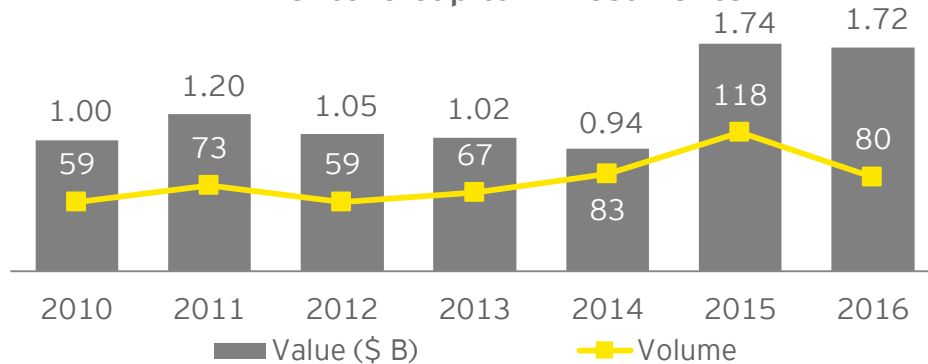
### Global Industrial Products M&A trend



Note: Above analysis includes M&A by industrial companies with disclosed values >US\$50m; refer to slide note for detailed definition of industrial companies.

Source: Mergermarkets

### DIP Venture capital investments



Source: Dow Jones VentureSource

- ▶ M&A deals by DIP companies grew 9% by value and 6% by volume during 2010-2015, however, value declined ~10% Y-o-Y in 2016 owing to geopolitical concerns such as Brexit, slowing growth in China, and the looming US presidential election.

#### Future looks promising

- ▶ Going forward, deal activity in the US is likely to be driven by
  - ▶ Expected reduction in tax rates
  - ▶ Infrastructure investment
  - ▶ Health care reform
  - ▶ Reduced government regulation

#### Rising VC investments (mainly tech) to seed innovation

- ▶ VC investments by DIP companies have been growing drastically in the software & services sector.
- ▶ Number of software & services VC deals increased from 12 in 2010 to 59 in 2015; in terms of value ~50% deals were for software & services in 2015.
- ▶ Leading investment in emerging digital areas include data analytics, security and industry-specific digital solutions.
- ▶ GE, Siemens and Mitsui emerged as the most active VC investors.

For a detailed list of recent M&A and VC deals, please click [here](#)

## M&A and funding drivers

→ Product portfolio expansion (digital)

→ Faster time to market via speedy product development

→ Enter new markets

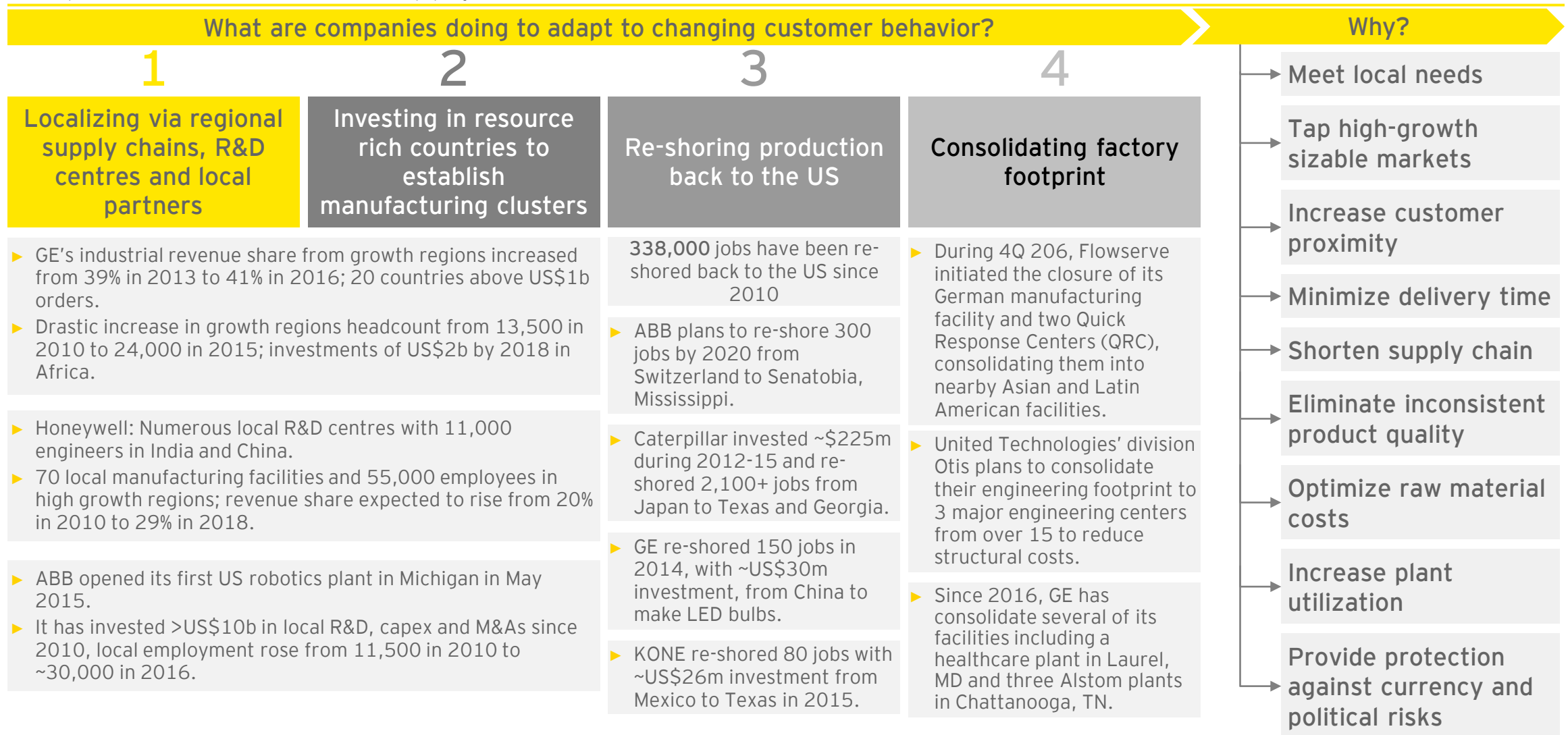
→ New intellectual property

→ Savings via vertical integration or in house sourcing

→ Product and service differentiation

# Increasing focus on the customer

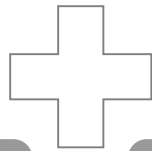
Manufacturers are localizing, establishing manufacturing clusters, re-shoring production and optimizing footprint to cut short the supply chain and move closer to the customer





# Driving growth through innovation (1/2)

Backed by strong confidence in their growth potential, manufacturers are starting to place big bets on their ability to create new products and services by increasing their R&D spend and setting up COEs



Resulting in



## Focusing on product innovation as manufacturing bigwigs augment R&D spend

- Major industrial enterprises<sup>1</sup> spent ~US\$24b on in-house R&D, up from US\$22b in 2011.



Source: CapitalIQ

- Their average industry R&D spend as % of sales also surged from 3.6% in 2011 to 4.4% in 2016 as they beefed-up investments in advanced manufacturing to launch premium products and services.

Siemens	GE	Honeywell
5.9%	4.5%	7.9%
2016 (up from 5.4% in 2011)	2016 (up from 3.7% in 2011)	2016 (up from 7.3% in 2011)

- However, R&D spend as % of sales still remains well below Tech (8%) and Pharma (15%) sectors.

## 'Centers of Excellence' and varsity partnerships fuel innovation growth

Leading manufacturers, such as GE, Honeywell, Siemens, Eaton, are increasingly setting up COEs and partnering with universities to:

- Create dedicated teams focussed on specific business needs
- Easily access pools of knowledge and save R&D costs
- Drive product and process innovation
- Develop integrated solutions and build capabilities in advanced technologies

### Examples

- GE launched its Powering Efficiency COE in March 2017 in Switzerland to reduce coal plant emissions by up to 11%
- It also has numerous R&D partnerships with Purdue, Northeastern University, Notre Dame, Ohio State University, etc.

**Eaton** opened an additive manufacturing COE in Michigan in 2016

**Honeywell** partners with University of New Mexico, Kansas State university, etc.

## Growing ability to develop new technologies and introduce new products

- New product launches have been the core of every industrial manufacturer's growth agenda as they strive to achieve greater market share in increasingly competitive markets.
- Along with robust R&D expenditures, companies also maintain an expansive in-house R&D team to expedite new product launches.

### Key 2016 metrics

Company	R&D Spend	R&D employees	Patents filed
GE	US\$5.5b	45,000	3,000+
Siemens <sup>2</sup>	US\$5.1b	33,000	3,600
Honeywell	US\$2.1b	22,000	~1,000
3M	US\$1.7b	12,000+	3,770
Schneider <sup>2</sup>	US\$1.4b	11,000	500+

Note: 1) Major enterprises include 15 companies with CY16 revenues of more than US\$10b

2) All currency conversions at €1 = US\$1.08000 as of 23 March 2017

# Driving growth through innovation (2/2)

Advanced materials (AMs), with their superior performance, structural and processing attributes, are increasingly being developed and deployed by industrial manufacturers to drive product innovation

**What comprises advanced materials?**

Composites, ceramics, nanomaterials, high performance polymer, matrix structures, coatings, etc.

**Key players**

3M Advanced Materials, GE, Honeywell, ABB, Eaton, etc.

**Key characteristics**

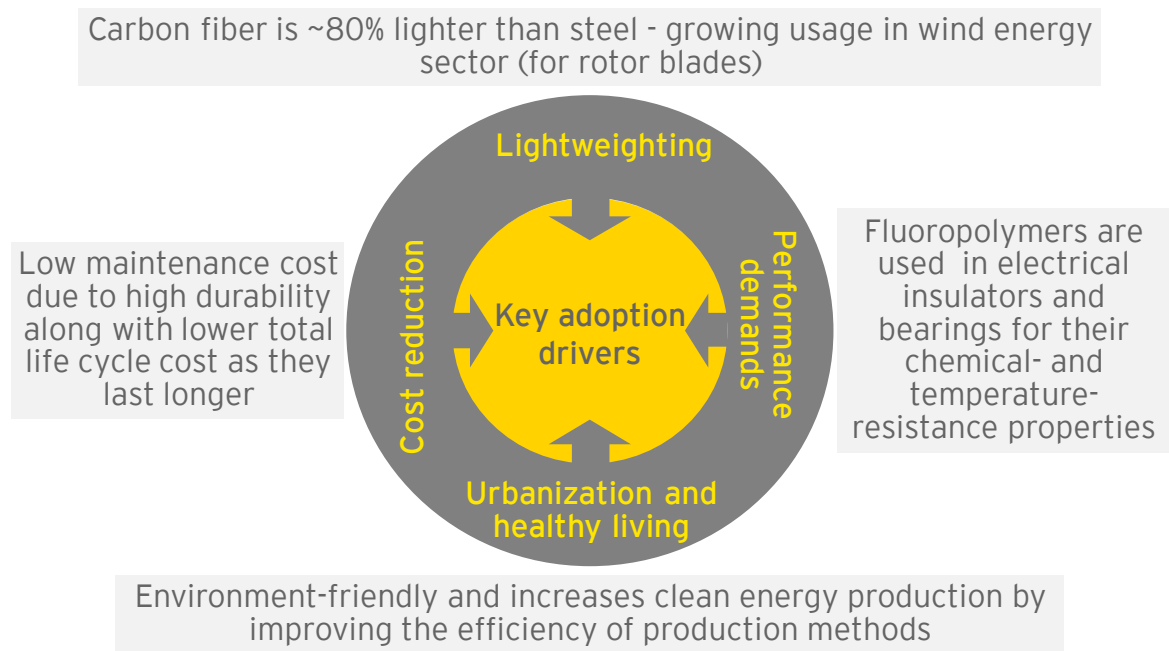
- ▶ A knowledge-intensive and complex production process
- ▶ New, superior, tailor-made properties for structural or functional applications
- ▶ Potential to contribute to competitive advantage on the market

**Global advanced materials market (US\$b)**

Year	Market Value (US\$b)
2015	42.8
2024F	102.5

10.4% CAGR

Source: Transparency Market Research



DIP companies innovating and reaping benefits of AMs - examples		
Company	AM portfolio <sup>1</sup>	Relevance/importance
GE	Magnetic materials for refrigerators	Cools up to 20% more efficiently
	Superhydrophobic materials and coatings	Stops ice formation on wind turbine blades, increasing efficiency
Honeywell	Fluorocarbons, hydrofluoroolefins, specialty films, waxes, additives, advanced fibers, etc.	Honeywell's Advanced Materials sub-division continues to account for more than 8% of total company sales since 2014
3M	Wide range of products from ceramics and fluorochemicals to specialty additives and stable isotopes	Sales of Industrial division increased 4.6% y-o-y in FY16 primarily driven by growth of advanced materials sub-division

Note: 1) Indicative list, does not exhaustively covers all AM offerings





# Overcoming talent shortage (1/2)

Developing talent to overcome skills shortage is vital for a long-term sustainable industry growth

Rising talent shortage is a major bottleneck to sustainable and profitable industry growth

How companies can overcome it?

## Talent shortage in numbers (US)

**2 million**

manufacturing jobs are likely to go vacant in the US by 2025 due to skill shortage

**3.3x rise**

in unfilled jobs due to skills gap



**How?**



### Retirement of baby boomers

2.7 million baby boomers are expected to retire by 2025, creating an equivalent number of jobs



### Economic growth

will create another 700K jobs



**3.4 million total jobs**

, of which **2 million (~60%)**

likely to go unfilled owing to talent scarcity

Note: 1) As per a 2015 study by Bureau of Labor Statistics and Gallup, 60% of skilled manufacturing jobs remained vacant due to talent shortage in 2014-15 and this trend is likely to continue

Note: 2) STEM is US government's initiative on education policy and curriculum choices in the fields of science, technology, engineering and mathematics (STEM) to improve its competitiveness

## Implications for industrial companies



Difficulty in maintaining or increasing production levels with rising demand



Struggle in implementing new technologies and increasing productivity



Obstructs new product development and innovation



Hinders ability to expand globally

**11% loss**

An average US manufacturer potentially loses 11% of its EBITDA due to talent shortage

## Key causes of skills gap

- ▶ **Poor industry perception:** Americas rank manufacturing jobs as a low as a career choice and only 35% encourage their children to pursue a career in manufacturing.
- ▶ **Strict immigration policies:** Difficulties in getting work visas and aggressive competition from emerging countries is hampering US' ability to acquire and retain global talent.
- ▶ **Declining apprenticeships:** Active apprenticeship programs in the US fell 31% between 2004 and 2014.
- ▶ **Ageing population:** Large industrial nations, such as Japan, Germany and Korea, will have sizeable older population by 2030, further exacerbating skills shortage.

## Training and development



Internal and external classroom trainings and certifications



Web-based trainings and digital simulations



Establishing Think-tanks and Centre of Excellence



Academic partnerships with schools and community colleges

## Develop strategic hiring plans

- ▶ Effective succession planning to respond to an aging workforce.
- ▶ Engage in STEM<sup>2</sup> initiatives early to build hiring pipeline.
- ▶ Collaborate with marketing function to develop robust hiring campaigns across channels.

## Overcome perception issues

- ▶ Improve perception of industrials being "clean and safe" and "high-tech" rather than "dirty and dangerous."
- ▶ Demonstrate new technologies (3DP, robotics, and advanced analytics) to showcase innovation.

# Overcoming talent shortage (2/2)

Companies plan to bridge the skills gap via robust trainings, academic partnerships, changing industry perception and recruiting via social media



## Robust employee training and development

- ▶ GE invests >US\$1b each year in employee development and also operates numerous large learning centres globally, the Crotonville campus is the largest with an annual participation of ~40,000 employees. It also offers 2,100 courses annually across 200 locations.
  - ▶ It also opened a \$50m center of excellence in Florida focussed on energy management devices such as transformers and capacitors.
- ▶ Deere & Company operates the John Deere University in Statesville, North Carolina that offers numerous courses for technicians and assists them with apprenticeships as well.
- ▶ ABB operates the ABB University for training at training facilities, plant site, or on-line in ~24 countries.



## Changing the industry perception

- ▶ The Manufacturing Institute, along with industry players organizes an annual 'Manufacturing Day' event (250,000+ attendees in 2016) to increase positive perception of the industry and attract talent.
- ▶ The Institute also launched its 'Dream It Do It' program to inspire next-generation workers to pursue manufacturing careers; in 2015, it engaged 426,000 students via summer camps, ambassador programs, and competitions.
  - ▶ Companies, such as Cooper Tire & Rubber Company, are actively using ambassador programs, where they send younger employees as "ambassadors" to schools and colleges to speak about their jobs, positioning them as well-paid, high-tech, and innovative.



## Academic partnerships

- ▶ Honeywell collaborated with Arizona State University to develop student engineers who specializing in 3-D printing. (August 2016)
- ▶ GE's 'Developing Skills' initiative awarded a US\$1.5m grant to Delgado Community College, LA to bridge the education and employment gap in New Orleans.
  - ▶ It also launched 'Brilliant Career Lab', an interactive mobile technology lab, in public schools in Boston, to enhance access to skills training in STEM through hands-on experiences and mentoring.

  
**Initiatives to  
overcome  
talent shortage**



## Recruiting via social media and new technologies

- ▶ Many companies, such as Turner Machine, are using social media platforms, including Facebook, Twitter and LinkedIn, for better engagement with potential recruits. The companies post videos and photos of the shop floor, new technologies and cultural activities.
- ▶ Cleveland-based Lincoln Electric uses VR to test welding skills and then find the best welders at career fairs, farmer conventions and robot-building competitions.
- ▶ GE also uses VR at career fairs to accustom students with its new locomotive technologies or subsea oil-and-gas recovery machines.



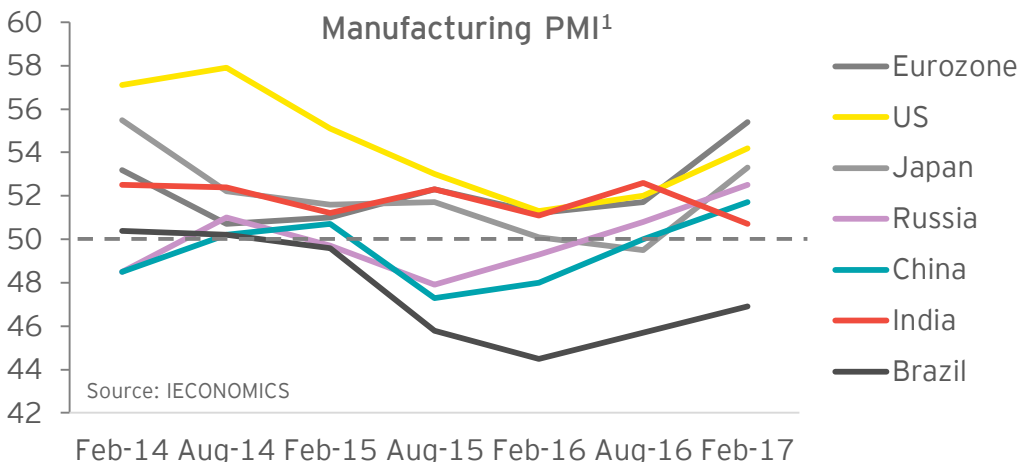
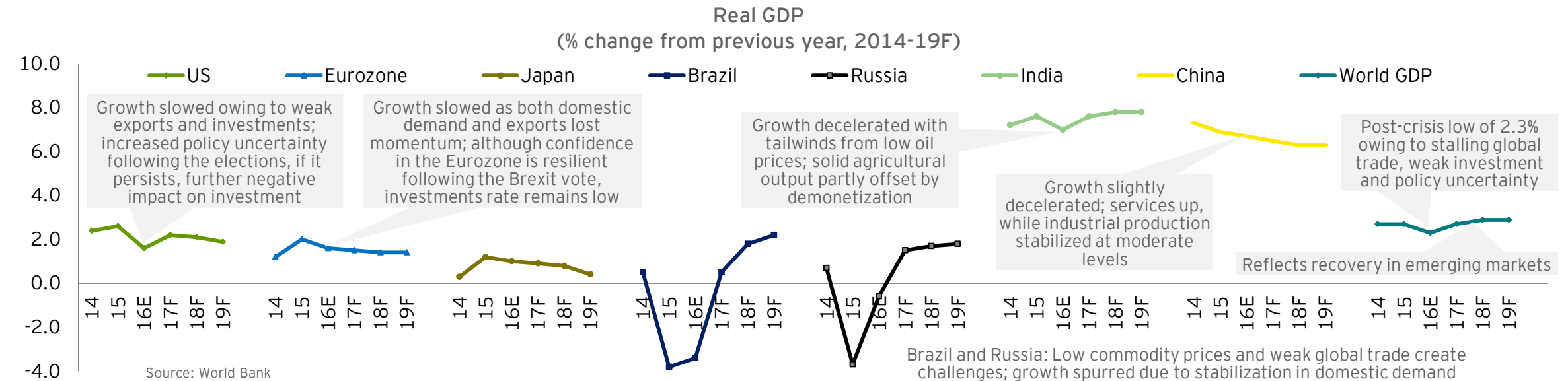


Macroeconomic factors impacting industrial manufacturing



# Macroeconomic factors impacting industrial manufacturing (1/3)

Stagnant global trade, subdued investment and heightened policy uncertainty were major drags on global growth and manufacturing activity in 2016; recovery underway as emerging economies resurrect rapidly



Manufacturing activity across the globe closely follows the GDP trend

After subdued activity in 2016, a rebound is underway (in 1H17) on the back of growing activity in emerging economies

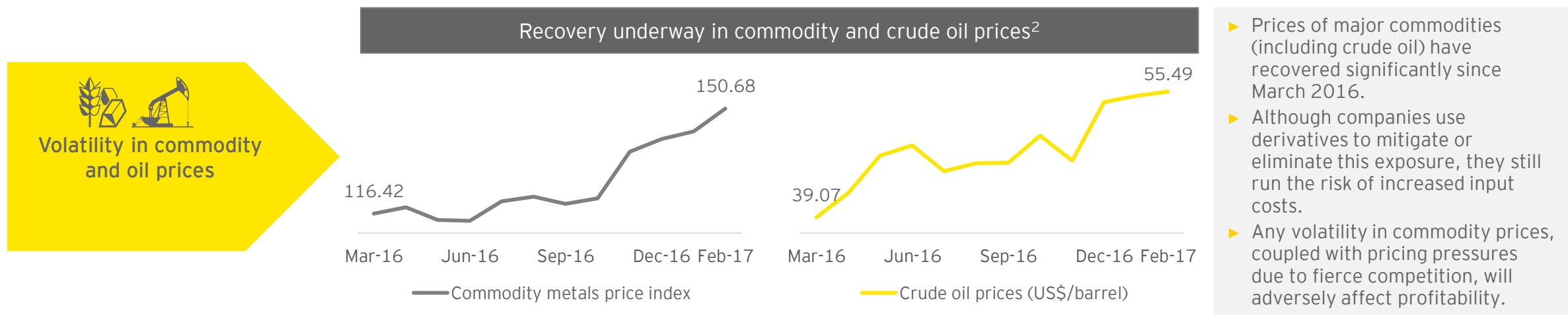
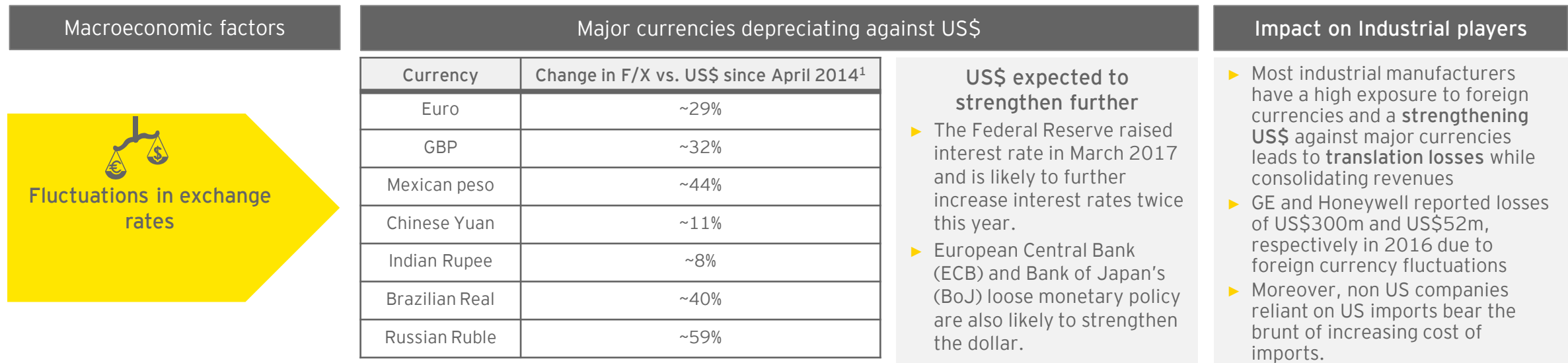
## Implications for industrial manufacturing

- ▶ **Advanced economies (US, Eurozone and Japan)** continued to struggle (in 2016) with subdued growth and low inflation amidst increased policy uncertainty and tepid investment
  - ▶ Resulted in sluggish productivity and manufacturing growth
  - ▶ Growth potential in 2017 still uncertain as effects of Brexit and administration change yet to be realized
- ▶ **Emerging market and developing economies (India, Brazil, Russia, China)** fared slightly well compared with their advanced counterparts
  - ▶ Growth outlook positive as Russia and Brazil recuperate due to stabilizing oil prices and receding political uncertainty, respectively

Note: 1) Purchasing Managers' Index: a reading above 50 indicates an expansion of the manufacturing sector compared to the previous month; below 50 represents a contraction; while 50 indicates no change

# Macroeconomic factors impacting industrial manufacturing (2/3)

Strengthening US\$ (vs. major global currencies) coupled with steady increase in commodity and crude oil prices are further adding to the woes of industrial manufacturers



Note: 1) Comparison as of April 2017 vs. April 2014

2) Commodity Metals Price Index, 2005 = 100, includes Copper, Aluminum, Iron Ore, Tin, Nickel, Zinc, Lead, and Uranium price indices

# Macroeconomic factors impacting industrial manufacturing (3/3)

Impact of Brexit and Trumponomics, although unclear, could weigh negatively on industrial manufacturers in both US and Europe



## Change in the US administration - Industrial manufacturers 'cautious' on the scope of Trump's policy measures



- ▶ In the 2016 American presidential election, Republican presidential candidate Donald Trump was elected as the new President of the US.
- ▶ President Trump and his team have hinted that their priority is **lowering taxes, increasing spending on infrastructure and cutting regulations by at least 75%**.
- ▶ Companies such as Caterpillar (CAT), US Steel and John Deere, along with the S&P 500 industrials index experienced major gains post-election, owing to a bullish outlook for manufacturing in the coming years.
- ▶ However, **apprehensions remain** due to potential **constraints on free trade**.
- ▶ Manufacturing giants in India and China, in particular, are concerned over **Trump's protectionist policies** as they rely heavily on the US for trading finished products as well as sourcing raw materials.
- ▶ Also, global companies such as GE and CAT, which have large facilities outside the US and offshore jobs, might have to pay **35% punitive tariffs on imports**.



## Brexit likely to hamper growth of both US and domestic UK industrial companies; visible impact by 2019

- ▶ After the referendum held in June 2016, the UK government invoked Article 50 on 30 March 2017 and notified the European Council of its intention to leave the EU by March 2019.
- ▶ Once the UK leaves the EU it will not get several benefits of the EU group such as free trade agreements and free access to labor market within all EU countries.
- ▶ However, the separation process is likely to be a long ordeal with impact likely to be visible post 2019.

## Key implications for US-based industrial companies

- ▶ **Currency translation losses** for pound sterling- and euro-based manufacturers
- ▶ **Lower US export revenues from Europe:** Increased uncertainty and an economic slowdown in the UK will decrease US export revenues from UK and other European countries
- ▶ **Trade agreement renegotiations** likely with the EU and the US



## Regulatory and compliance costs - Rising regulatory burden putting pressure on manufacturers



Rapidly rising cost of complying with manufacturing-related rules makes it difficult and costly for manufacturers to succeed globally



- ▶ **US\$726b** is the annual cost of complying with major regulations affecting US manufacturers.
  - ▶ Moreover, 43 new major rules in 2015 increased annual regulatory costs by ~US\$22b.
- ▶ Cost of resolving alleged Foreign Corrupt Practices Act (FCPA) violations has grown exponentially from US\$7.3m per company in 2004 to US\$156m in 2014.



# Appendix



# Rising Inorganic acceleration: Key M&A transactions

Top M&A deals by DIP companies since 2016

Acquirer (Country)	Acquirer's sector	Target (Country)	Target's sector	Deal value (\$b)	Date
Johnson Controls (US)	Industrial Conglomerates	Tyco International (Ireland)	Machinery & Electrical Systems	16.2	Jan 2016
Siemens (Germany)	Industrial Conglomerates	Gamesa (Spain)	Energy (wind)	7.5	Jun 2016
		Mentor Graphics (US)	Technology	4.0	Nov 2016
Parker Hannifin (US)	Industrial & Mechanical Components	Clarcor (US)	Machinery and Electrical systems	4.2	Dec 2016
Komatsu (Japan)	Machinery and Electrical systems	Joy Global (US)	Industrial Conglomerates	3.7	Jul 2016
Emerson Electric (US)	Machinery and Electrical systems	Pentair - Valves & Controls (Switzerland)	Industrial & Mechanical Components	3.2	Aug 2016
Roper Technologies (US)	Industrial & Mechanical Components	Deltek (US)	Technology	2.8	Dec 2016
GE (US)	Industrial Conglomerates	LM Wind Power (Denmark)	Industrial & Mechanical Components	1.7	Oct 2016
Honeywell (US)	Industrial Conglomerates	Intelligrated (US)	Technology	1.5	Jul 2016

Major investments by top 3 DIP VC investors in software start-ups: 2010 - 2016

Technology	GE	Siemens	Mitsui
Cloud	Bracket Computing, Pivotal Software, Bit Stew	OpenCloud Ltd., BuildingIQ Inc., Electric Cloud Inc.	Box, Pica8
Data Analytics	Apertiva, Ayasdi, Cirro, DataTorrent, Maana, MedAware, PingThings, Predixion Software	CounterTack, Plotly, Wireshan	Kaminario, Spire Global, Wellaware
HeathTech	Aver Informatics, Caremerge, ChronoTherapeutics, DigiSight, Evidation Health	Aventura	GNS Healthcare, Change Healthcare, Pipeline Health, goBalto
M2M and other advance tech	Ingenu	Lagoa, TeamUp Technologies	Axeda, EyeSight Mobile
Security	Digital Guardian, Mocana, Morphisec, ThetaRay, TTTech	Airtisght Networks, Cyactive, Cyberflow Analytics, Wurldtech	CounterTack, DocuSign, Sensage
Smart Buildings/Utilities	Lucid Design, SClenergy Inc., View Inc.	J2 Innovations, BuildingIQ, Sensys Networks; Powerit, Tendril Networks, ThinkStep	Stem
Total # of VC investments	180	93	120

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