

R&D strategy

- Strategies to accelerate new growth -

12th April 2010

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100th
ANNIVERSARY

Celebrating 100 years of the Hitachi Group

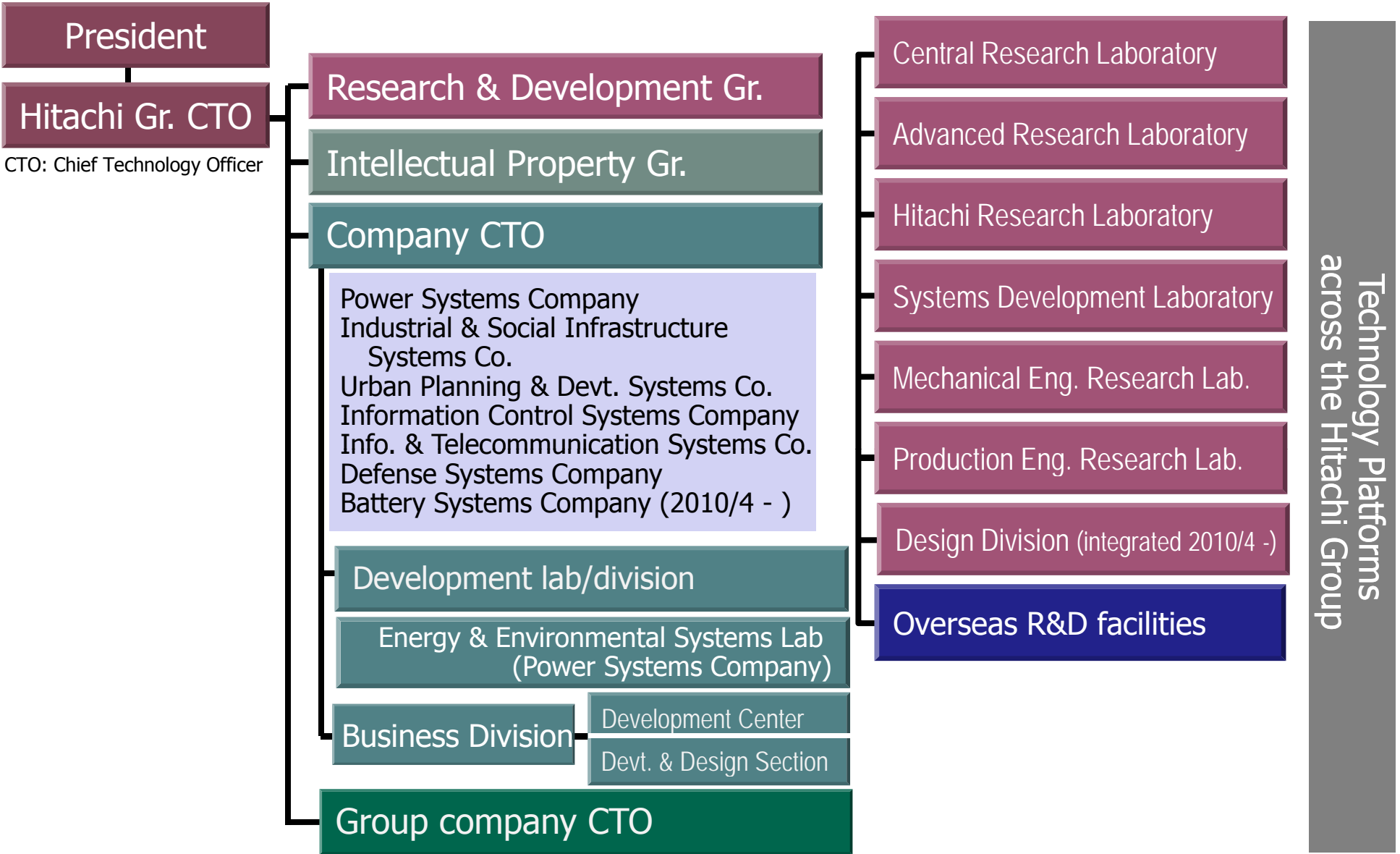
Contents

1. Corporate R&D organization
2. R&D to pioneer fusion & environment business
3. Positioning for the future
4. IP strategy
5. Summary

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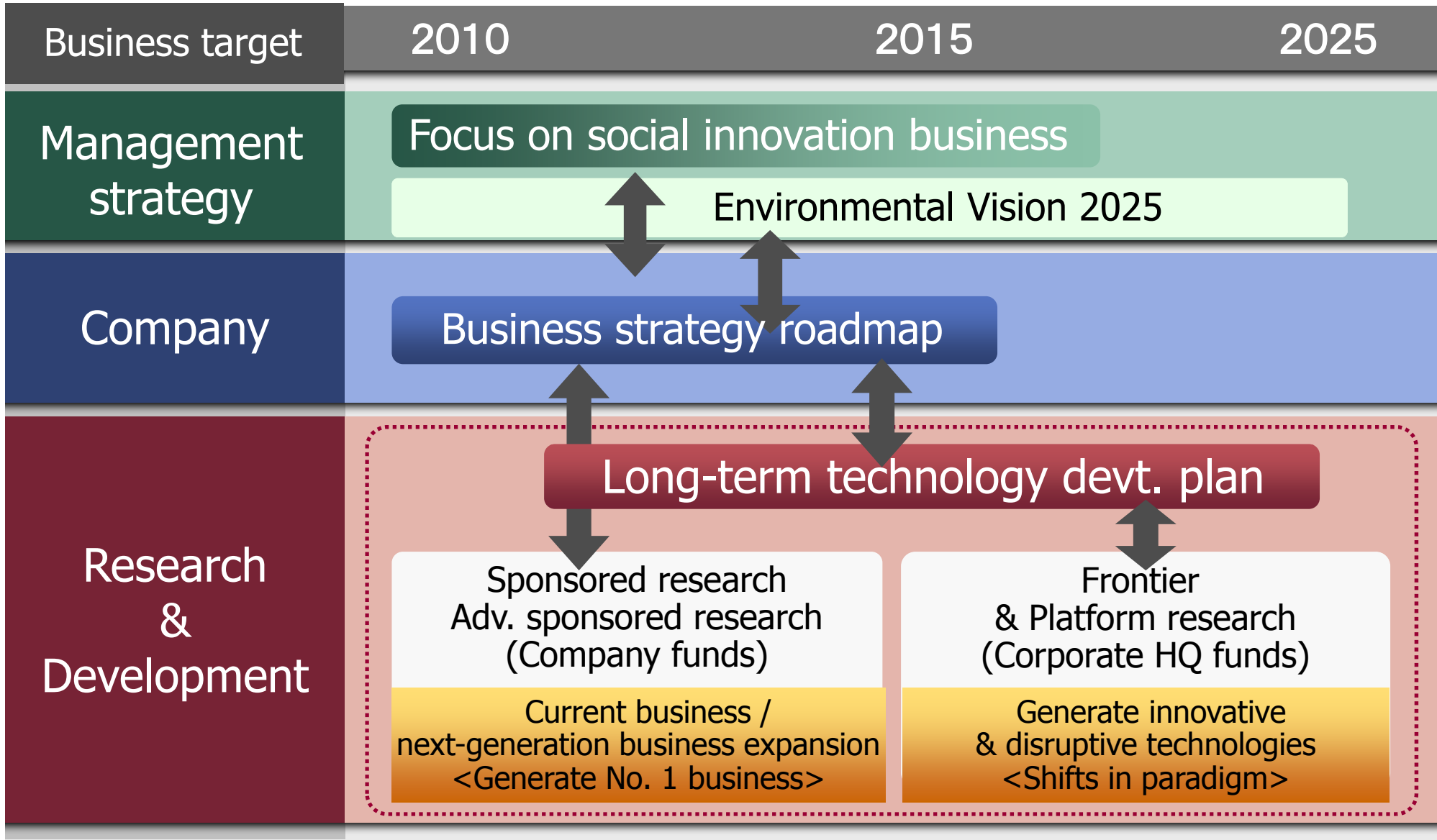
- 1. Corporate R&D organization**
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1-1. R&D organization



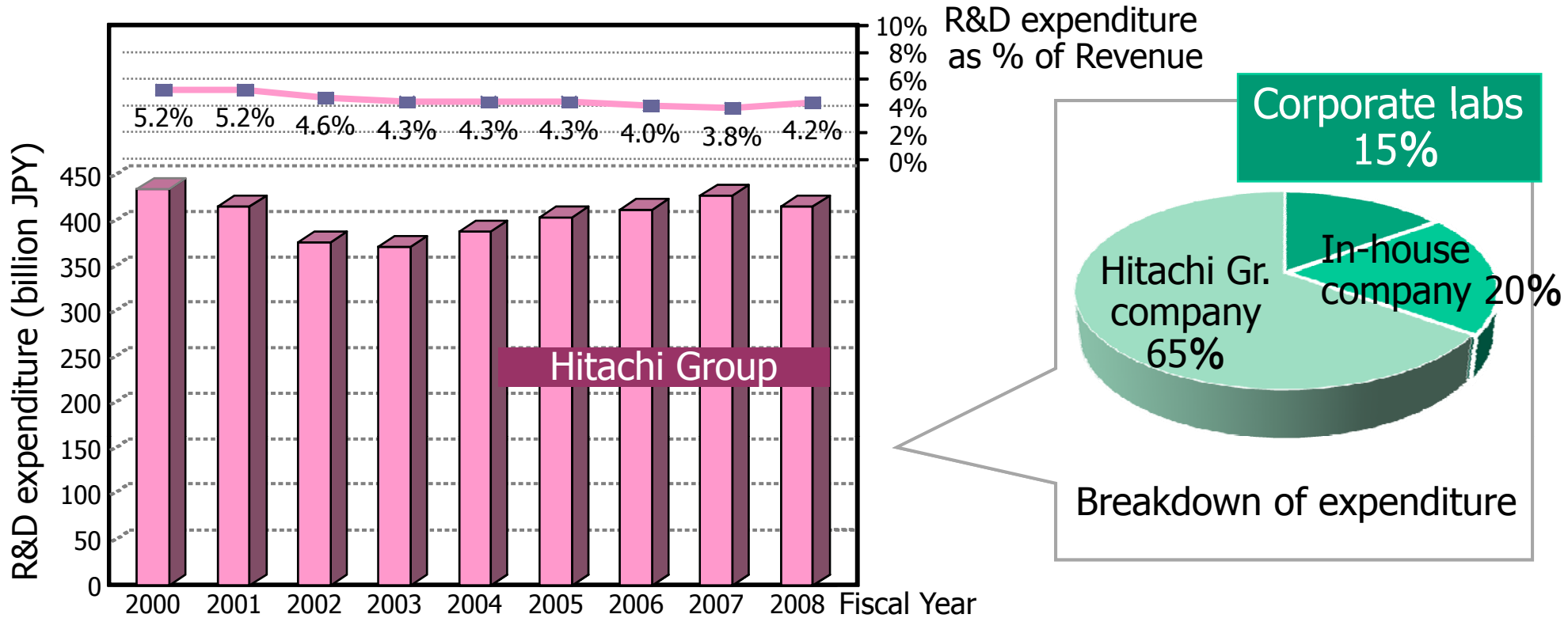
Technology Platforms
across the Hitachi Group

1-2. R&D scheme



1-3. R&D investment

R&D expenditure



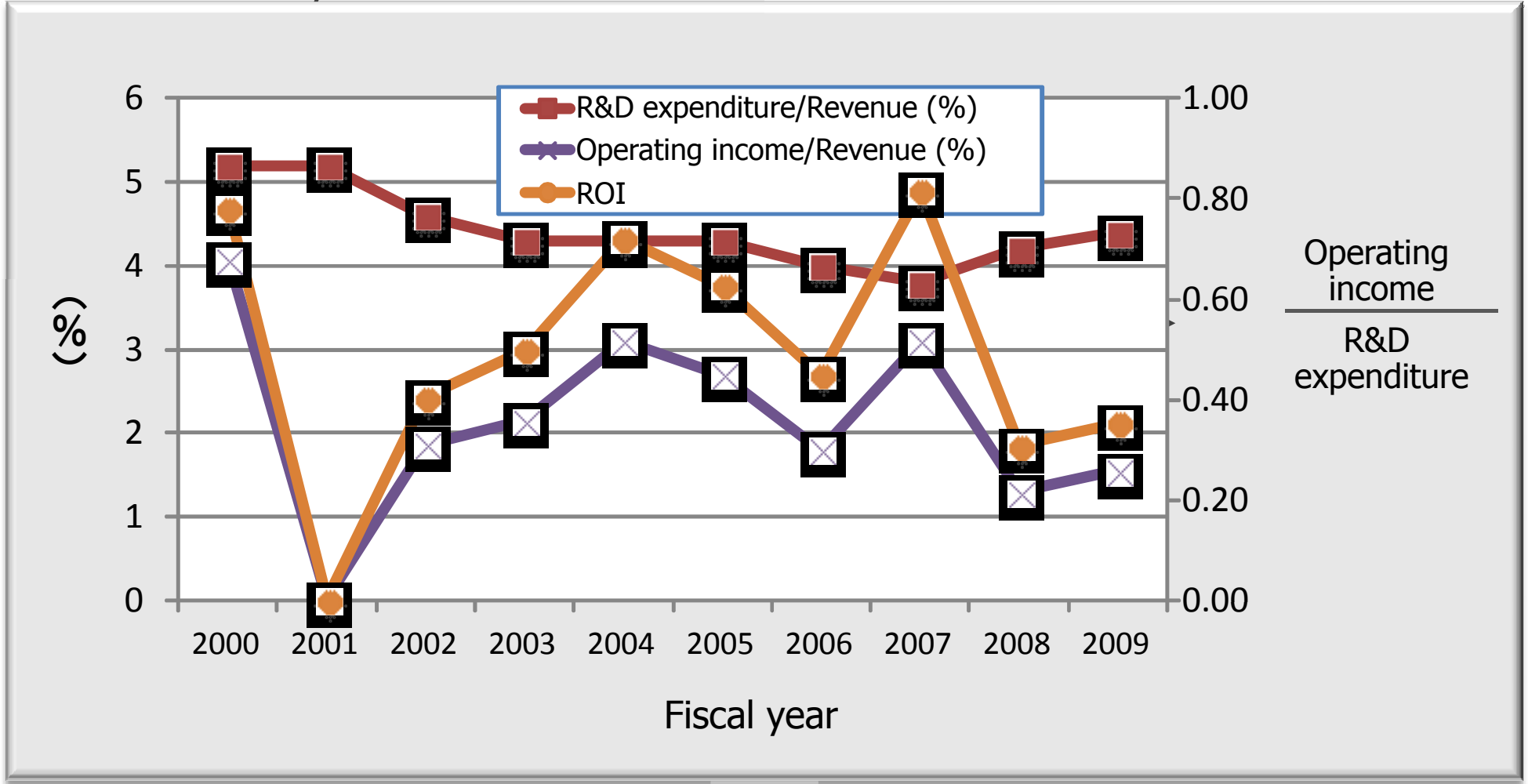
R&D personnel

Corporate labs + Devt. labs

	FY2008	FY2009	FY2010
Hitachi, Ltd.	3,700	3,600	3,500
Hitachi Gr. co.	2,200	2,200	2,200
Total	5,900	5,800	5,700

1-4. Improving return on investment

■ R&D efficiency based on Hitachi Gr. consolidated financial data



Focus on social innovation business

1-5. Focusing on social innovation

Social innovation business

Social · Industrial · Urban development systems

Urban systems Transport systems

Cloud



Smart grid



Green mobility

Eco-friendly data centers

Fusion business

Nuclear power generation

Renewable energy

Software

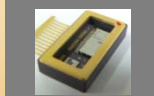
Network

Thermal power generation

Info. & Telecom. systems

Storage

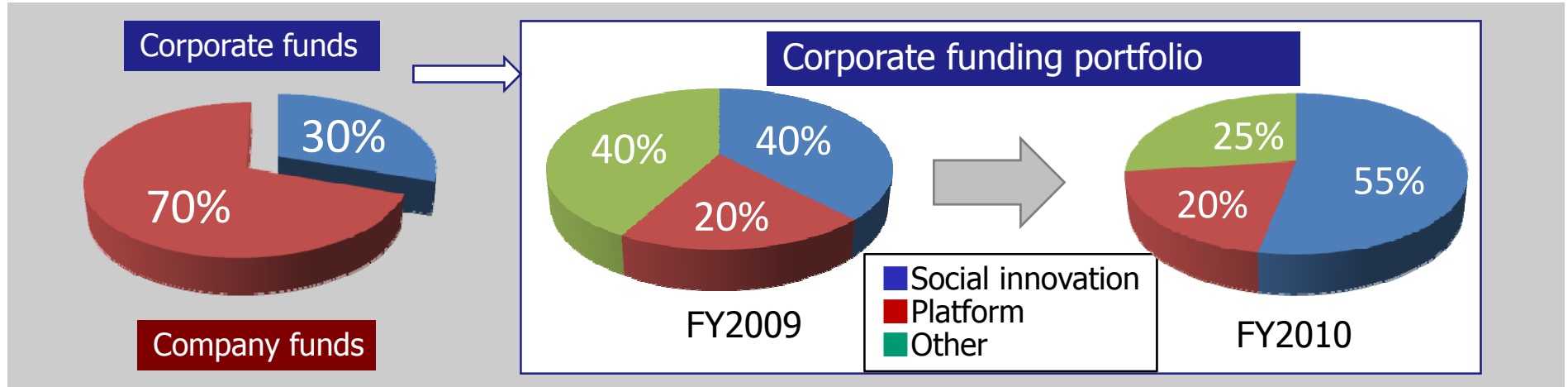
Power systems



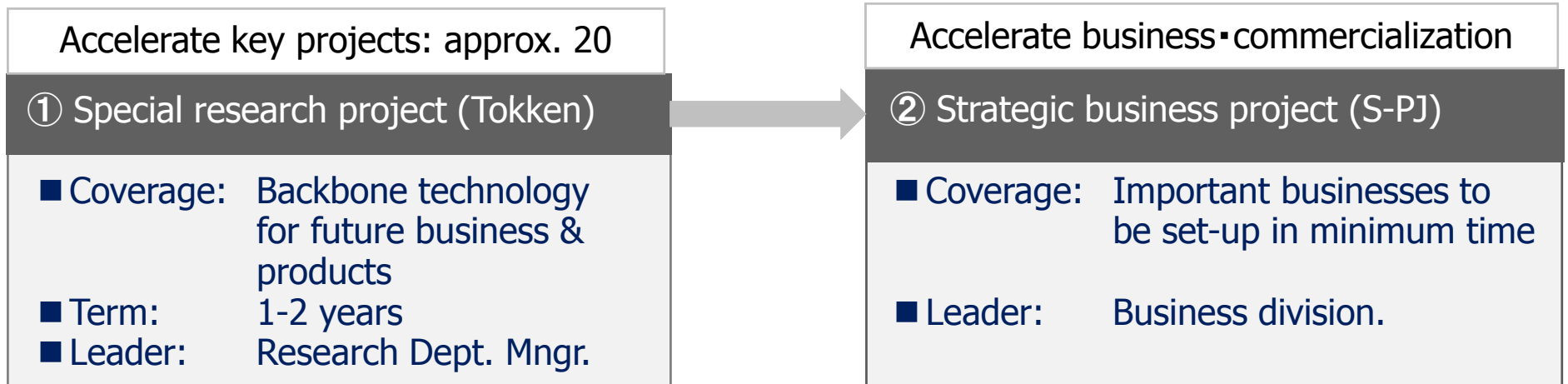
Key devices

1-6. ① Prioritizing R&D investment

1 Increased appropriation of corporate funding to social innovation areas

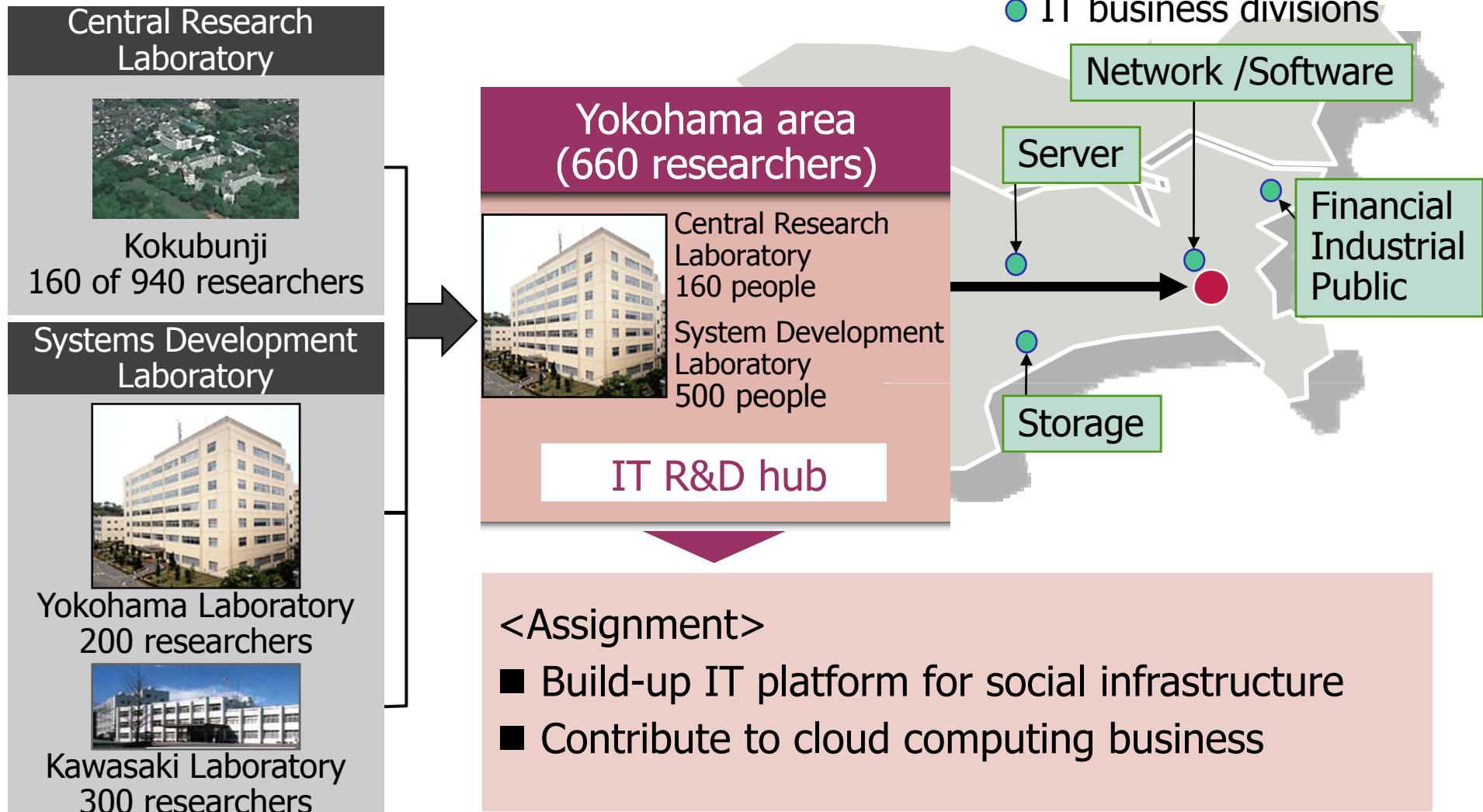


2 Priority investment in social innovation research



1-7. ②Convergence of IT research facilities

- Consolidate IT research facilities into the Yokohama area to increase development efficiency



1-8. ③ Strengthen global R&D

Regional R&D synchronized with expansion of social innovation business overseas

North America

- Strengthen green mobility research
- Promotion of smart grid research (NEDO pilot project in NM, U.S.A.)

Participation in NEDO pilot project in New Mexico, USA

- PCS
- Storage batteries
- Amorphous transformers

Power Systems Company,
Info. Control Systems Company,
Hitachi Research Laboratory



PCS for
mega solar
power systems

PCS: Power Conditioning System

Research hub

Hitachi America, Ltd.



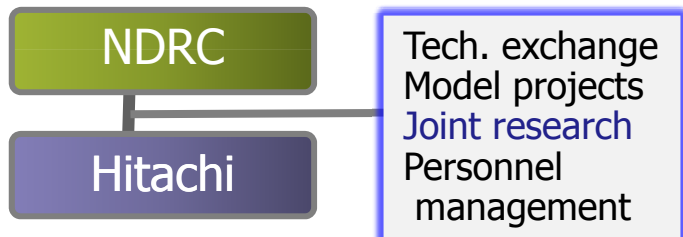
<40 employees>
Green mobility,
Storage systems

China

- Participate in the Chinese National Development and Reform Commission project
- Lead info. & telecommunications and software business development in China

Agreement with the Chinese National Development and Reform Commission (NDRC) to collaborate in the "Low carbon society construction and Resource recycling" project (2009/11/8)

NDRC-Hitachi Green Economy Technology Exchange (2010/3/19)



3/19 Sub-committee theme
[Highly-efficient electricity generation & smart grid]
[Water treatment]
[Home appliance recycling]
[Urban transport (subway)]

Research hub

Hitachi China
R&D Corporation

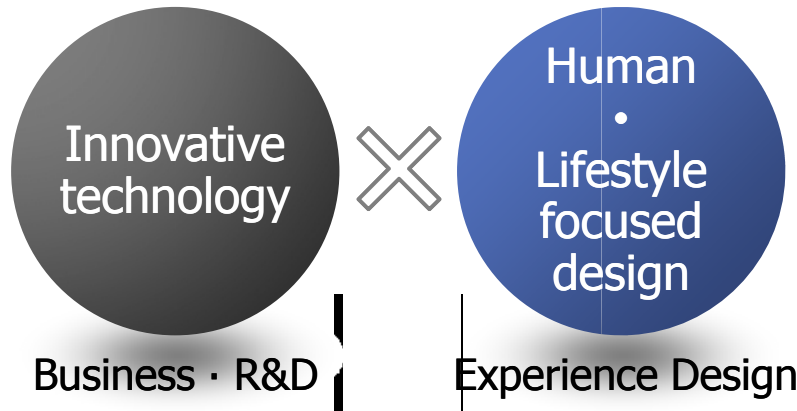


<80 employees>
Smart grid, Offshore devt., Adv. software

1-9. Integration of the Design Division

■ Contribute to business innovation

1. "Visualization" of social innovation business through innovative technology and market (people/lifestyle) focus
2. Introduction of human-centric design to Info. & Telecomm. and Power & Industrial systems fusion areas



Exhibit



UK IEP (Intercity Express Programme) high-speed trains



Ultrasound scanner
HI VISION Preirus
[2009 Good Design Gold Award]



Application of Experience Design in information business (financial/public):
Visualization of customer requirements

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Focus on social innovation business

1. Expansion of global business

2. Fusion of information & telecommunication (IT) systems and power & industrial (PIS) systems

3. Expansion of environmental business

To generate globally competitive business

- 1.** Build-up **information platforms** for social infrastructure
Facilitate business cooperation and contribution to fusion business by consolidate IT research facilities in the Yokohama area

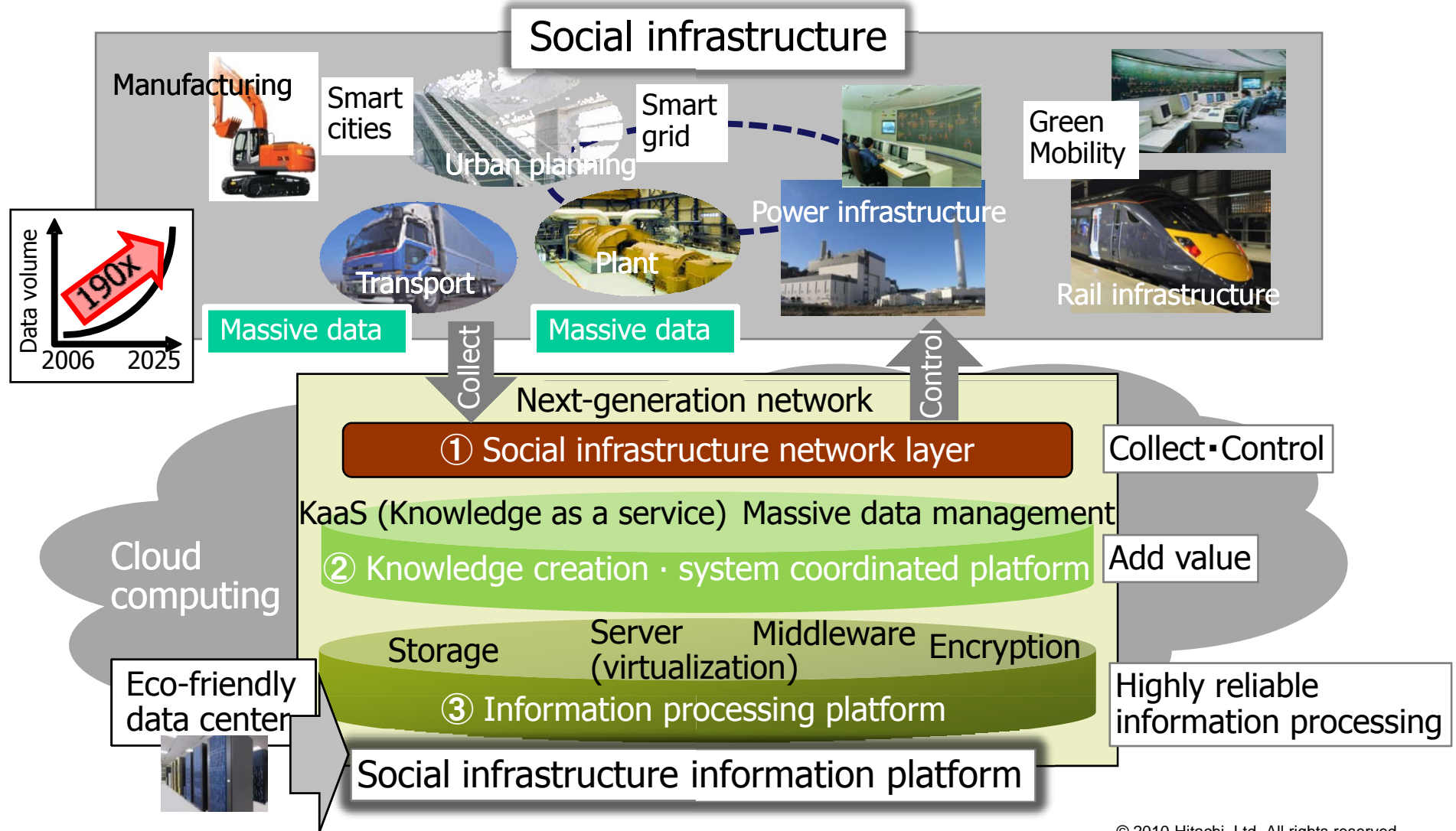
- 2.** Develop platform technologies to support **IT-PIS fusion /environmental business**
Eco-friendly data centers, Railway Systems, Inverter, Li-ion batteries

- 3.** **New directions in electronics research**
for social innovation business

- 4.** Strengthening **Green Mobility** R&D for environmental business expansion

2-3. Social infrastructure info. platforms

- Collect massive volume of data from social infrastructure, transform into value-added information and control



2-4. Network transport equipment

- Highly reliable high quality next-generation transport equipment integrating various services in one infrastructure

- World's first operational service via delivery to a domestic carrier (2009/8)
- Awarded 52nd (FY2009) Best Ten New Products Prize

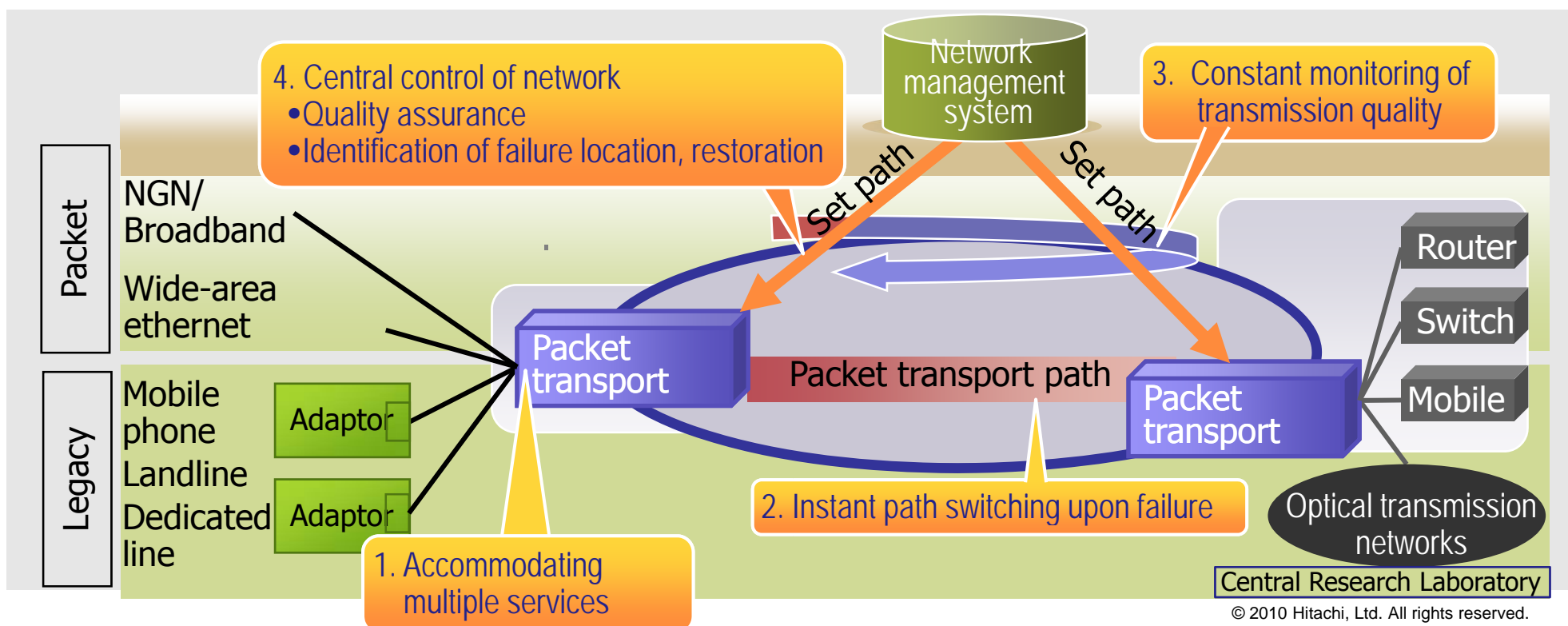
(Nikkan Kogyo Shimbun, Ltd.; 2010/1)

Features

1. Able to accommodate various services regardless of whether it is packet communication or legacy transmission
2. Providing high quality & high reliability: 99.999% availability



Packet transport MPLS-TP equip.



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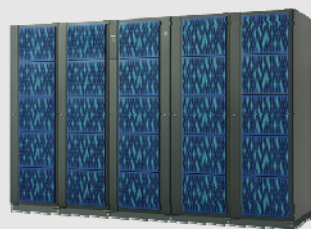
2.5 Virtualization technology supporting information processing platforms

③ Highly reliable information processing platforms

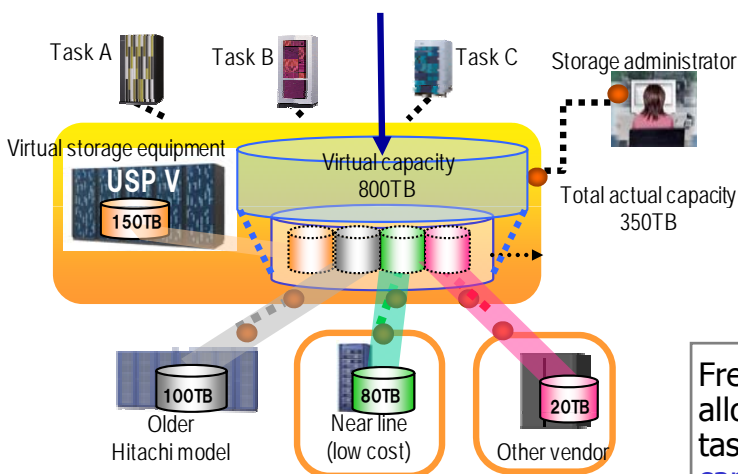
Storage capacity virtualization

Providing users with virtual storage capacity greater than actual capacity

- Worldwide No. 1 share in enterprise storage capacity
- 13 year sales record of No. 1 domestic share for storage



Enterprise storage USP V



Integrated management of virtual storage
⇒ number of administrators, cost reduction

Free capacity allocation for each task ⇒ increased capacity

Provide a larger virtual capacity than actual total capacity

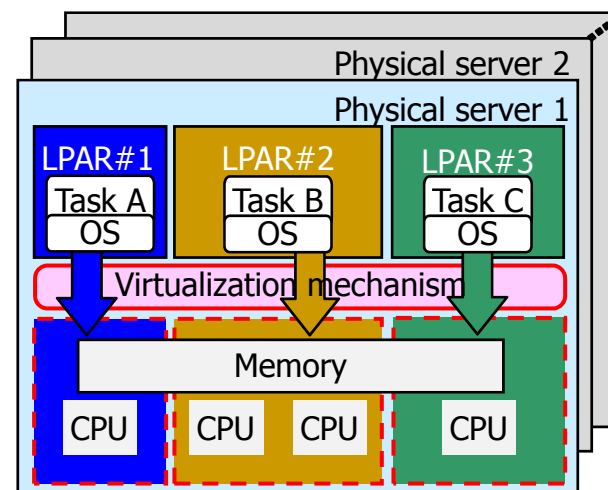
Server virtualization

Multiple business processes achieved on one server

- 51st (FY2008) Best Ten New Products Prize (Nikkan Kogyo Shimbun; Jan. 2009)
- FY2009 Kanto local commendation for invention: Invention encouragement prize



Blade server Blade Symphony BS2000



number of administrators, cost reduction

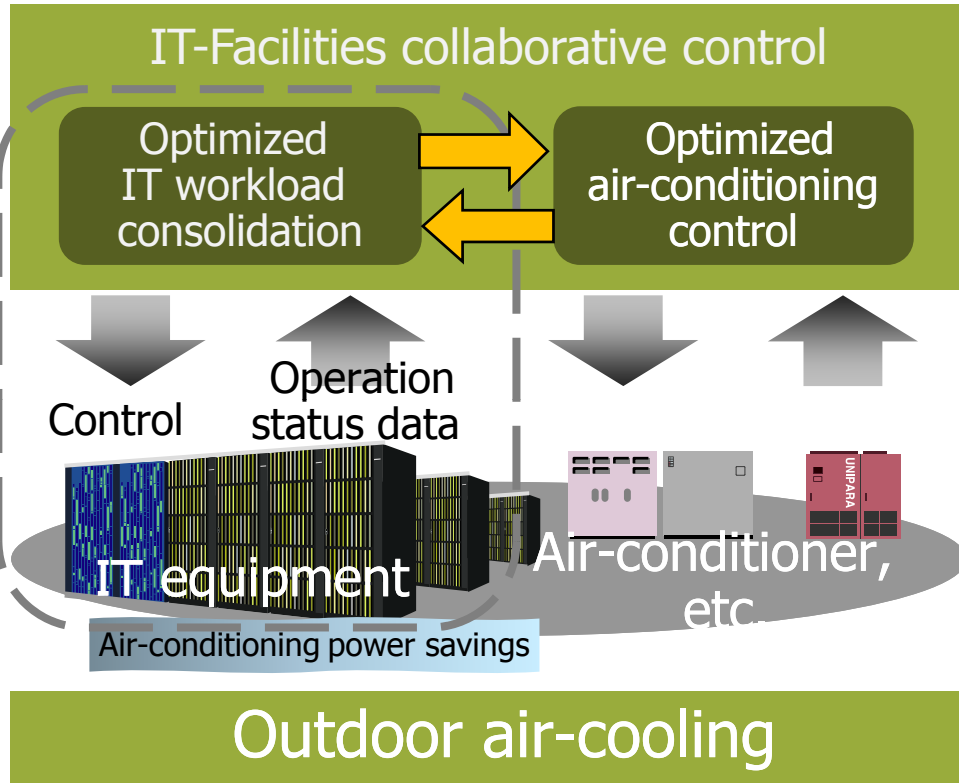
In a system which manages several servers, the tasks from low load servers are collected on one physical server

Use one physical server as if 2 or more theoretical servers exist

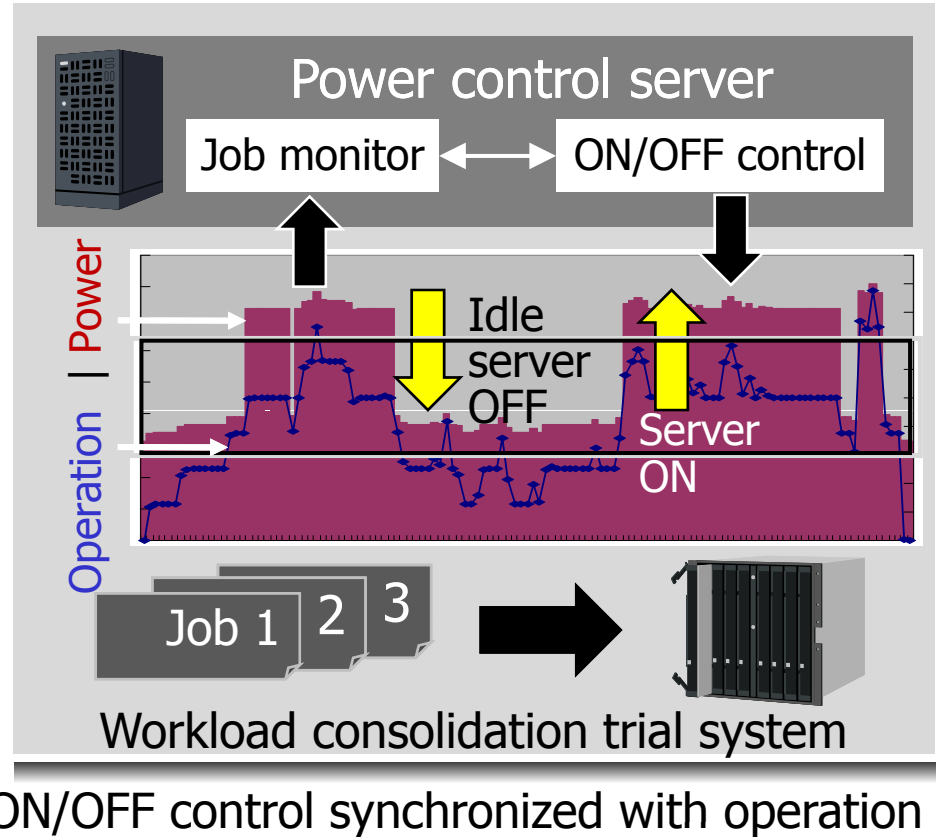
2-6. Eco-friendly data centers

Verification tests conducted on prototype IT/Air conditioning Facilities collaborative control system

Prototype configuration



IT power control operation status

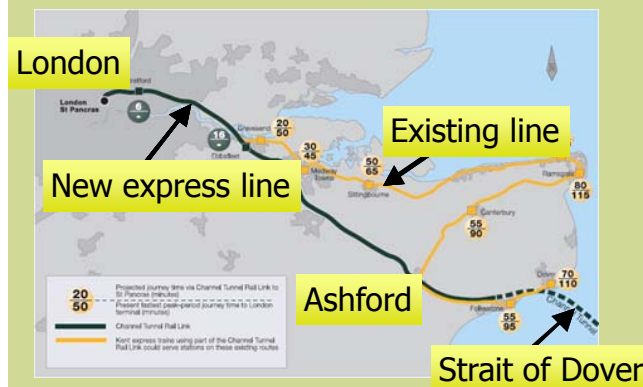


Verified 20-50% power savings

Central Research Laboratory
Mechanical Engineering Research Laboratory
Systems Development Laboratory

2-7. Global rail services

2009/12/13 UK high speed express (Class 395) commences operation



Features

1. Designed to conform to European carriage regulations
2. Aluminum carriage: "A-train"

Awarded Prime Minister's Prize in the 39th Japan Industrial Technology Awards (2010/4/7)

Channel Tunnel Rail Link

Class 395 in operation
(Carriage designed by Design Divn.)

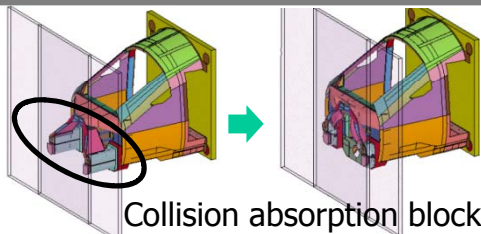
Core technology supporting global rail systems

Analysis-led design

Supercomputer simulation

MONOZUKURI technology

Inverter & Battery technology



Friction stir welding



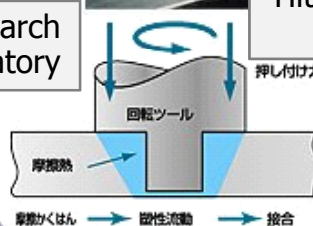
Light-weight, compact & low noise inverter



Mechanical Engineering Research Laboratory

Hitachi Research Laboratory

Hitachi Research Laboratory



Li-ion battery system

UK IEP
(Intercity Express Programme)
2009/2 Appointed preferred bidder status



- ◇ Planned delivery: max. 1,400 cars
- ◇ Planned delivery: 2013-2018

Two trains passing in a tunnel

2-8. Fortifying inverter R&D

■ R&D formation to expand business in highly efficient, compact & low cost inverters

Inverter research organization (2010/4)

Hitachi Research Laboratory
Central Research Laboratory
Production Engineering Research Laboratory
Mechanical Engineering Research Laboratory

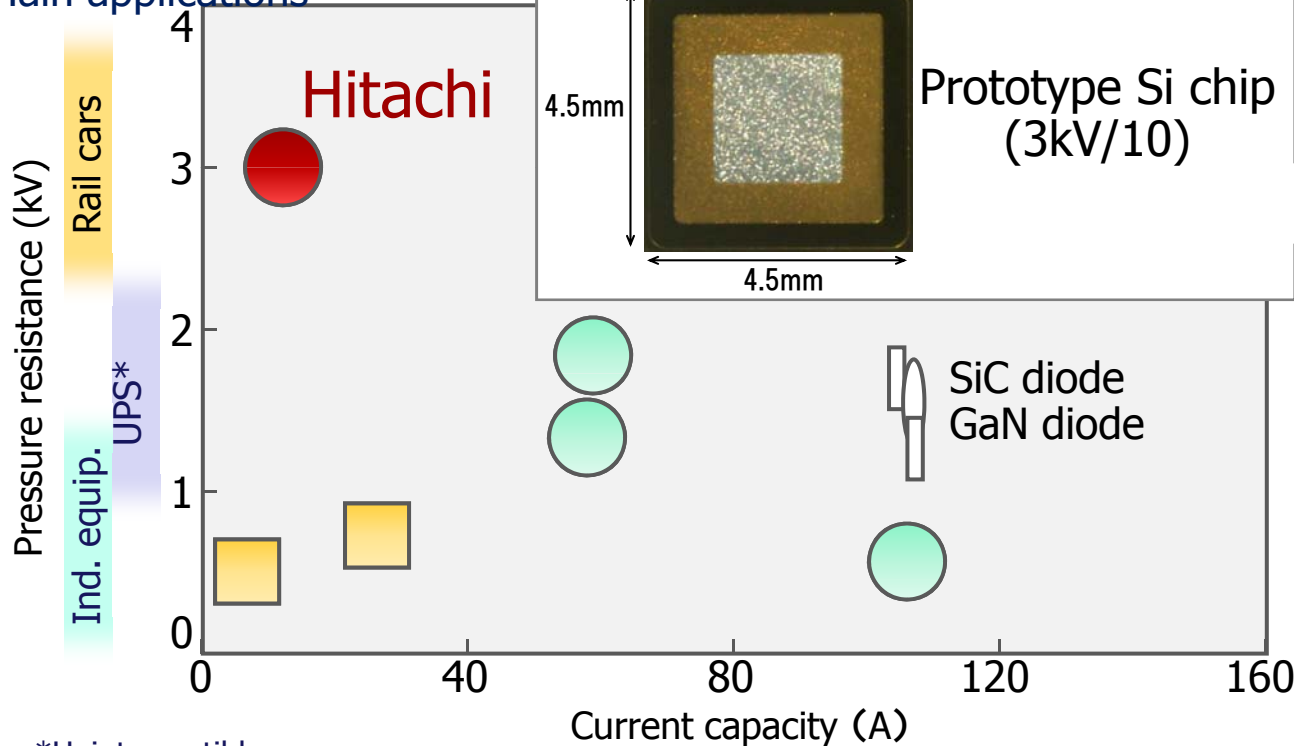
Approx. 120 people

Power device & modules

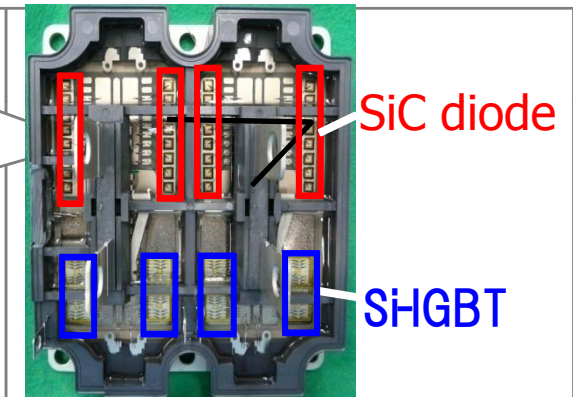
Inverter circuits & control

Inverter design platforms

Main applications



30% decrease in power conversion loss (2009/4)



Prototype module 3kV/400A

*Uninterruptible power source

2-9. Li-ion batteries

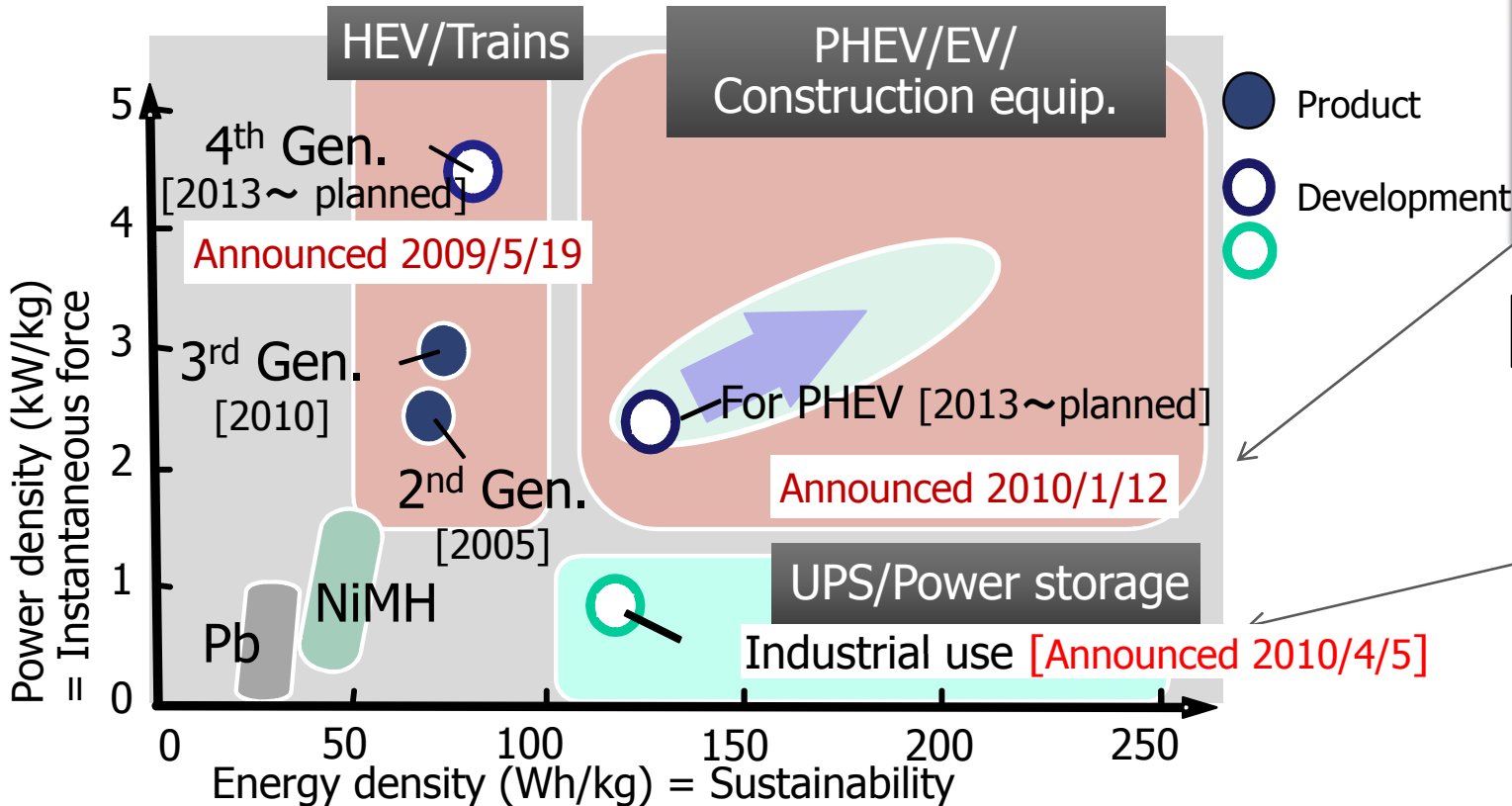
- Strengthen R&D to expand business in high output, high quality & safety Li-ion batteries for motor vehicles and industrial applications

Hitachi Research Laboratory
(Adv. Battery Research Center, estab. 2009/4)
Mechanical Engineering Research Laboratory
Production Engineering Research Laboratory

Approx. 70 people



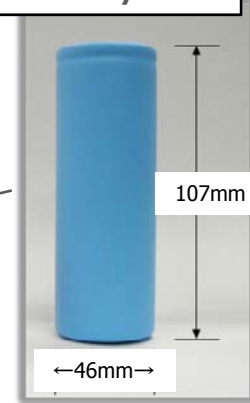
Battery Systems Company
(est. 2010/4)



2x battery capacity



2x battery life



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3-1. Challenging R&D frontiers

1910 1950 1980 2000 2010~

Independent technology devt.

Co-generation

Global/Open innovation

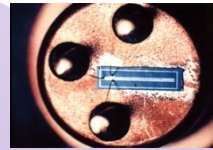


5HP motor
First product with domestic tech.

Electric locomotive ED 15 (1924)



MOS transistor



Shinkansen traffic management system (1972)

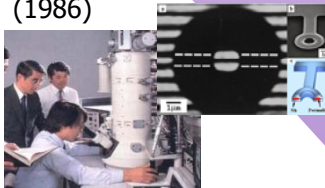


Electron microscope (1942)



The Chugoku Electric Power Co., Inc. Shimane nuclear power plant (1974)

Electron beam holography
Verification of the A-B Effect (1986)



General purpose computer



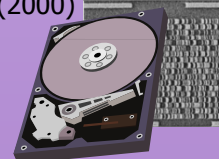
Finger vein authentication equipment (2000)



Proton beam therapy facility
MD Anderson cancer center Treatment started on (2002)



Perpendicular magnetic recording HDD (2000)



Environment / Energy

Innovative materials for batteries

Next Generation BWR

New Power Device

IT

New ICT

Next Generation Photonic Connection

Innovative Technology for Database

Basic

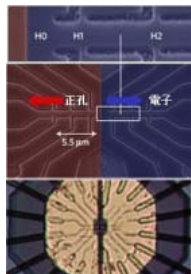
Robotics

Single cell analysis

Brain Machine Interface

3-2. Global / open innovation

■ Promotion of world-leading advanced research to pioneer next-generation industry through concentration of knowledge within Japan and overseas



Spintronics
(2009: Nature Physics)

Advanced storage device

- Hitachi Cambridge Laboratory, ARL, CRL
- Univ. of Nottingham, Univ. of Cambridge
- Paris South Univ., Charles Univ. in Prague

Analytical technology for semiconductor characteristics (2008/2~)

- IBM Watson Laboratory
- SUNY Albany Nanotech Complex
- Hitachi High-Technologies Corporation
- Central Research Laboratory

Encryption US NIST international Cryptographic Hash Algorithm Competition (2012)

- Katholieke Universiteit Leuven
- System Development Laboratory

Tsukuba Robot special zone (2010/4~)

- University of Tsukuba
- Mechanical Engineering Research Laboratory



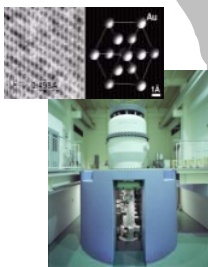
Autonomous robot
(Public space experiment)



Semiconductor inspection equipment (CD-SEM)

Atomic level resolution holography electron microscopy (FIRST program 2010/4~)

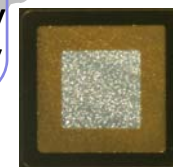
- RIKEN
- MEXT
- JST
- Advanced Research Laboratory
- Central Research Laboratory



Electron microscope

Green nano-electronics device Tsukuba Innovation Arena (2010/4~)

- AIST
- METI
- Central Research Laboratory
- Hitachi Research Laboratory



Power device

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IP strategy

- No. 1 IP strength in social innovation business –
Strengthening overseas patent applications
(esp. in Asian developing nations)

4-1. Globalization of IP activity (1)

Strengthen overseas patent applications

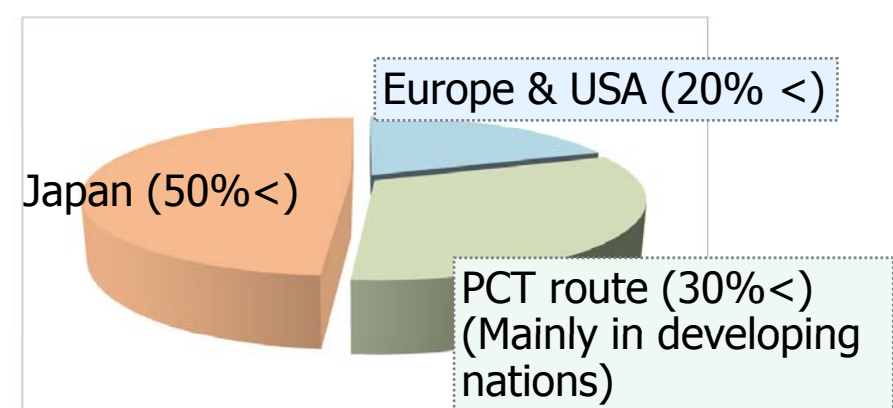
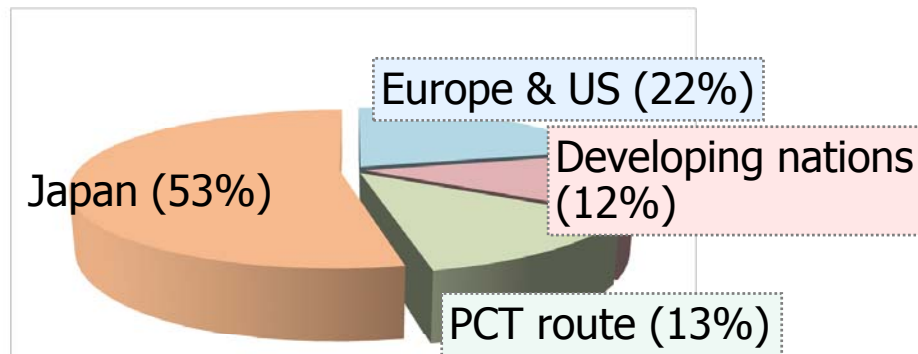
- Total no. of patent applications: Overseas > Domestic
- Shift focus from US to developing nations in Asia
- Potential PCT patent applications for potential markets

Domestic: 53%

Overseas: 47%

Domestic: 50%<

Overseas: >50%

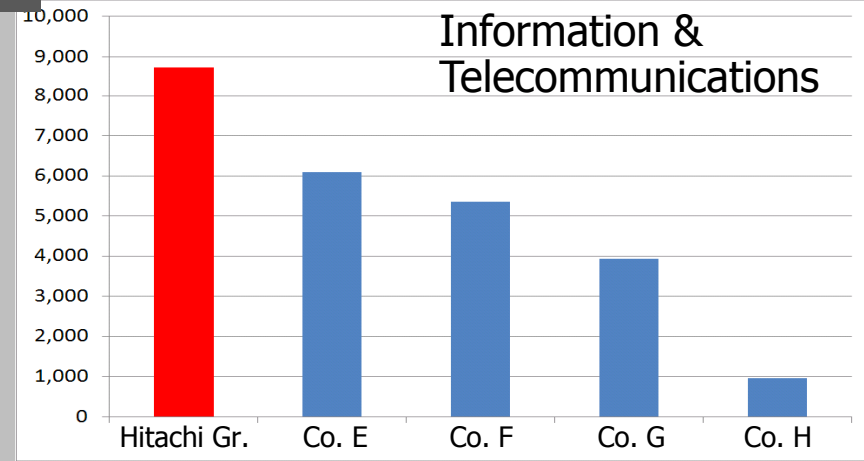
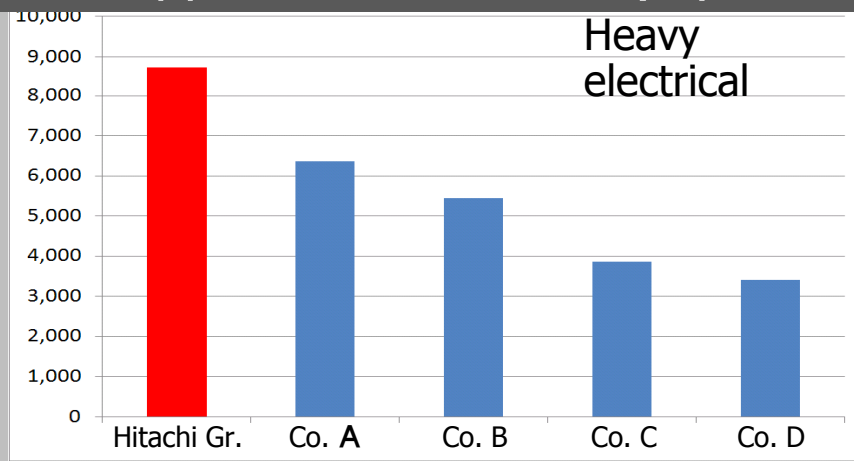


- Anti-counterfeit measures: Reinforce local staff (numbers & education)

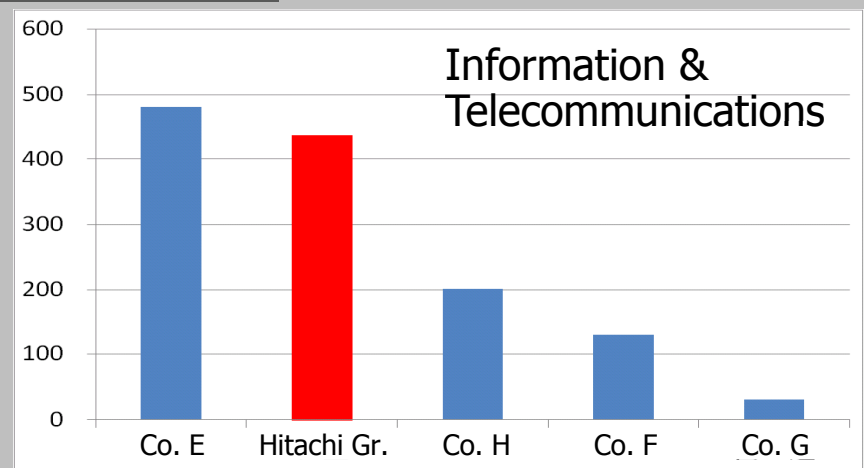
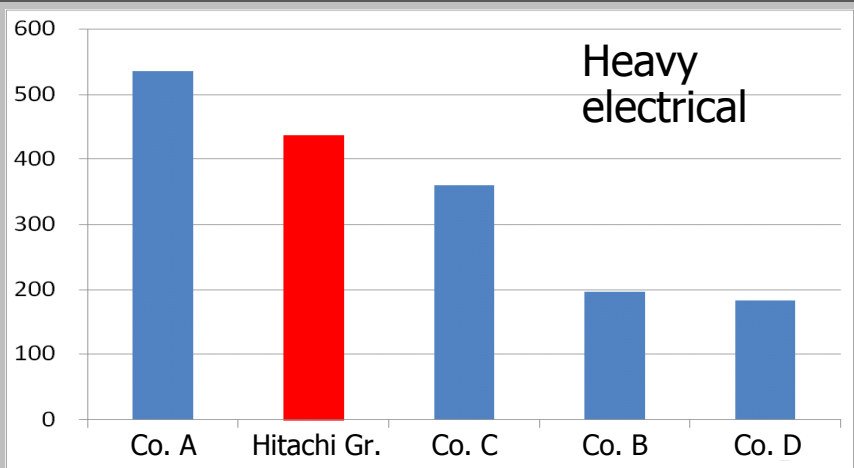
4-2. Globalization of IP activity (2)

Strengthening portfolio in developing nations of Asia

Patent applications in China (5 year total)



Patent applications in South-East Asia (5 year total)



4-3. Current state of patent acquisition (1)

■ Example areas of IP activity focus for social innovation business

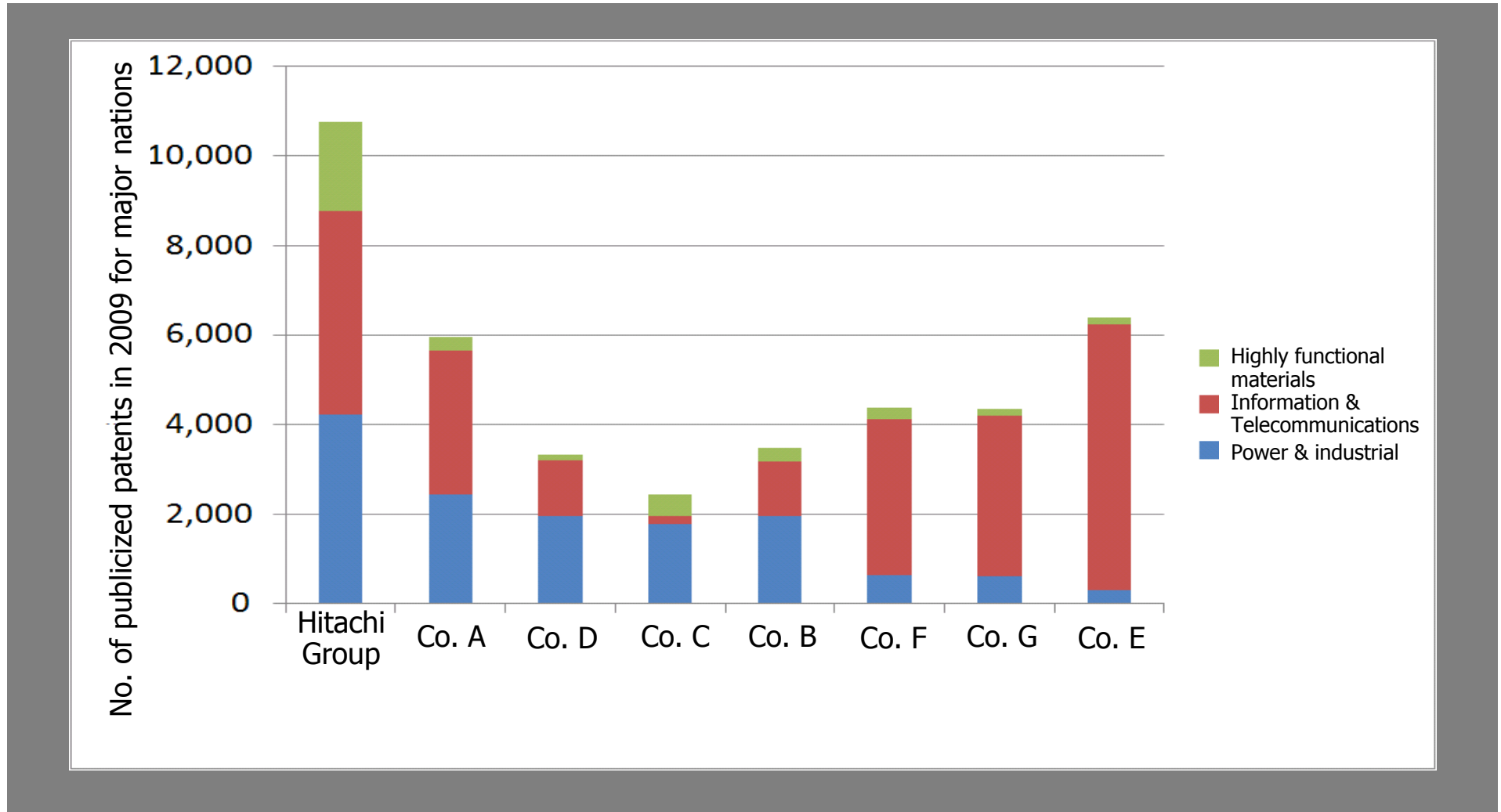
Company	FY 2010 FS/PPM theme
Power Systems Company	Environmental/highly efficient thermal power generation; Nuclear power generation; Power device (SiC)
Industrial & Social Infrastructure Systems Company	Global rail
Information Control Systems Company	Smart grid
Urban Planning & Development Systems Company	Elevator
Information & Telecommunication Systems Company	Eco-friendly data centers Next generation networks (NGN) Cloud computing
Battery Systems Company	Li-ion batteries

FS: Flagship

PPM: Patent portfolio management

4-4. Current state of patent acquisition (2)

■ Environment-related technology patent portfolio



- 1) Total of patents publicized patents for Jpan, USA, EU (EPC), and China
- 2) Hitachi survey based on Shareresarch, PATOLIS, IFIPAT/Questel-orbit, Pat-List/CN

- Differentiation & prevention, contribute to orders

- Secure degree of freedom for business (cross licensing)

- Income from patent fees

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■ New corporate R&D structure

- Shift the R&D portfolio towards social innovation business
- Consolidation of IT research facilities & integration of the Design Division

■ Research strategy

- Reinforce development of original technology to pioneer IT-PIS fusion business
- Innovative technology to expand environmental business & reinforce development of key components

■ IP strategy

- Reinforce overseas (esp. in developing nations in Asia) patent applications

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