2015 R&D strategy
Global R&D leading Social Innovation Business

15 April 2015

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Vice President & Executive Officer
Chief Technology Officer
President & CEO, Research & Development Group
Hitachi, Ltd.
Contents

1. Realignment of global R&D structure
2. For new growth
3. Strategic steps for the future
4. Summary
2015 Mid-term Management Plan

- Achieving Growth and Hitachi’s Transformation -

**Innovation**
Strengthen service businesses that maximize the utilization of IT and bring about innovation

**Global**
Deliver Innovation to Customers and Society globally

**Transformation**
Transform Hitachi: To deliver innovation by standardized and speedy operation
1-2 Contributing to Social Innovation Business

Pursuing transformation to fulfill 2015 Mid-term Management Plan

<table>
<thead>
<tr>
<th>Mgmt. index</th>
<th>'12</th>
<th>'13</th>
<th>'14 (Forecast)</th>
<th>'15 (Target *2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>JPY9,041B</td>
<td>JPY9,616.2B</td>
<td>JPY9,600B *1</td>
<td>JPY10,000B</td>
</tr>
<tr>
<td>Operating income ratio</td>
<td>4.7%</td>
<td>5.5%</td>
<td>6.0% *1</td>
<td>Over 7%</td>
</tr>
<tr>
<td>% overseas</td>
<td>41%</td>
<td>45%</td>
<td>47% *2</td>
<td>Over 50%</td>
</tr>
</tbody>
</table>

*1: as at 2015/2/4, *2: as at 2014/5/12

Timely integration of R&D results in products for the global market

Storage systems '14/4
- VSP G1000
  - Uninterrupted service through virtualization technology

Proton beam therapy '14/8
- PROBEAT-RT *3
  - Improved precision through moving tumor tracking irradiation technology

Railway systems '15/1
- Class 800 series
  - Simplification of impact absorption structure through analysis-led design

Elevators '14/4
- World’s fastest elevator
  - Improved riding comfort through active control technology

Eco-friendly vehicles '14/12
- Inverters
  - Reduced inverter size through dual-sided cooling power modules

UPS '15/6
- UNIPARA
  - 30% size reduction through modular power conversion unit

*3: Developed with Hokkaido University under the FIRST Program (Cabinet Office of Japan), '14/8 Approval granted for partial amendment of previously approved items under Japan’s Pharmaceutical Affairs Law (tumor tracking system).
Strengthen innovation transforming R&D investment into business earnings to take on the challenge of global major players

R&D investment as a % of revenue

<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Hitachi</th>
</tr>
</thead>
<tbody>
<tr>
<td>'09</td>
<td>4.2%</td>
<td></td>
<td>1.6%</td>
<td>1.0%</td>
</tr>
<tr>
<td>'10</td>
<td>4.2%</td>
<td>2.0%</td>
<td>2.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>'11</td>
<td>4.3%</td>
<td>4.3%</td>
<td>2.2%</td>
<td>1.0%</td>
</tr>
<tr>
<td>'12</td>
<td>3.8%</td>
<td>3.7%</td>
<td>2.6%</td>
<td>1.0%</td>
</tr>
<tr>
<td>'13</td>
<td>3.7%</td>
<td>3.7%</td>
<td>2.4%</td>
<td>1.0%</td>
</tr>
<tr>
<td>'14</td>
<td></td>
<td></td>
<td></td>
<td>1.0%</td>
</tr>
<tr>
<td>'15~</td>
<td></td>
<td></td>
<td></td>
<td>1.0%</td>
</tr>
</tbody>
</table>

*Figure for FY2014 is given as forecasted on 2015/2/4
R&D: From generating technology to driving innovation

Research investment → Technology → Knowledge → Business profit

Research
R&D until today

Innovation
R&D which addresses innovation
1-5 R&D Policy

Hitachi Gr. business policy: increase business income

From “product-out” to “market-in”
Shift to “customer-driven”

Realign R&D organization, enhance innovation strength

1. Assign researchers close to customers to expand collaborative creation
2. Create innovative technology that satisfy market needs
2011/4: Consolidate sites, integrate technology areas

R&D Group

- Technology Strategy Office
- Central Research Laboratory
- Hitachi Research Laboratory
- Yokohama Research Lab.
- Design Division
- Overseas research centers

Power Systems Co.

- Energy and Environmental Systems Research Lab.

Consumer Electronics Laboratory

R&D Group

- Technology Strategy Office
- Central Research Laboratory
- Hitachi Research Laboratory
- Yokohama Research Lab.
- Design Division
- Overseas research centers
1-7 Realignment of Global R&D Organization

2011/4: Consolidate sites, integrate technology areas

- R&D Group
  - Technology Strategy Office
  - Central Research Laboratory
  - Hitachi Research Laboratory
  - Yokohama Research Lab.
  - Design Division
  - Overseas research centers

Power Systems Co.
- Energy and Environmental Systems Research Lab.
- Consumer Electronics Laboratory

2015/4: Global realignment to speed-up collaborative creation

- R&D Group
  - Technology Strategy Office
  - Central Research Laboratory
  - Hitachi Research Laboratory
  - Yokohama Research Lab.
  - Design Division
  - Overseas research centers

- R&D Group
  - Technology Strategy Office
  - Central Research Laboratory
  - Hitachi Research Laboratory
  - Yokohama Research Lab.
  - Design Division
  - Overseas research centers

- R&D Group
  - Technology Strategy Office
  - Global Center for Social Innovation (TYO, NA, CHN, EUR)
  - Center for Technology Innovation (Energy, Electronics, Mechanical engineering, Materials, System engineering, Information & Telecommunications, Control systems, Production engineering, Healthcare)
  - Center for Exploratory Research

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1-8 Research Sites & Personnel

CSI North America [100]
- Santa Clara
- Farmington Hills
- Sao Paulo

CSI Europe [50]
- London
- Sophia Antipolis
- Munich
- Copenhagen
- Cambridge

CSI China [100]
- Beijing
- Shanghai

CSI Tokyo (APAC) [250]
- Bangalore
- Singapore
- Akasaka

CTI [2,000], CER [100]
- Kokubunji
- Hatoyama
- Ohmika
- Katsuta
- Yokohama

[ ]: Head count, APAC: Asia-Pacific
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Serving the world with our Social Innovation Business

SOCIAL INNOVATION - IT’S OUR FUTURE

“IT × Social infrastructure”

Energy

Urban development

Transportation

Healthcare

Water and Natural resources

Logistics

Manufacturing and Construction

Finance
<table>
<thead>
<tr>
<th>Build-up solutions utilizing IoT and big data</th>
<th>Renewable energy</th>
<th>Safe &amp; secure cities</th>
<th>Rail systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mega solar</strong></td>
<td><strong>Sensing</strong></td>
<td><strong>Community</strong></td>
<td><strong>Security</strong></td>
</tr>
<tr>
<td>Raise facility output by detecting PV module failure or deterioration</td>
<td>Secure safety &amp; comfort by using wide-area surveillance &amp; high-speed image search to protect communities</td>
<td>Raise reliability by remote monitoring of carriage condition to predict failure</td>
<td></td>
</tr>
</tbody>
</table>

**Preventive medicine**
- Predict and reduce lifestyle disease related medical costs in groups by big data analytics on health check-up data

**Distribution**
- Improve retail performance by analyzing customer behavior patterns with AI

**Mining**
- Improve productivity by optimizing dispatch through big data analytics of equipment position & operational status

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IoT: Internet-of-Things  AI: Artificial intelligence

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Build-up common platforms, accelerate business expansion

Accelerate global collaborative creation with customers

Energy
Urban development
Transportation
Healthcare
Logistics
Mfg. & Construction

Job
Job
Job
Job
Job
Job

IoT (Internet-of-Things)

Issue analysis
Service business
Build-up solution
Operation

Proof of value

Big data

Scale-up using symbiotic ADS platform

ADS: Autonomous Decentralized System

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### Position researchers close to customers to accelerate collaborative creation

<table>
<thead>
<tr>
<th>Region</th>
<th>Research strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tokyo (APAC)</td>
<td>Co-create solutions with key accounts in the APAC region leveraging customer collaborative creation methods developed through service design research</td>
</tr>
<tr>
<td>North America</td>
<td>Construct big data analytics platforms, and pursue collaborative creation with customers in areas such as energy, telecommunications, finance and healthcare</td>
</tr>
<tr>
<td>China</td>
<td>Strengthen collaborative creation with key accounts in elevators/escalators, ATMs, etc. to realize solutions to industrial policies such as low-carbon society and new-type urbanization</td>
</tr>
<tr>
<td>Europe</td>
<td>Together with major institutions, participate in market creation through standardization activity in Europe, to realize solutions for developed nations which resolve issues in mature society</td>
</tr>
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Pioneer new frontiers through creative vision-driven exploratory research

Open innovation

Future Social Innovation Business areas

Country/Governments
Regional communities

Center for Exploratory Research
- Physical sciences
- Information sciences
- Life sciences
- Frontier

Center for Technology Innovation

Global Center for Social Innovation

Hitachi Group
- Information & Telecommunication Systems
- Energy Urban development
- Transport Healthcare
- Water & Natural resources
- Logistics Manufacturing & Construction
- Finance
- Power & Infrastructure
- Healthcare
- High functional materials

Business areas
- Energy Urban development
- Transport Healthcare
- Water & Natural resources
- Logistics Manufacturing & Construction
- Finance
- Power & Infrastructure
- Healthcare
- High functional materials

Space
- Innovative materials
- Societal information
- Advanced medical care
- Symbiotic robot

Education
- Agriculture

Private industry
Research institutes
Universities
3-2 Case Examples

**Physical sciences**

Realize an eco-friendly society by creating innovative material using the holography electron microscope

**Hitachi, Ltd.**

- NIMS: National Institute for Material Science, EM: Electron microscope
- CMOS: Complementary metal-oxide semiconductor, QoL: Quality-of-Life

Realize a smart society by new paradigm computing

- RIKEN
- Prof. TOKURA Yoshinori
- Prof. SHINDO Daisuke

Prototype

"Ising chip" solving combinatorial optimization problem at ultra-high-speeds

Develop applications for the “Ising Chip” through industry-academia-government collaboration

**Information sciences**

- World’s highest resolution: 0.043 nm

**Frontier**

Realize increased organizational productivity & satisfaction through human big data analytics

- Manage-ment
- R&D
- HR
- Design & Mfg.
- Sales & Marketing
- Services

Applicable to many industries & operations

- Transport-ation
- Energy
- Buildings
- Health care
- Logistics
- Finance

Wearable sensor

Collaboration with MIT & other US universities

**Life sciences**

Realize a healthy high QoL society by innovations in automatic cell culturing

- Automated cell culturing equipment
- Devt. with the Tokyo Women’s Medical University through broad industry-academia-government collaboration
- Supported by MEXT program for the creation of innovation centers for advanced interdisciplinary research. This work was based on the results of research supported by NEDO.

Cell sheet

NIMS: National Institute for Material Science, EM: Electron microscope

CMOS: Complementary metal-oxide semiconductor, QoL: Quality-of-Life
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Realignment of global R&D structure

- Realign R&D organization to strengthen innovation
  - Global Center for Social Innovation
  - Center for Technology Innovation
  - Center for Exploratory Research

For new growth

- Build-up autonomous ADS platforms, expand business
- Accelerate global collaborative creation with customers

Strategic steps for the future

- As an innovation hub, pioneer new frontiers
END

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