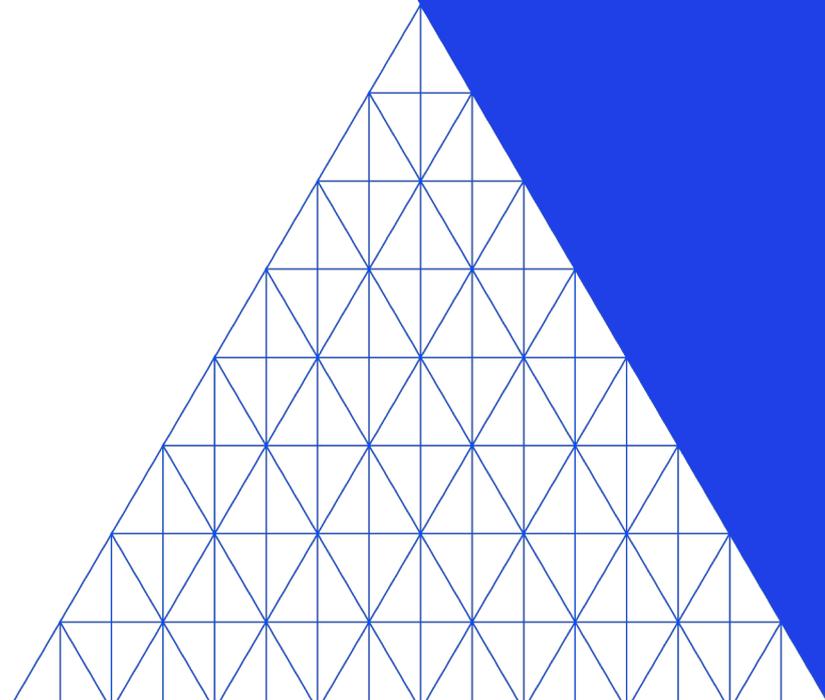


# Artificial Intelligence for Industry

Norbert Biedrzycki

March 2019



# Artificial Intelligence is on the verge of disrupting businesses and society

13X

Equity investments in AI startups  
2018E vs 2012



~4,500

Number of AI deals in 2018



250X

Processing power of a GPU over  
CPU for image classification



\$15 trillion

Value of wages automatable



\$37B

Equity funding in AI Startups  
in 2017 (3x 2016)



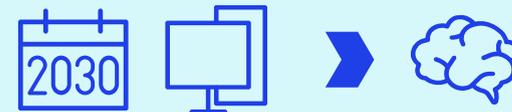
420+

AI US startups, exceeding \$15bn in  
total capital raised



\$300+ billion

Expected enterprise revenue from AI  
in 2025

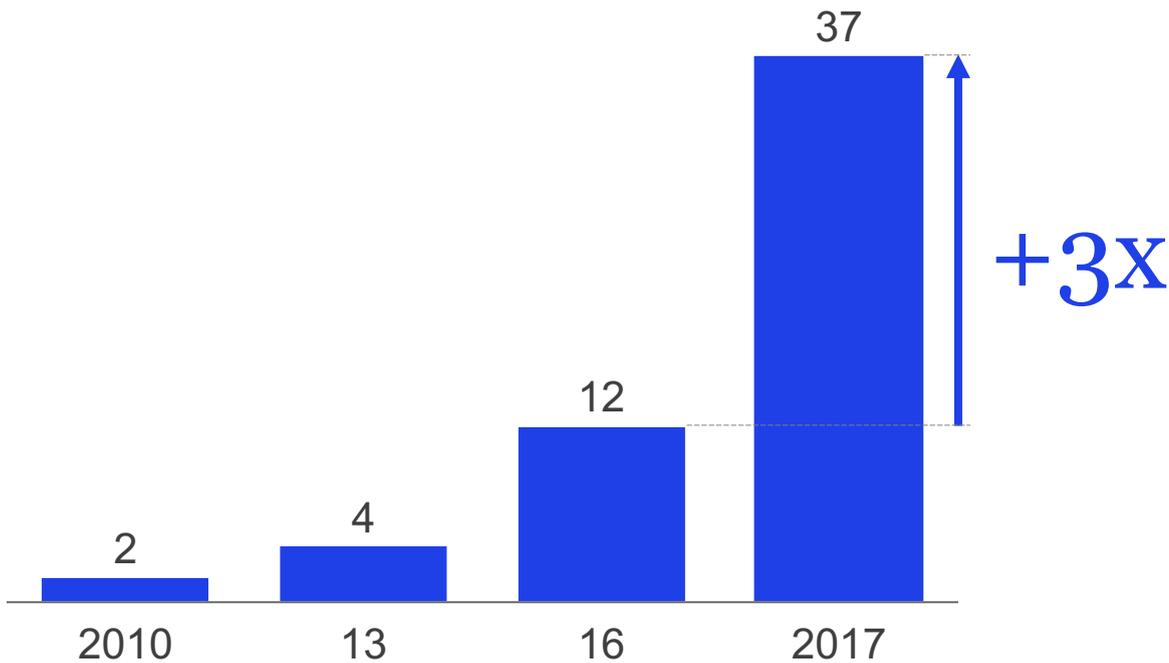


Year when computer power is estimated to surpass human  
brain power in terms of computations per second

# Investment in AI has continued to grow exponentially fueled by expectations of an emerging AI market that will be over \$300 bn by 2025

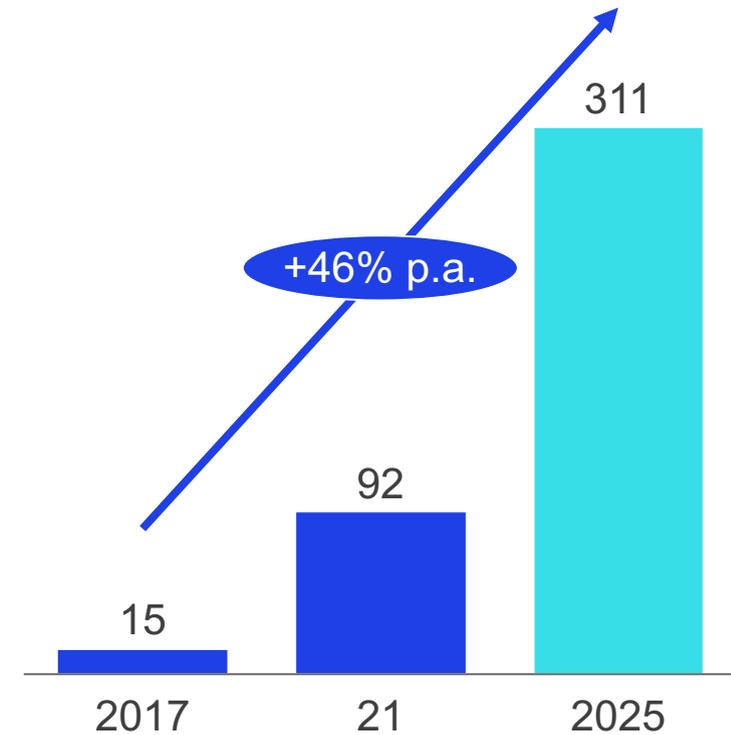
▶ **Global investment in AI companies has been tripling every 3 years<sup>1</sup>**

USD bn



▶ **AI expected to be a +\$300 bn market by 2025, growing at ~50% CAGR<sup>2</sup>**

Enterprise AI revenue, USD bn



<sup>1</sup> Estimates consist of annual VC investment in AI-focused companies, PE investment in AI-related companies, and M&A done by corporations. Includes only disclosed data available in databases, and assumes that all registered deals were completed within the year the transactions were announced.

<sup>2</sup> Enterprise AI Revenue including software, applications, hardware, services

# Some business leaders and scientists foresee an AI revolution coming soon



**Bill Gates**  
Founder of Microsoft

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It will look at all the new information and present to you, knowing about your interests, what would be **most valuable**. What we're seeing is, for the first time, **computers can see as well as humans**. If you combine that with arm-like manipulation, then they could **make us far more productive**

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**Steve Wozniak**  
Founder of Apple

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It is a new revolution in my mind, the **revolution of artificial intelligence, machines that will learn**, that will **be able to do things much better than we know how to tell them**

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**Andrew Ng**  
VP & Chief Scientist  
of Baidu

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**AI is the new electricity**. Electricity had once transformed countless industries. **AI will now similarly transform transportation, manufacturing, healthcare, communications, and more**

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**Stephen Hawking**  
Professor,  
U. of Cambridge

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Success in creating **effective AI, could be the biggest event in the history of our civilization**. Or the worst. We just don't know. So we cannot know if we will be infinitely helped by AI, or ignored by it and side-lined, or conceivably destroyed by it. I fear that AI may replace humans altogether

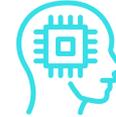
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# Industry 4.0 is enabled by disruptive technologies that will change the manufacturing sector between today and 2025



## Data, computational power and connectivity

- Sensors
- Internet of Things/ Machine-to machine
- Cloud technology



## Analytics and artificial intelligence

- Automation of knowledge work
- Big data and advanced analytics

# Industry 4.0



## Human machine interaction

- Touch interfaces and next-level graphical user interfaces
- Virtual and augmented reality



## Conversion to physical world

- Industrial automation (e.g., collaborative robots, AGVs)
- Additive manufacturing (i.e., 3D printing)

# Industry in Poland needs to increase productivity to catch up with Europe it's full AI driven automation potential

- Productivity of industrial production in Poland is far behind the European average. The **gap to the average in the countries of Western Europe (EU-15) is over 40%**
- On average **49% of working time is devoted to activities that could be fully automated** (potential of 3m jobs in Poland)
- Activities with the highest automation potential: predictable, repetitive activities such as **machine operation, production line work and simple maintenance duties**

Key AI Industry applications for further consideration by Polish Industrial sector



**Failure avoidance** based on prediction analysis



**Computer vision enhancement**



Postproduction and production inspection and **quality control**

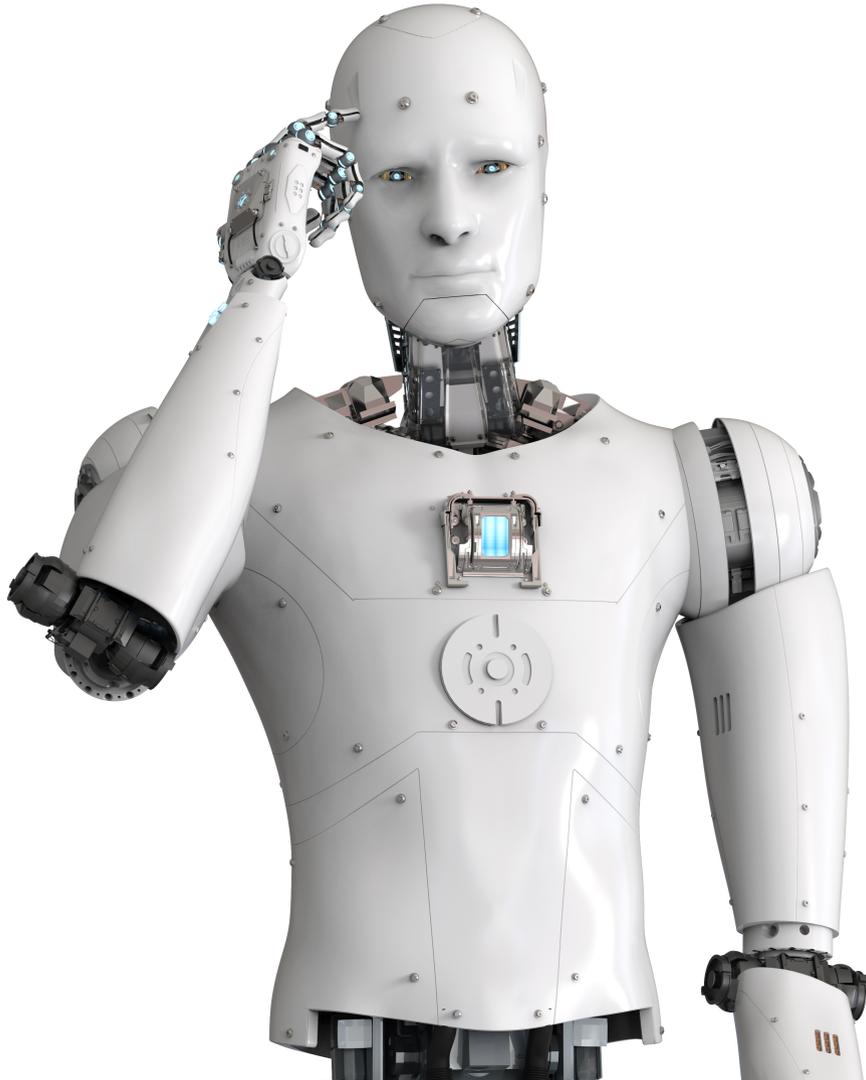


**Demand prediction**



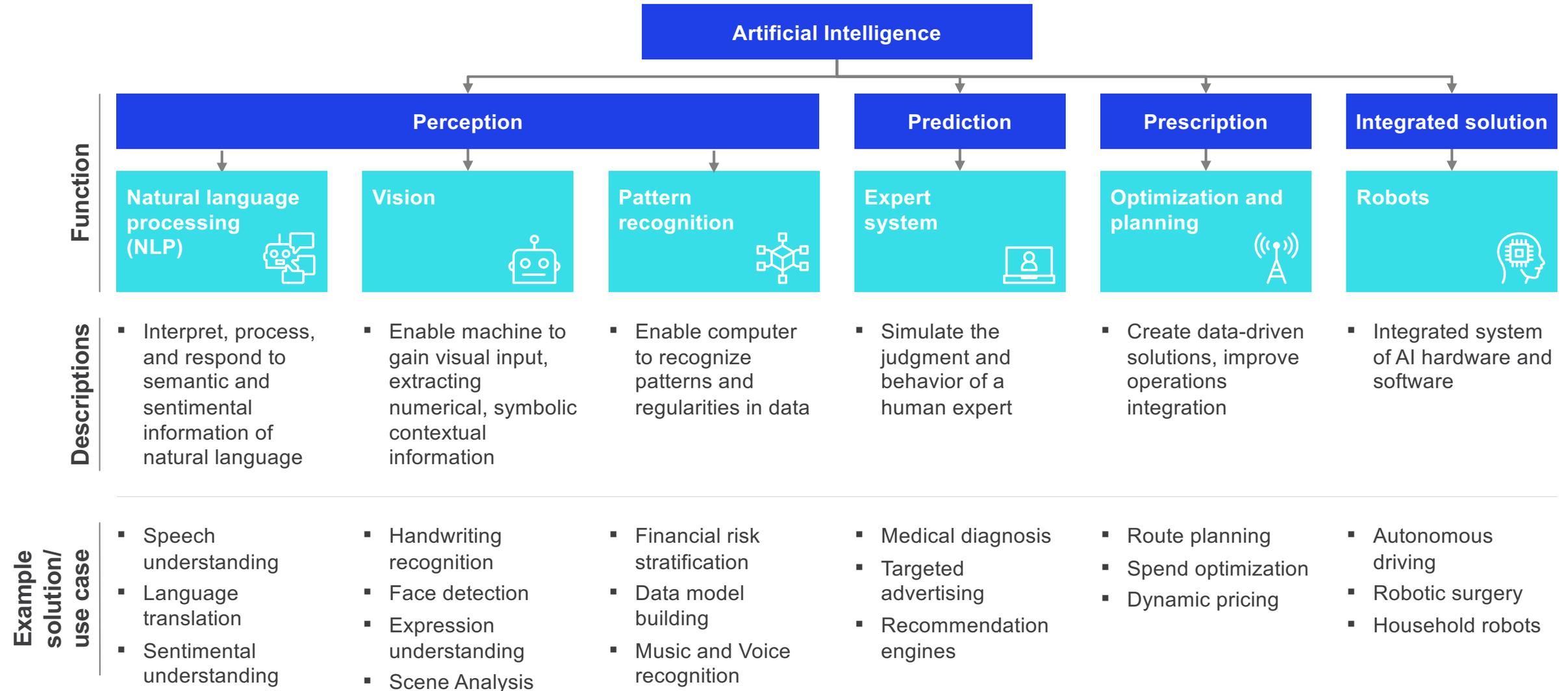
**Safety and early warnings**

# A definition of artificial intelligence



- **Intelligence exhibited by machines** that are used to perform **cognitive functions** we associate with human minds
- AI enables machines to deal with imperfect and new data, that they can process and learn from through algorithms and therefore can interpret new data and make decisions based on it
- **Human cognitive functions** performed by AI include **perceiving** (e.g. computer vision, language processing), **learning**, **identifying patterns**, **making predictions**
- **Machines learn through different AI techniques**. Depending on the technique used, AI can be limited to problems for which it was trained or adapt to new contexts i.e., situations it was not previously trained to deal with

# Using the output from algorithms, machines can perform functions that imitate human cognition



# Machine/deep learning use cases yield tremendous value

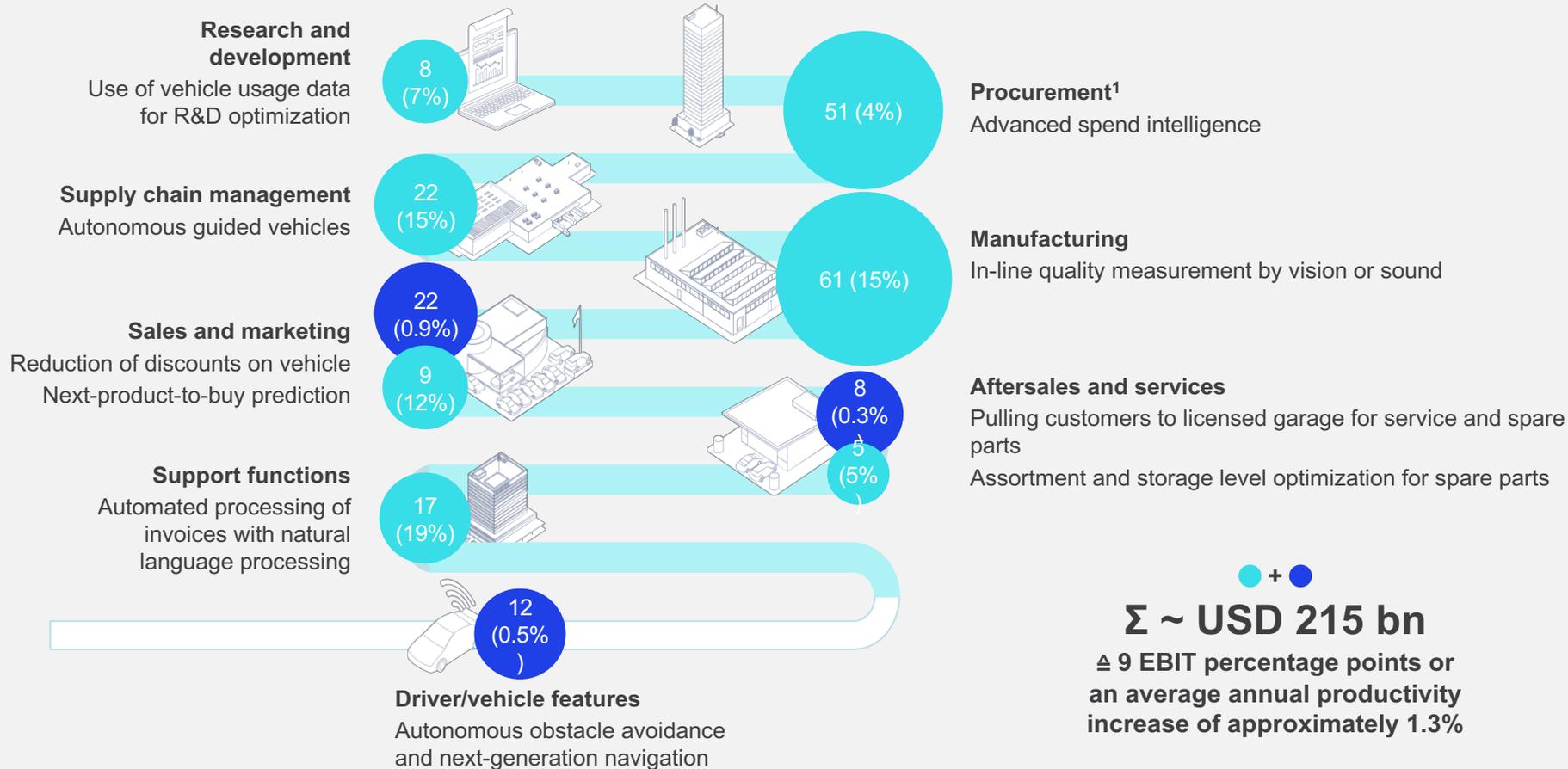
The total value opportunity for all global Automotive OEMs together is about USD ~ 215 bn in 2025 – equaling a ~9 percentage point EBIT increase for an average OEM

In cooperation with:



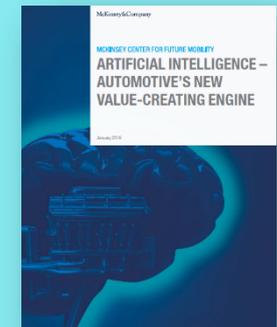
● Value potential from bottom-line effects  
USD billions (as share of costs in corresponding part of the value chain)

● Value potential from top-line effects,  
USD billions (as share of total revenue)



## Key insights

- **120 AI use cases** identified along the value chain
- AI-enabled **value opportunity of ~USD 215bn** derived
- **4 key success factors** for AI transformations: collecting/ synchronizing data, setting up partner ecosystem, establish AI operating system, build core AI capabilities/team
- OEMs need to start transformations now by **implementing pilots**



<sup>1</sup> Includes direct and indirect spend

# While AI based automation was only the beginning, we already see the benefits of ML and will move towards cognitive intelligence building new processes on its own



## Task automation & robotic process automation (RPA)

- Rule based **process automation**
- **Structured** data sources
- **Static** performance level



## Machine learning (ML)/ advanced analytics (AA)

- Algorithms **beyond human ability**
- Utilizes **unstructured** data
- Performance of models **improves over time**



## Cognitive intelligence/ deep learning

- Neural networks and advanced ML algorithms **beyond 'statistical' learning**
- Natural language to **build neural network**
- Based on **largest unstructured data sets** and natural language
- **Execute new processes** based on observation

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Where AI is going

and that's all folks!

Norbert Biedrzycki

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