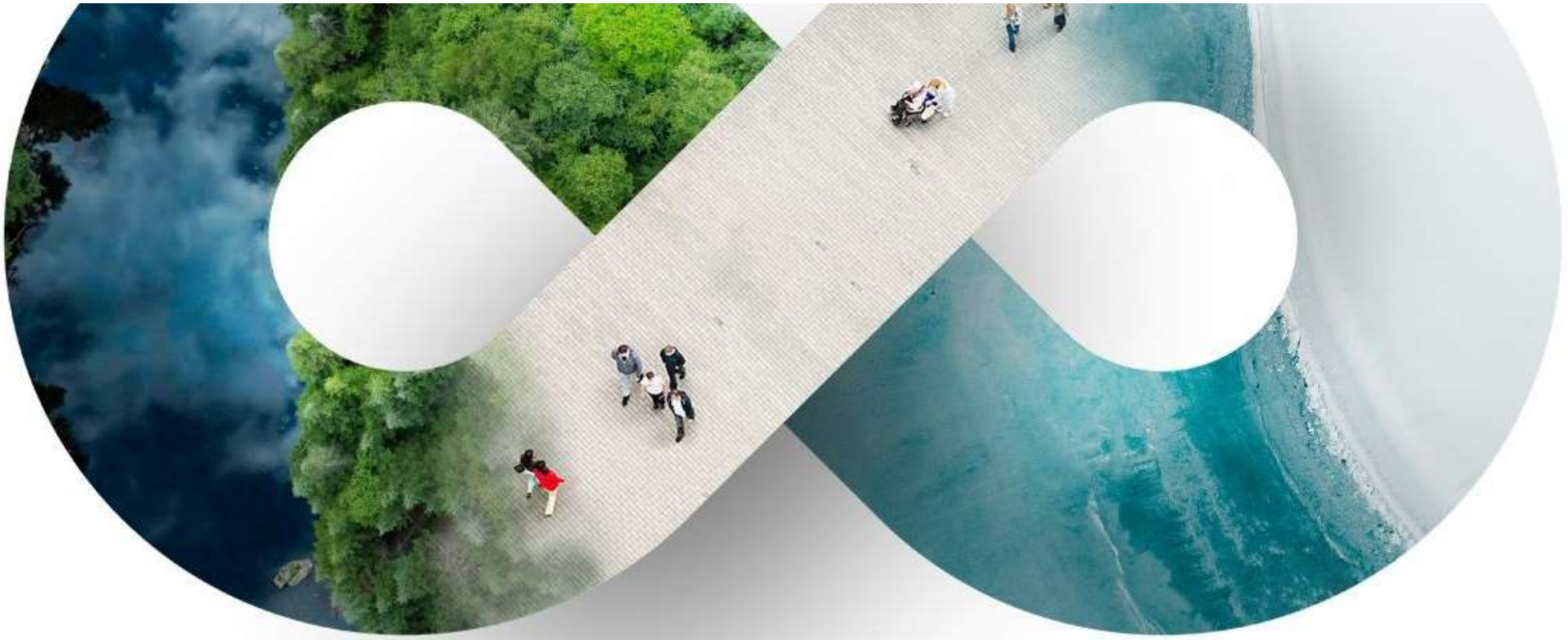


NOVEMBER 2022

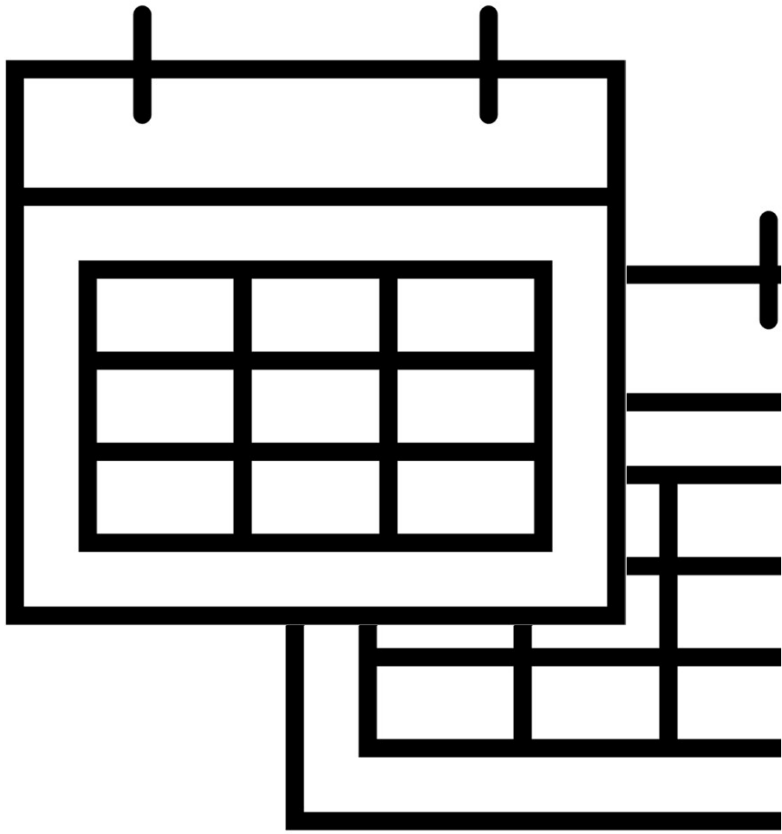
R&D@ABB

Industrial transformation’s new imperative, digitalization and sustainability

SHIVA SANDER TAVALLAEY, Senior Principal Scientist, Applied Analytics

Content

- Group presentation
- Industrial transformation’s new imperative
  - “Billions of better decisions”
- R&D focus areas and innovation eco system



Group presentation

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future.

By connecting software to its **electrification**, **motion**, **process automation and robotics & discrete automation** portfolio, ABB pushes the boundaries of technology to drive performance to new levels.

Our Business Areas

- Electrification
- Motion
- Process Automation
- Robotics & Discrete Automation

Our business areas

Electrification

- Distribution Solutions
- Smart Power
- Smart Buildings
- Installation Products
- Power Conversion
- E- mobility
- Service

Motion

- IEC LV Motors
- Large Motors & Generators
- NEMA Motors
- Drive Products
- Systems Drives
- Motion Service
- Traction

Process Automation

- Energy Industries
- Process Industries
- Marine & Ports
- Measurement & Analytics

Robotics & Discrete Automation

- Robotics
- Machine Automation

R&D facts & figures

- 4.7% of revenues spent on R&D and digital
- 7000+ Scientists and Technologists which >60% focused on digitalization
- 11 countries with major R&D Centers
- >100 University collaborations
- >25,000 active patents to secure IP
- Start-up engagement direct or via our own ATV & Synerleap
- >15 strategic Partnership

Corporate Research

Fueling tomorrow’s innovation

~300 highly qualified scientists and engineers

7 corporate research and technology centers around the world

Business aligned research with **7** core technologies

>200 technology projects and pre-studies

>200 FFs and **>200** publications

Technology Areas

of common interest within the ABB group

Multiphysics

Merging physical properties with digital transformation

Mechatronics

Intelligent and complex products: mechanic- electric-electronic-software-sensing- control

Power Electronics

Conversion and control of electrical power in different applications.

Connected Systems

Simple access and use of seamless and standardized information as well as systems.

Sensing

Extract information, create solutions transform real-world parameters into valuable information

Switching

Safe and controllable devices (switches and breakers) at system level.

Software &Control

Efficiently engineered, user-friendly, optimal, intelligent and sustainable solutions.

ABB Research, Sweden

Research and Technology for the future

Facts

- Located in Västerås
- Established 1916
- 90 Co-Workers (35 nationalities)
- 60% PhD researchers
- 10 Associate professors/affiliated faculty
- Intense Lab infrastructure
- Hosting SynerLeap
- University collaborations
  - KTH, Chalmers, LiU, MDU,, …
  - Imperial College, Aalto, ETH….

Industrial transformation’s new imperative

Digitalization and sustainability -> Autonomy

Survey

How can industry transform to do better?

To explore the evolution of digital transformation and sustainability strategies, ABB commissioned a global research study that asked over **700 key decision-makers** across **12 industrial segments** how their businesses will address these issues.

This was supplemented by in-depth interviews with subject matter experts in these areas.

Billions of better decisions

As it confronts climate change, the world needs industry to be at its very best, balancing the needs of the economy and the environment to create a future that works for all. The Industrial Internet of Things (IoT) will play a key role in striking this balance, delivering the infrastructure, innovation and intelligence to unlock new sources of productivity and efficiency and enable a low-carbon society.

Billions of better decisions

Survey methodology

765

respondents were comprised of executives, vice presidents, directors, and senior managers with operational knowledge of Industrial IoT

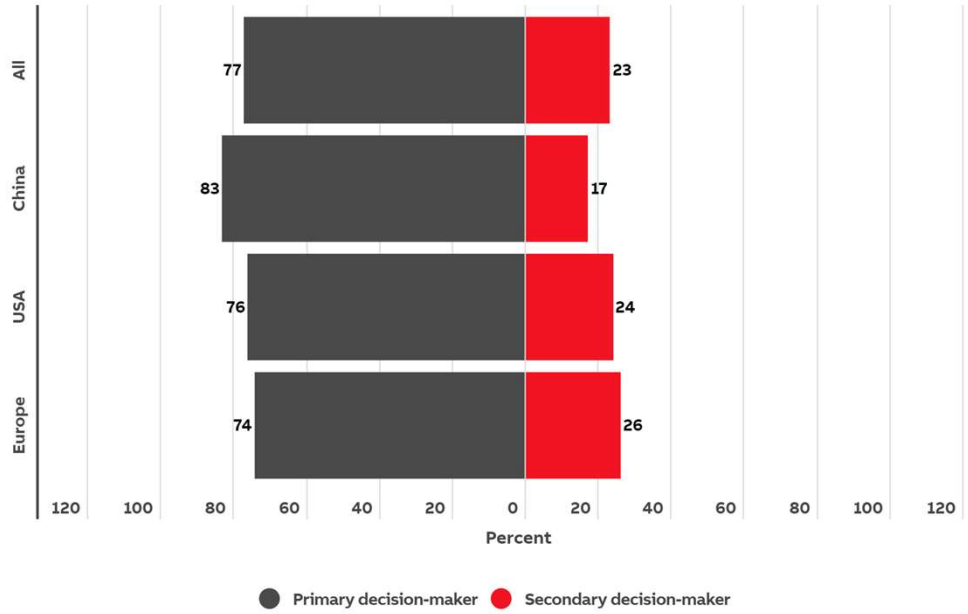
77%

primary decision-makers

23%

secondary decision-makers

The respondents came from a broad range of industries, with the largest share coming from discrete manufacturing, including automotive production.



Billions of better decisions — ABB Ability™ (global.abb)

Billions of better decisions

The state of the Industrial IoT

85%

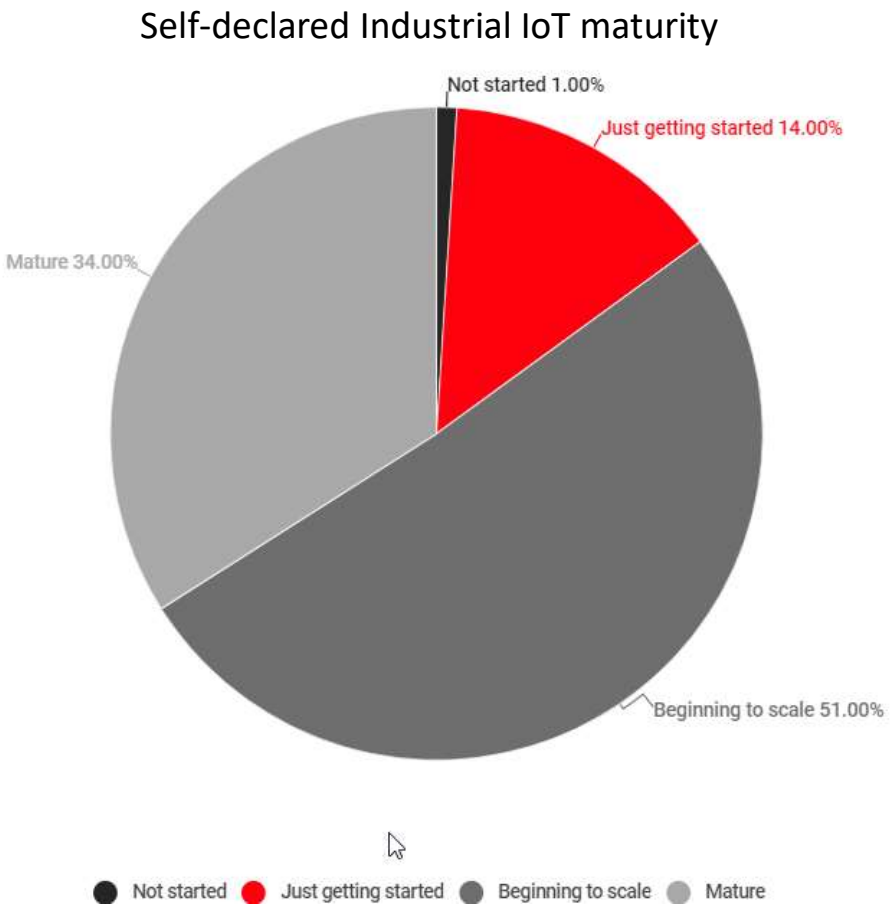
are now adopting Industrial IoT initiatives.

14%

Just getting started

1%

Not started yet



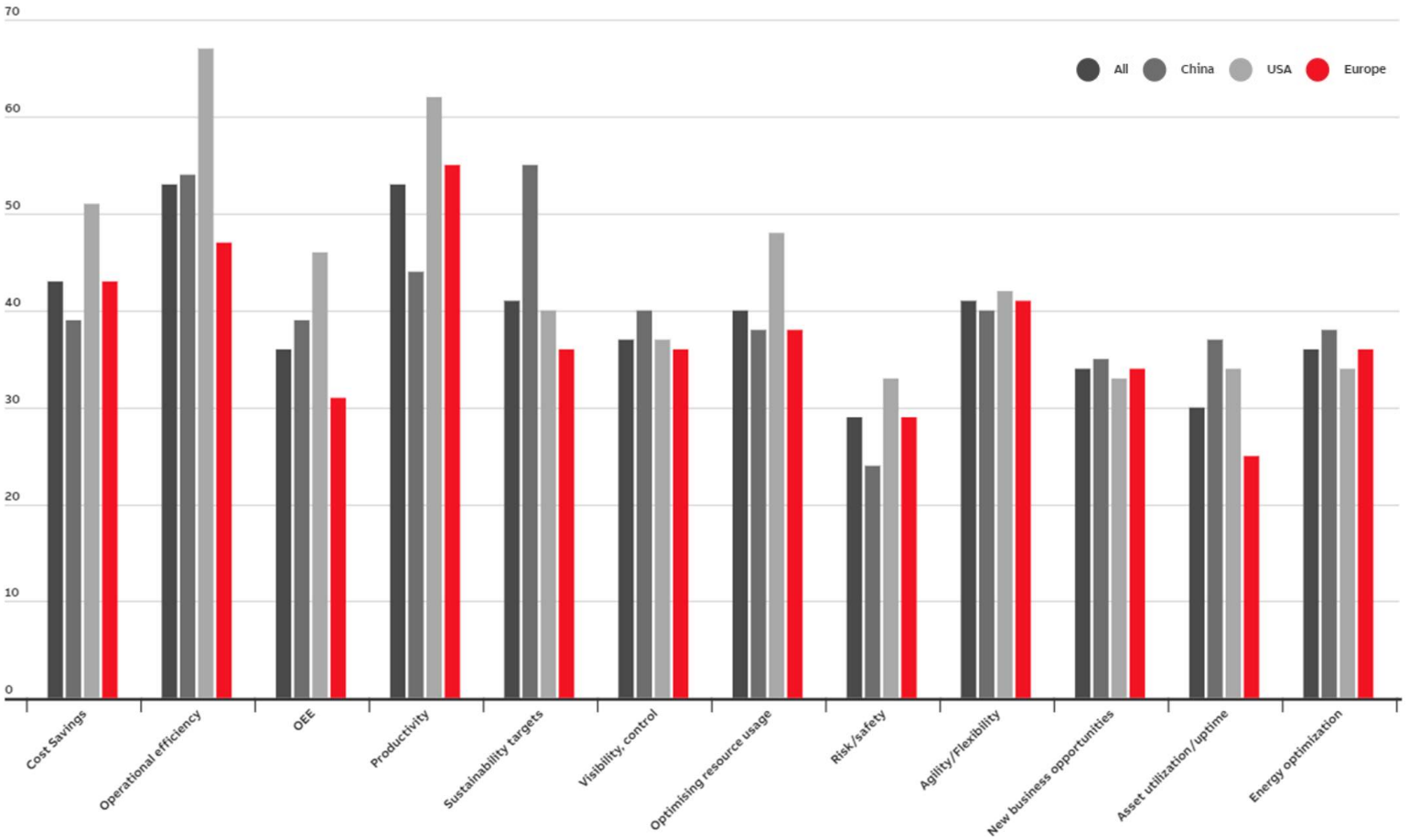
Main drivers

94%

of respondents agree the Industrial IoT “enables better decisions, improving overall sustainability”

72%

said they are “somewhat” or “significantly increasing spending on Industrial IoT” due to sustainability



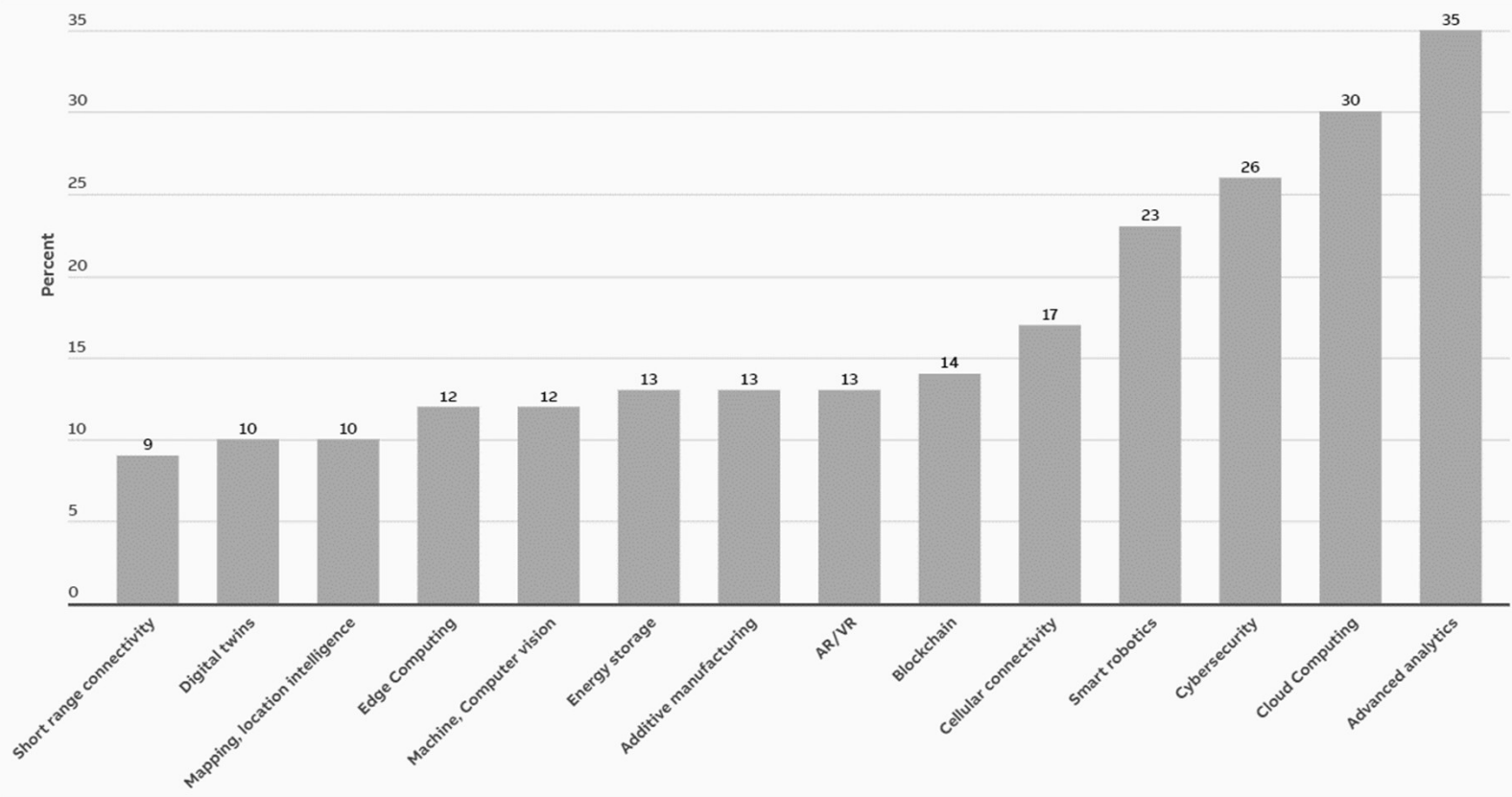
Technologies for improving sustainability

Top sustainability drivers

- Future competitiveness
- Efficiency
- Brand reputation

Key Insight

The top 3 benefits of Industrial IoT for sustainability are… operational efficiency, safety, and optimizing energy and resource consumption.




35%
“digitally mature”


38%
experienced top-line growth
due to sustainability practices


45%
Improved Compliance


33%
“significantly increased”
sustainabilityoriented
investment in Industrial IoT


42%
reduced carbon footprint

Knowing more, doing better

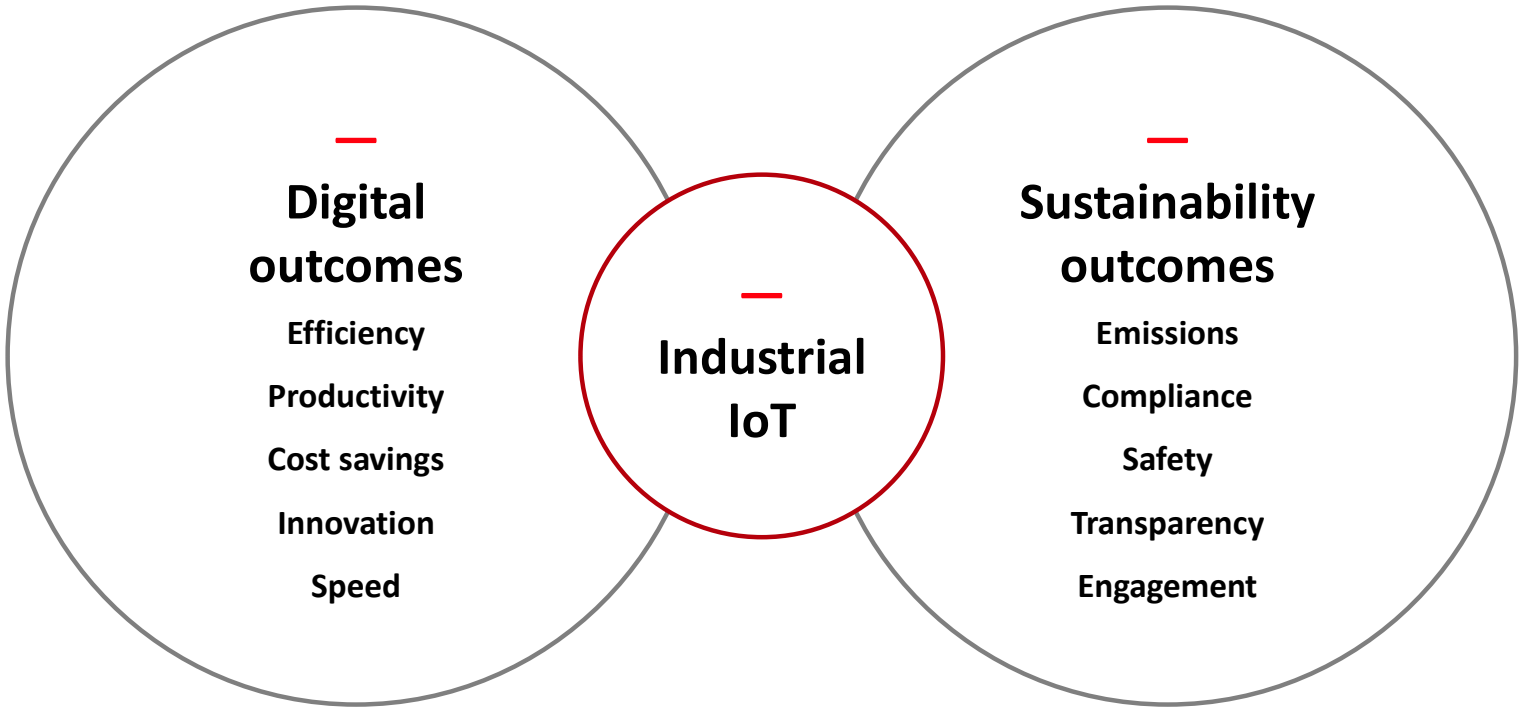
Key Insight
Digitalization and sustainability are two of the biggest drivers of change across industries today.

96%

of decision-makers say digitalization is “essential to sustainability”

$7 trillion

Projected global spending on digital transformation from 2020 to 2023



The transition to autonomous systems in industry

Value proposition of autonomy

Handle increasing complexity of Industrie 4.0 systems

Lot size one production

Higher productivity / yield and increased quality

Lower cost and energy consumption

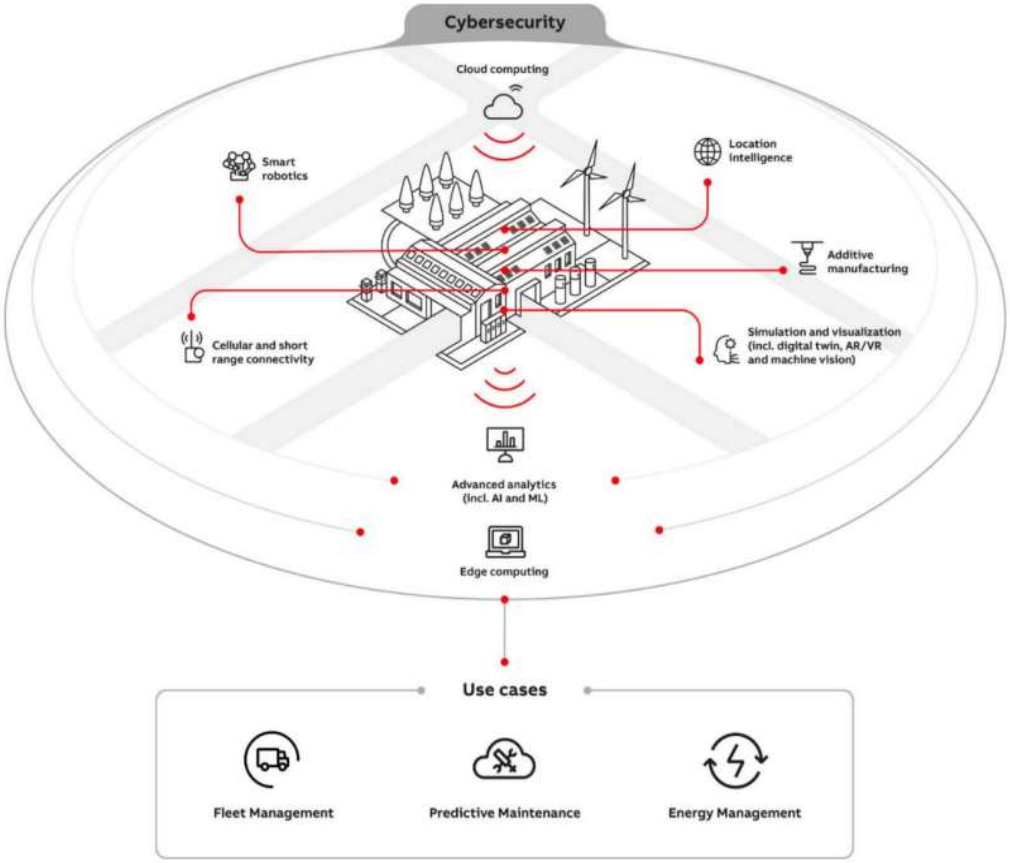
Improved worker health & amplify human potential

Bring out and accelerate new innovations

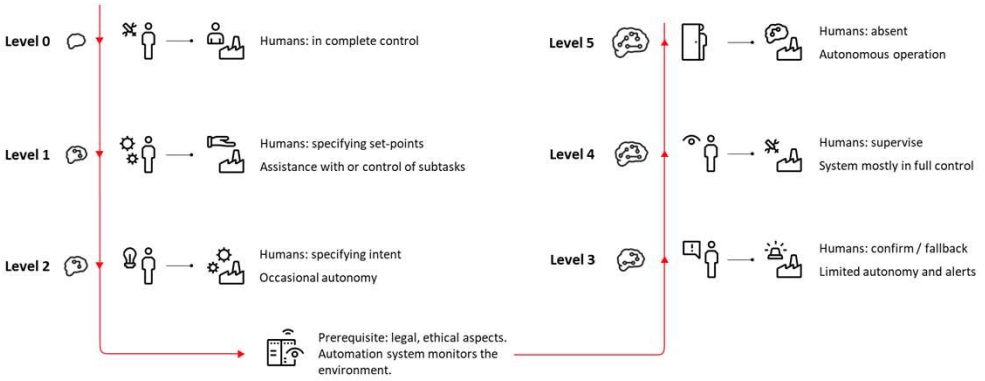
Enable new business models and value propositions

Opportunities currently not imagined at all

Industrial IoT technologies



Autonomous Industry



https://new.abb.com/news/detail/11164/autonomous-systems

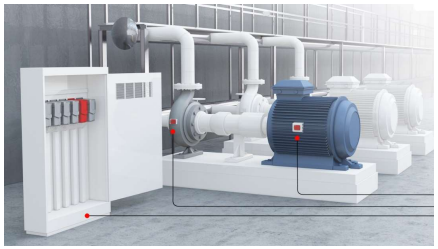
R&D focus areas and innovation eco system

ABB and R&D Demands

Motion

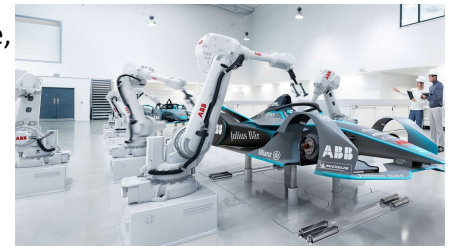
Market growth is driven by mega-trends such as growing population, urbanization and digitalization

This requires further automation of industrial processes, **energy efficiency** and electric mobility



Robotics & Discrete Manufacturing

Market growth driven by mega-trends of individualized consumers, labor shortage, digitalization and uncertainty
Resulting in need for automation solutions for increased **productivity**, highest **flexibility**, improved **quality** and maximum **simplicity**



Electrifications

Electricity demand grows 2x faster than other energy sources

Digitalization accelerates demand for **intelligent solutions**

Process Automation

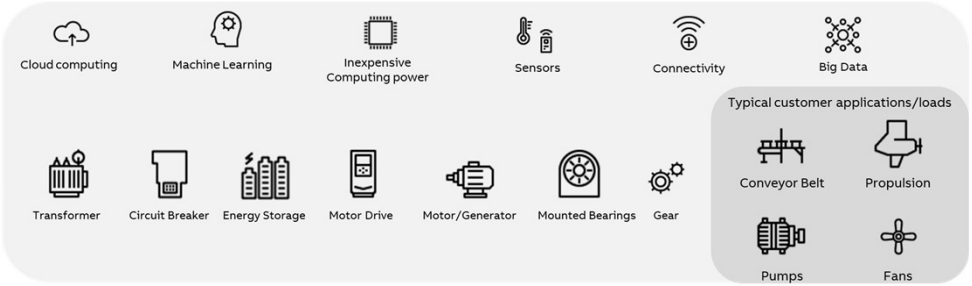
Increasing demand for **end-to-end integrated**, **connected solutions** and **advanced services**

Increasing demand for applications to drive **autonomous** operations

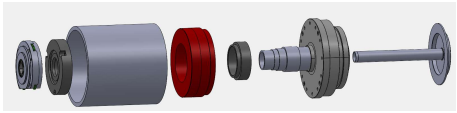
ABB Research Sweden

Focus Areas

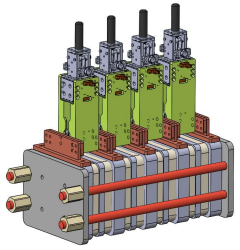
Physical and Digital Powertrain



Robotics



Switching and Systems

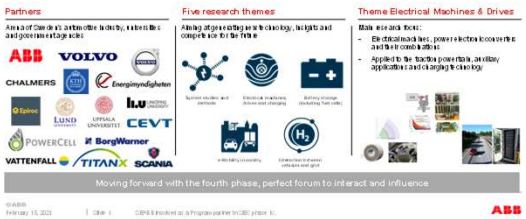


Automation

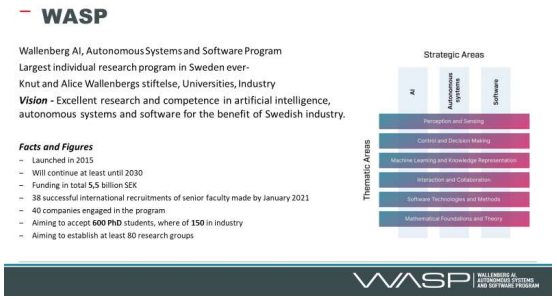
Public R&D initiatives in Sweden

Relevant to ABB, e.g.

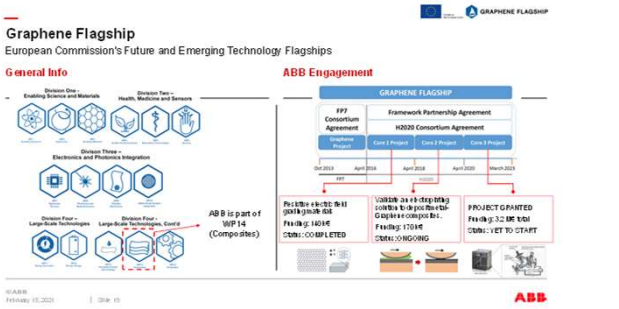
Swedish Electromobility Center



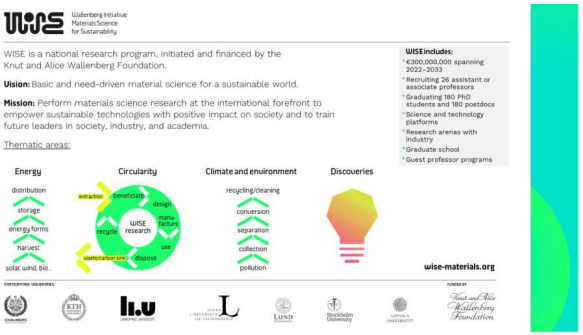
WASP



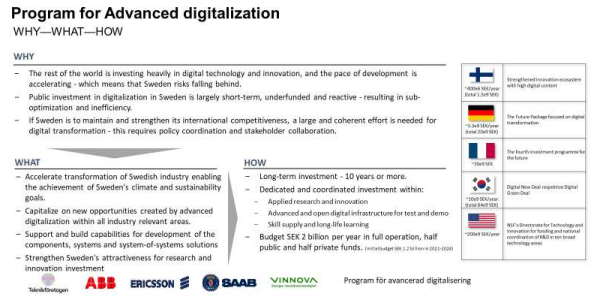
EU Graphene Flagship



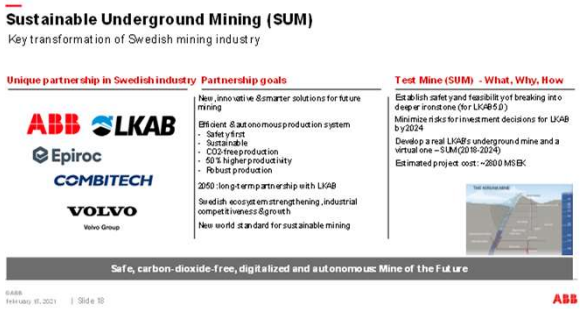
WISE



Program for Advanced Digitalization



Sustainable Underground Mining



The Swedish R&D ecosystem

External and internal partnerships – increase the speed of innovation

Industry partners

Partners in developing innovative solutions to real-time challenges

Academia

Partners in developing long-term disruptive technologies

Start-Ups

Partners in building breakthrough power and automation technologies

SynerLeap
Powered by ABB

Businesses

Close co-operation between core research and business ensuring constant customer value creation




Funding Agencies: EU, Energy Agency, Vinnova, KKS, SSF

Industry has a vision of integrated digital operations that create better outcomes - with self-managed, self-healing systems powered by AI