

Mitsubishi Electric R&D Strategy

February 13, 2019

Masahiro Fujita, Executive Officer
Corporate Research and Development Group

Promotion of R&D for Sustainable Growth

Corporate Mission

The Mitsubishi Electric Group will continually improve its technologies and services by applying creativity to all aspects of its business.
By doing so, we enhance the quality of life in our society.

Creating new value through innovation and promoting R&D that pursues sustainable growth

Contributing to realizing Society 5.0 and achieving the goals of the SDGs

Net Sales 5 trillion JPY or more
OPM 8% or more

Sustainable growth

2018

2020

Society 5.0

—ともに創造する未来—

SUSTAINABLE DEVELOPMENT GOALS

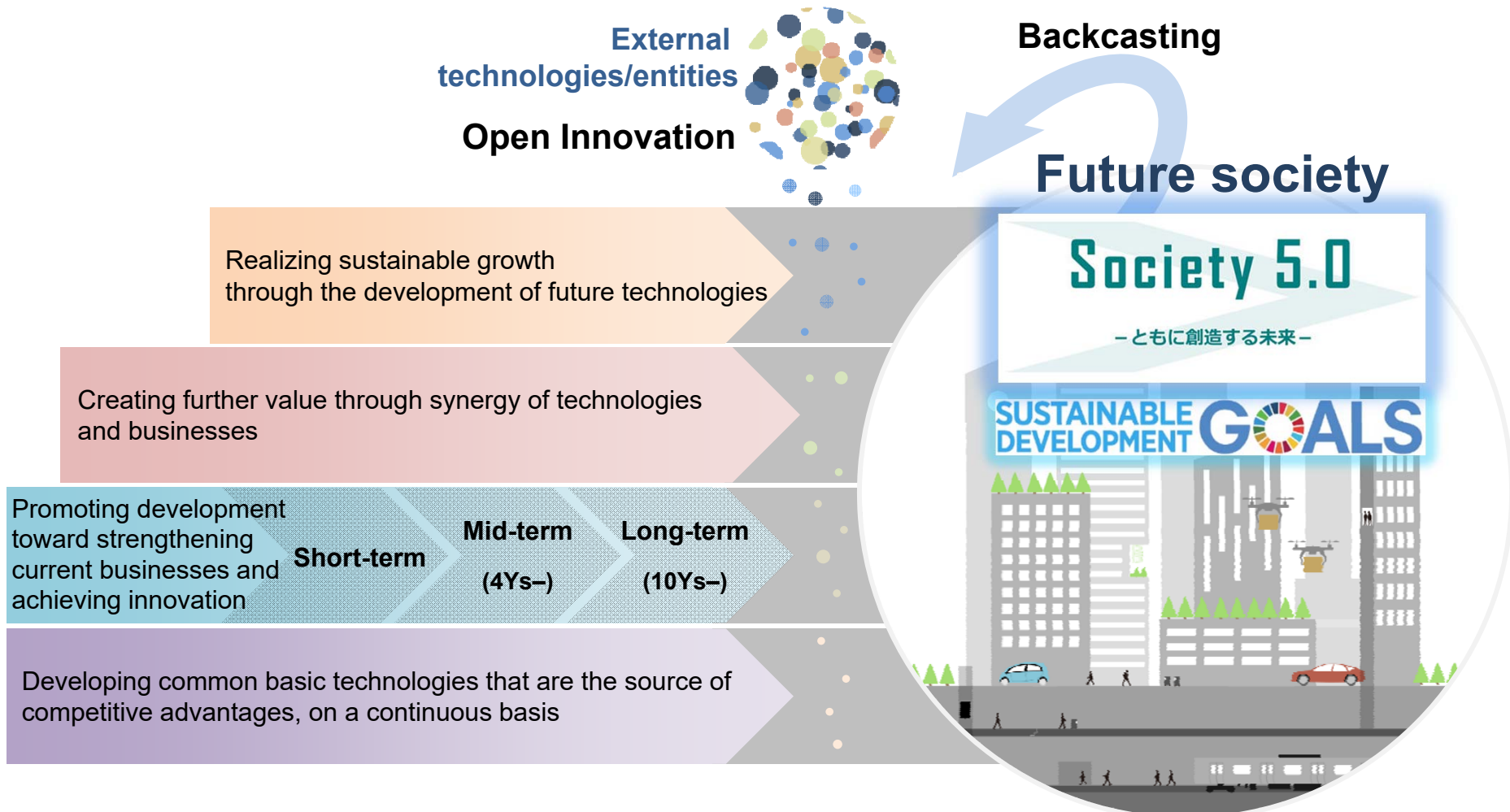


Society 5.0: It is contained in the 5th Science and Technology Basic Plan approved by the Government of Japan in Jan. 2016.

SDGs: "Sustainable Development Goals" adopted by the United Nations as goals to achieve towards 2030

Basic R&D Policy

Well balanced short-, mid- and long-term R&D

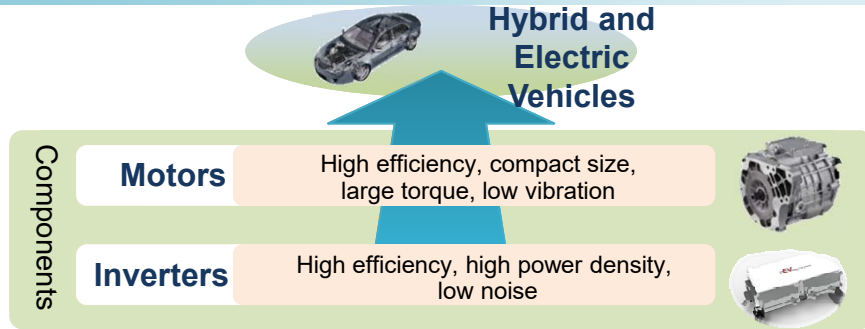


Society 5.0: It is contained in the 5th Science and Technology Basic Plan approved by the Government of Japan in Jan. 2016.

SDGs: "Sustainable Development Goals" adopted by the United Nations as goals to achieve towards 2030

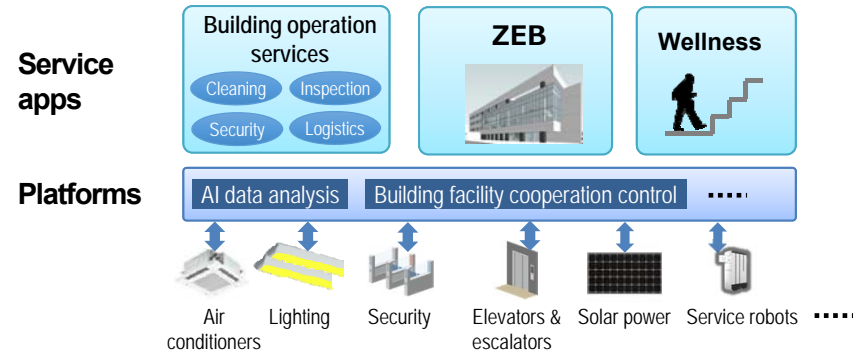
R&D Based on the Basic Policy

Promoting development toward strengthening current businesses and achieving innovation



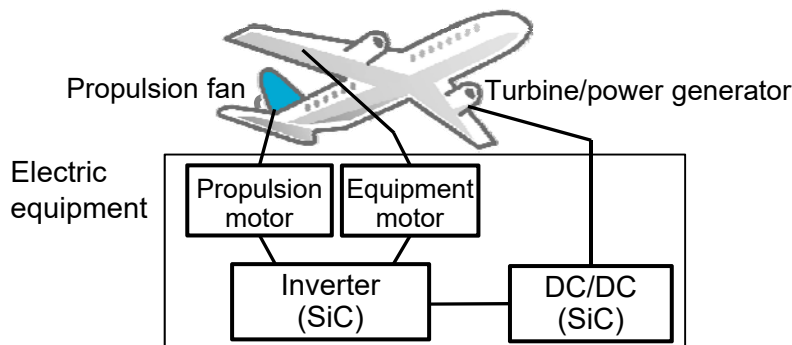
Development of compact high-efficiency, high power motor and inverter

Creating further value through synergy of technologies and businesses



Development of smart buildings by automating building operation services and incorporating ZEB, wellness, etc.

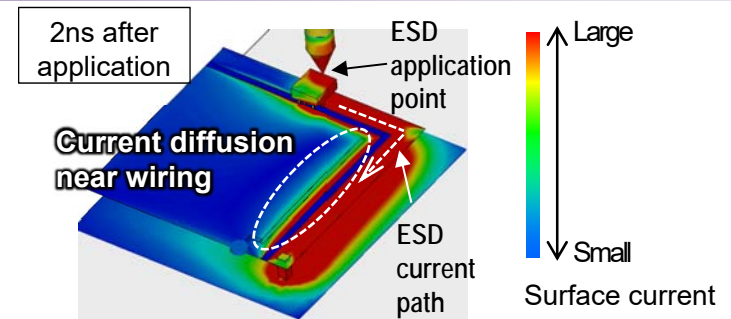
Realizing sustainable growth through the development of future technologies



Development of lightweight, high-efficiency electric equipment toward the electrification of aircraft

*Part of this research is supported by The New Energy and Industrial Technology Development Organization (NEDO)

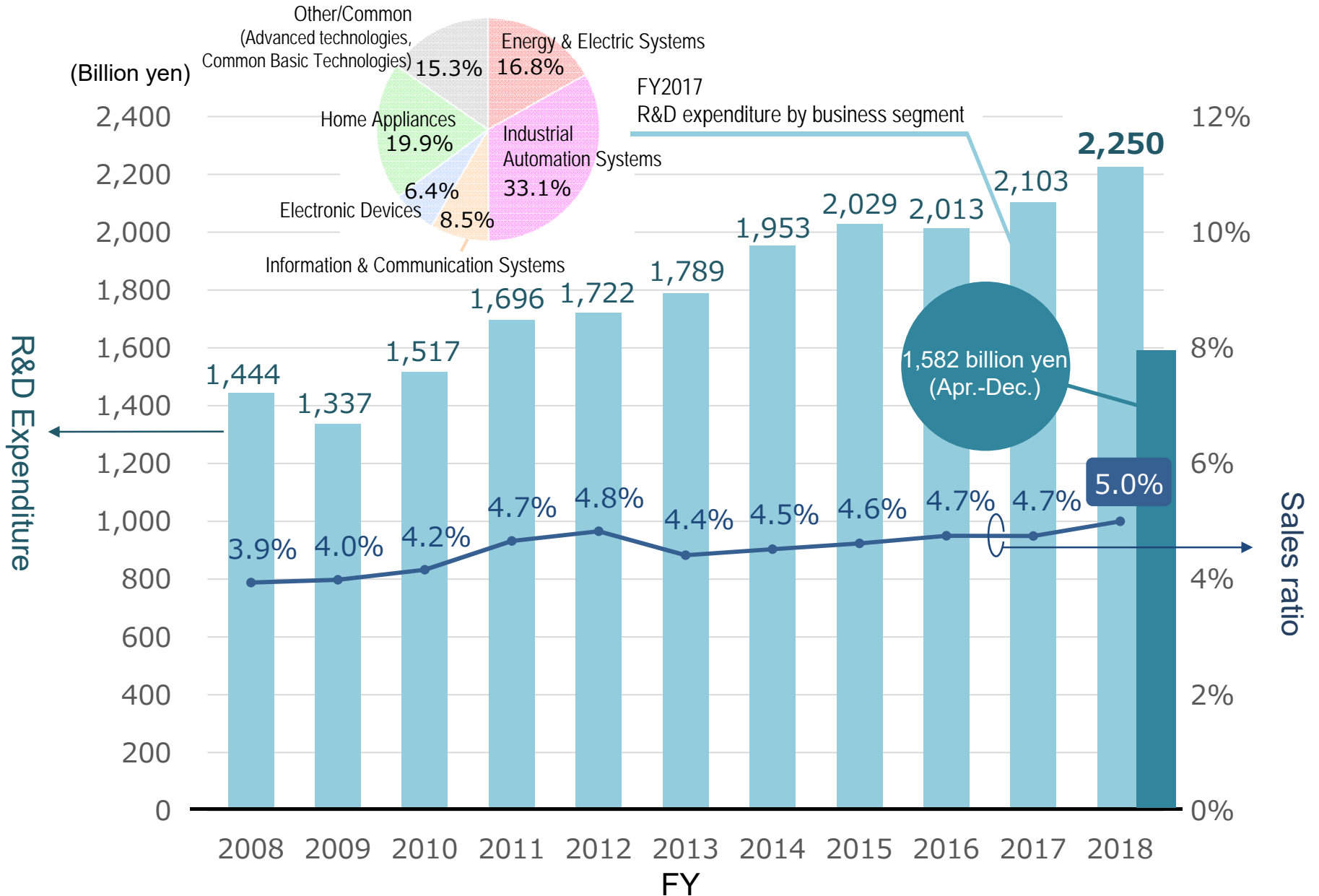
Developing common basic technologies that are the source of competitive advantages, on a continuous basis




Development of technology for visualizing noise propagation to facilitate ESD resistant designs

ESD: Electrostatic Discharge


R&D Expenditures (Consolidated)



Global Advancement of R&D

 **Mitsubishi Electric R&D Centre Europe (MERC)**

- Communication
- Software reliability validation technology
- Power electronics
- Heat management technology



 **Mitsubishi Electric Research Laboratories (MERL)**

- Signal processing technology
- Control technology
- Optimization technology
- Modeling simulation technology
- AI technology




 **Mitsubishi Electric China (R&D promotion department)**

- Development of technologies for China
- Market surveys

 **Advanced Technology R&D Center**

- Power electronics
- Electromechanical technology
- Mechatronics
- Environmental energy, materials
- Device technology
- System technology
- Image technology



Amagasaki, Hyogo Pref.

 **Information Technology R&D Center**

- Information technology
- Communication technology
- Media intelligence
- Electro-optics, wireless technology

 **Industrial Design Center**

- Design
- Creation of user experience



Kamakura, Kanagawa Pref.

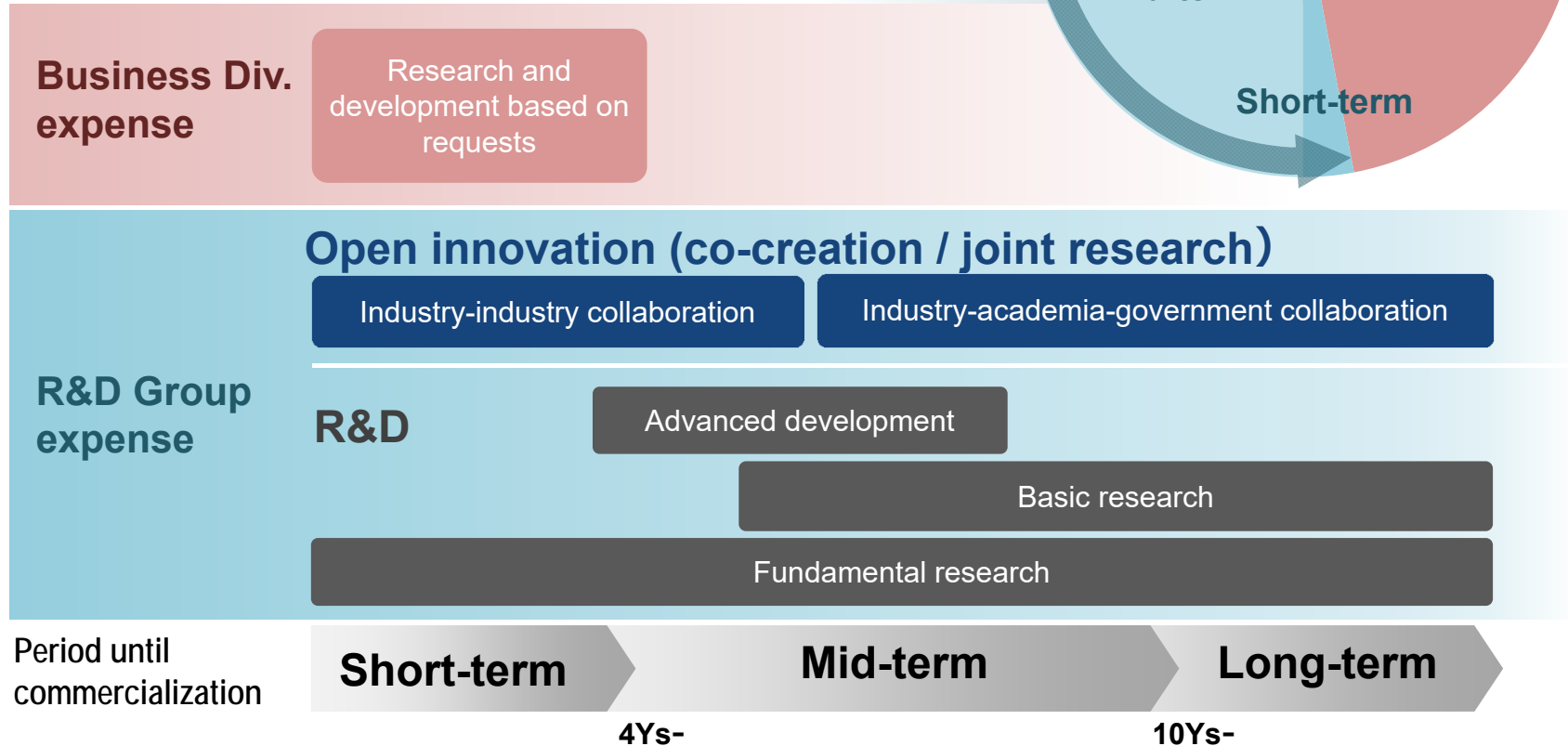
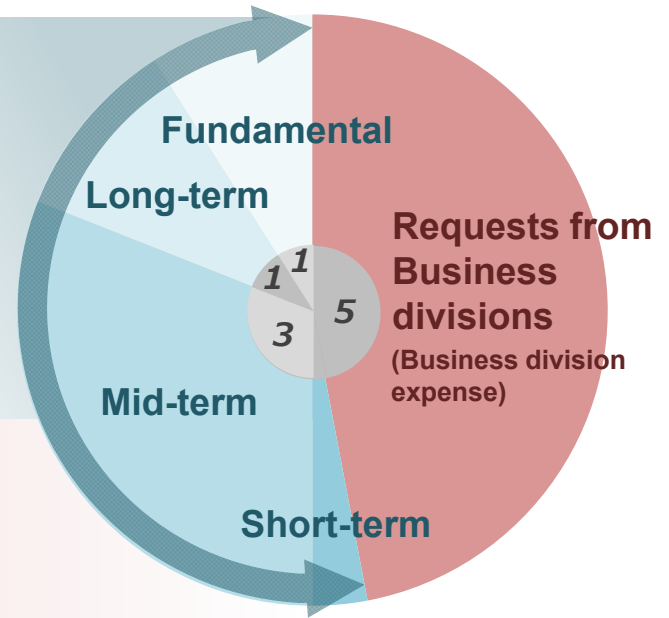
R&D Framework and Allocation of Resources

• Allocation of R&D resources

Promotion of short-term, mid-term, long-term and fundamental R&D at a balance of roughly **5 : 3 : 1 : 1**

• R&D Framework

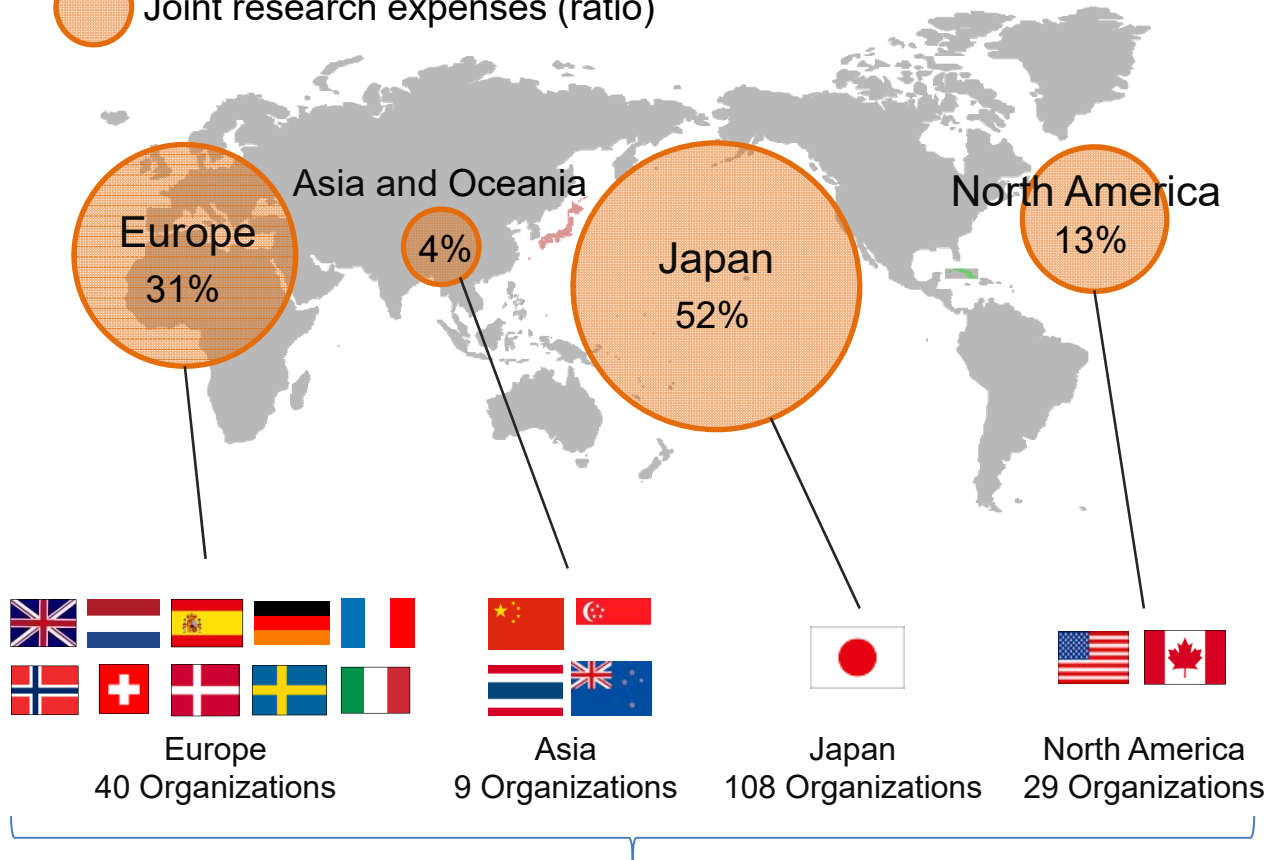
Voluntary R&D
(R&D Group expense)



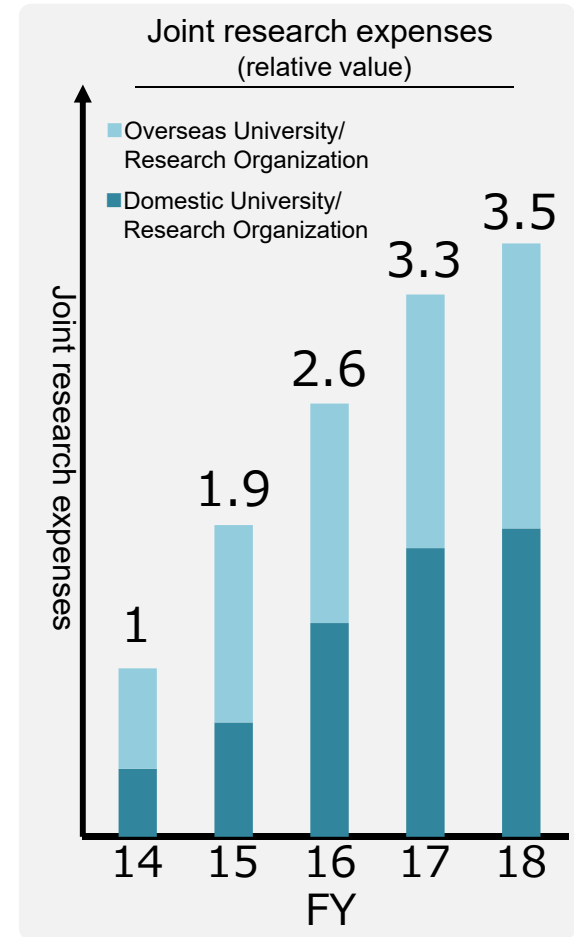
Open Innovation

Creation of technologies for winning the global competition
in collaboration with organizations possessing world-leading technologies

Joint research expenses (ratio)

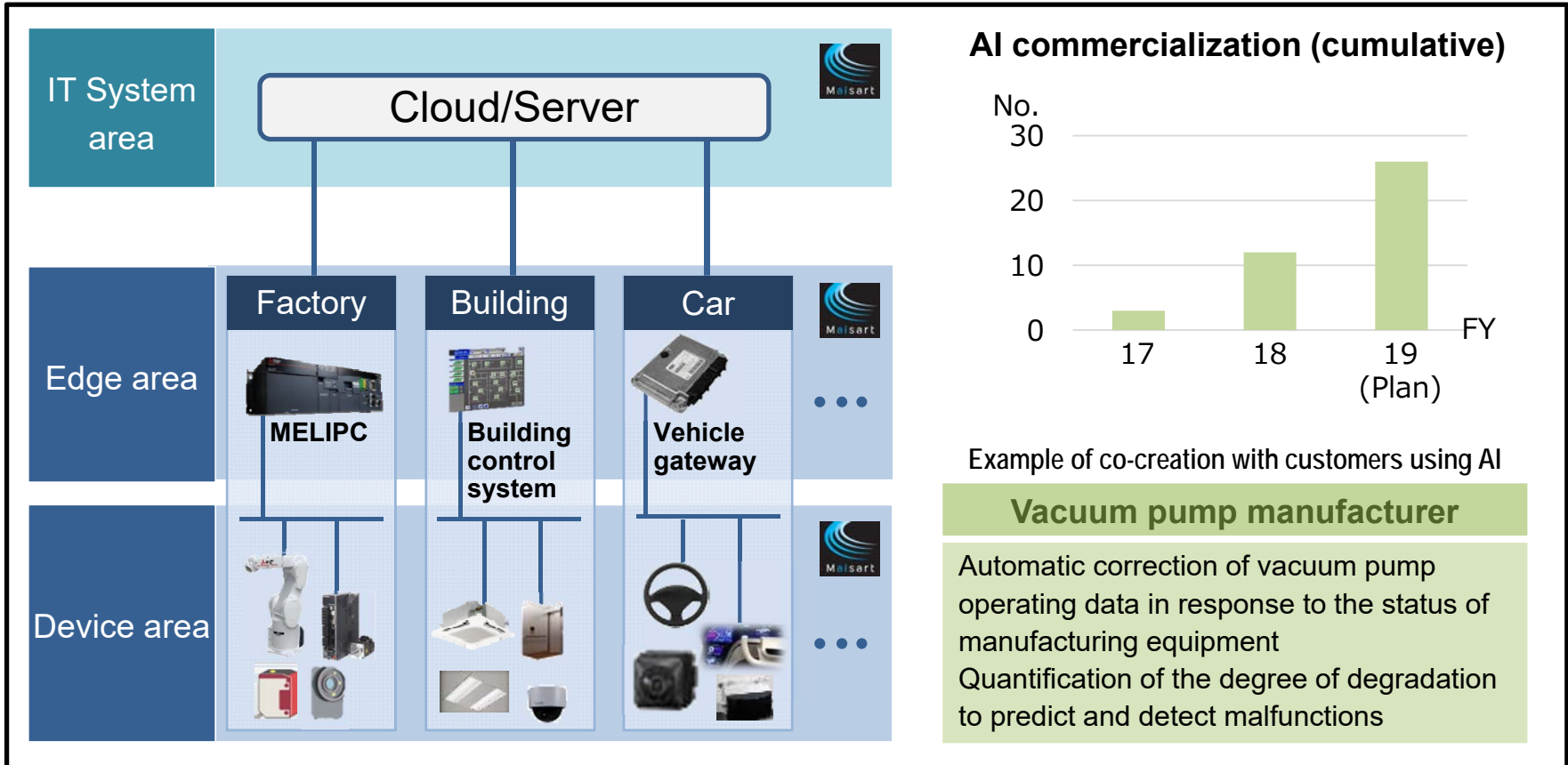


Collaboration with 186 worldwide organizations



AI Development Strategy

We develop smart devices/edge AI technology by using our strength of possessing a broad portfolio of devices and machinery.



AI Technology Brand “Maisart®”

- Compact
- Utilization of device knowledge

Construction of Test Facility for ZEB Technologies

We aim to realize net Zero Energy Buildings (ZEB), which generate all of their necessary primary energy to operate independently. Further, we will accelerate technology development and tests based on our original *ZEB+* concept to create further added value.



ZEB+ is a registered trademark of Mitsubishi Electric Corporation. In addition to ZEB, ZEB+ aims to create added value in efficiency, ease of use and comfort to offer a sustainable building solution and services that cater to the life cycle of buildings

Location: 5-1-1 Ofuna, Kamakura City, Kanagawa Prefecture
(inside the Information Technology R&D Center)
Area & structure: Building area – approx. 2,000m², Total floor area – approx. 6,000m²;
steel-framed building with four aboveground floors
Start of operation: June 2020

Recent Recognition and Awards

Room Air Conditioner



Kirigamine FZ Series

**Energy Conservation Grand Prize
Prize of the Commissioner of Agency of
Natural Resources and Energy**

FTTH (Fiber to the home) Devices

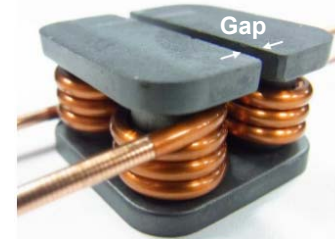
Device for carrier buildings Device for users' homes



GE-PON system device and optical device
GE-PON: Gigabit Ethernet Passive Optical Network

**Ichimura Prize in Industry for
Excellent Achievement**

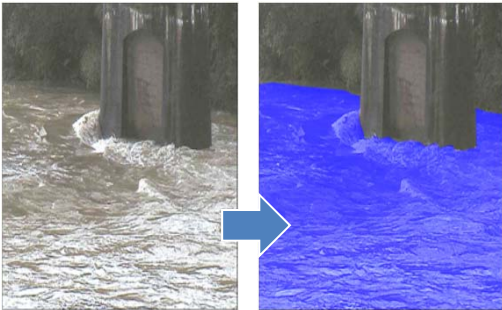
Electromagnetic Noise Countermeasure Design



Downsized noise filter achieved through
the development of a dual mode choke

**Electrical Science and
Engineering Promotion Award**

Water Level Measurement Imaging Device*



Identification of the riverbank using AI technology
*Product of Mitsubishi Electric Engineering Co., Ltd.

2018 R&D100 Awards

Smart Meter Transmission System



**Japan Industrial Technology Grand Prize
MEXT Minister's Prize**

Environment-Resistant IoT Communication Gateway



**Red Dot Design Award
Best of the Best Award
in the Product Design category**

SUSTAINABLE DEVELOPMENT GOALS

2018 2020 2030 2040

Society 5.0

—と社会は共生する未来—

Social issues

Aging population in advanced countries
Traffic jam in cities
Global warming
Energy/water shortage
Natural disasters
Aging infrastructure
Man-made threats



Keywords for solving issues and creating value

Smart production

Smart mobility

Comfortable space

Infrastructure for safety, security & relief



Smart production

Optimization of manufacturing as a whole by connecting various equipment and facilities by IoT, and realization of mass custom manufacturing that responds to diverse needs at low cost



Smart mobility

Pursuing the safety, security and convenience of people on the move based on advanced systems and solutions founded on strong components as befitting today's CASE era



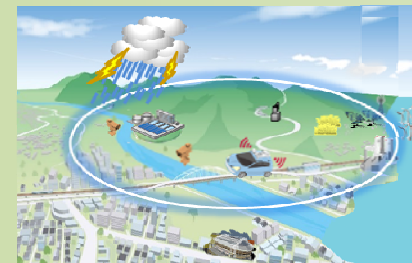
Comfortable space

Creation of an environment-friendly, convenient and affluent society where people and things are connected by IoT and the comfort of homes and buildings are enhanced by AI



Infrastructure for safety, security & relief

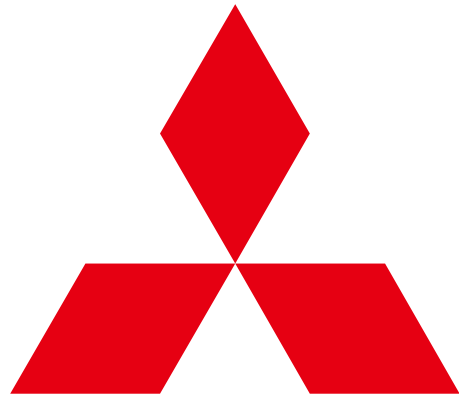
Realization of infrastructure for safety & security in response to changes in the environment and market as a contribution to realizing a sustainable society



Common technologies

Promotion of digital innovation and ongoing development of basic technologies

 AI	 Information processing
 Power electronics	 Machines & mechatronics
 Electrical machinery & energy	 Analysis & reliability evaluation
 Materials	 Environment
 Media	 Electronic devices
 Communication	 Design



**MITSUBISHI
ELECTRIC**

Changes for the Better