Revitalizing Japan by Realizing Society 5.0: ~ Action Plan for Creating the Society of the Future ~ Overview

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Japan Business Federation (Keidanren)
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In tandem with the ongoing fourth industrial revolution, Japan is promoting the realization of Society 5.0

With a view to shifting from “solving social issues” to “creating a better future,” Society 5.0 offers a new growth model for Japan that also incorporates Germany’s “Industrie 4.0” vision

We will position projects aimed at realizing Society 5.0 within the context of initiatives such as the Japan Revitalization Strategy 2017 and propose a specific action plan for actively promoting them within both the public and private sectors

*Industrie 4.0: Initiative aimed at realizing a smart manufacturing industry published in “High-Tech Strategy 2020” in 2010
*Society 5.0: Initiative aimed at achieving a “Super-Smart Society”—the 5th stage of society’s development, following the Hunting Society, Agrarian Society, Industrial Society, and Information Society
Going beyond individual optimization to realize the optimization of society as a whole. Breaking free of various restraints with the aim of resolving social issues and creating abundance for society and its citizens.

**Society 4.0**
- Invention of the computer
- Start of information distribution
- Information society
- Use of IoT and AI
- Advances in biotechnology
- Super-smart society

**Society 5.0**
- From early 21st century
- **Optimizing society** as a whole through integration of cyberspace and physical space (**total optimization**)

**Efficient use of natural resources**
- Use of new resources (data)

**World bound by various constraints** (temporal, spatial, etc.)
- World released from various constraints

**Seeking solutions to individual problems**
- Making individual industries more efficient
- Solving complex social issues
- Achieving abundance for society and citizens
### The World of Society 5.0: Overview of Society to Be Realized

<table>
<thead>
<tr>
<th>Society 4.0 Issues</th>
<th>The World of Society 5.0</th>
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<tbody>
<tr>
<td>Falling population</td>
<td>Smart society undaunted by population decreases</td>
</tr>
<tr>
<td>Declining industrial competitiveness</td>
<td>Doubling GDP per capita</td>
</tr>
<tr>
<td>Freedom from population constraints</td>
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<tr>
<td>Super-aging</td>
<td>Society in which individuals can actively participate, including the elderly and women</td>
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<tr>
<td>Lack of active participation among women</td>
<td>Maximizing the deployment of the abilities of individuals</td>
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<td>Freedom from age/gender constraints</td>
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<tr>
<td>Disasters/terrorism</td>
<td>Safe, secure society in both cyberspace and physical space</td>
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<tr>
<td>Deteriorating infrastructure</td>
<td>Zero damage from crime, disasters, and cyber attacks</td>
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<tr>
<td>Freedom from anxiety</td>
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<tr>
<td>Regional decline</td>
<td>Society where cities and regions are linked and it is possible to live comfortably anywhere</td>
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<tr>
<td>Urban concentration</td>
<td>Zero difference in QoL between cities and regions</td>
</tr>
<tr>
<td>Freedom from spatial constraints</td>
<td></td>
</tr>
<tr>
<td>Environmental problems</td>
<td>Sustainable society that balances the economy and environment</td>
</tr>
<tr>
<td>Resource/water shortages</td>
<td>Zero wasted use of resources/energy</td>
</tr>
<tr>
<td>Overcoming environment/energy constraints</td>
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</tbody>
</table>
Executing public-private Society 5.0 realization projects in areas that will serve as a foundation for enabling Society 5.0 as part of Japan’s new growth strategy

Five considerations for selecting areas

- Resolving complex social issues and focusing on creating a better future
- Enhancing industrial competitiveness and improving QoL through digitalization
- The need for collaboration between public and private sectors and between businesses, since Society 5.0 will not be achieved by the private sector alone
- Looking beyond R&D to consider social implementation
- Providing a foundation for the new society

World of Society 5.0 to be realized

- Smart society undaunted by population decreases
- Society in which individuals of all kinds can actively participate, including the elderly and women
- Safe, secure society in both cyberspace and physical space
- Society where cities and regions are linked and it is possible to live comfortably anywhere
- Sustainable society that balances the economy and environment

Promoting public-private projects in areas that will provide a foundation
Specifying “cities,” “regions,” “infrastructure,” “goods, products, and services,” and “cyberspace” as priority areas for action and considering specific action plans.

**Implementation Action Plan:**
**Executing Public-Private Projects**

Specifying 5 areas and considering actions:

- **Cities**
- **Regions**
- **Goods, products, and services**
- **Infrastructure**
- **Cyberspace**

Linking various fields via cyberspace to achieve an abundant, dynamic society.
Cities in Society 5.0

- Overcoming financial pressures caused by the falling birthrate and aging population to realize dynamic cities through public-private partnerships
- Resolving traffic jams (cost to national economy: 12 trillion yen/year), distribution efficiency (truck load factor: less than 50%), problems arising during disasters, etc.
- Improving international competitiveness with regard to work-life balance, increasing investment in Japan, and enabling women and the elderly to participate more actively in society

Core Initiatives

- Developing a sensor network that enables constant, instantaneous visualization of urban activities
  - Maintaining data for shared use by public and private sectors; promoting technological development of sensor network for collecting data, shared service platform, AI for optimized control, etc. (by 2020)

- Establishing data analysis infrastructure that will enable urban management adapted to the needs of each individual resident
  - Developing Japanese IoT service platform (shared service platform) to provide optimal services during the Tokyo Olympics/Paralympics (by 2020)
  - Starting in the mobility and disaster prevention fields and expanding into other areas; enabling structural resolution of social issues and the creation of a better future by adapting to the aging of society, refining working methods, establishing a society based on recycling of resources, etc.

- Establishing systems and structures aimed at ensuring practicality of effective data-based urban management
  - Clarifying powers and responsibilities relating to new area management systems in cities and fostering their acceptance by society
### Digitalization and Optimization of All Urban Activities through Public-Private Partnerships

#### Implementation Roadmap

<table>
<thead>
<tr>
<th>Implemented Activities</th>
<th>2017</th>
<th>2020 –</th>
<th>2020 –</th>
<th>2030 –</th>
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<tbody>
<tr>
<td>Taking inventory of various types of data and selecting shared data</td>
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<tr>
<td>Considering urban data management systems</td>
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<td>Considering area management systems</td>
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<td>Basic Act on the Advancement of Utilizing Public and Private Sector Data</td>
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<tr>
<td>- Definition of urban activity data</td>
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<tr>
<td>- Fostering social acceptance</td>
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<tr>
<td>Introducing sensor installation system for physical social infrastructure</td>
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<td>Urban data development promotion initiatives</td>
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<tr>
<td>Sensor development promotion initiatives</td>
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<tr>
<td>General definition of shared service platform</td>
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<tr>
<td>Establishing infrastructure</td>
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<td>Test beds</td>
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<tr>
<td>Formulating specifications for platform and sensor network</td>
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<tr>
<td>Development of Tokyo’s ICT infrastructure (sensors, network)</td>
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</tbody>
</table>

#### Results in Tokyo

- Increased implementation of initiatives in Tokyo
- Expansion of services nationwide
- Collaborative initiatives between major cities and surrounding areas
- Public-private partnership proposals to international cities
- National and international expansion

#### Consideration of next-generation cities

- Expanding range of services
- Promotion of standardization of international activities
- Development of ICT infrastructure across Japan
Establishing infrastructure that will enable the realization of agriculture support technology and regional agriculture projects based on labor-saving and smartification

- Supporting the expansion of agriculture support technology and diverse work methods via growing information acquired from satellites and ground-level cameras, smartification of soil and harvest information based on smart agricultural equipment, labor-saving based on the use of robotics, etc.

Enabling comprehensive regional care through the application of cutting-edge technology and cyber information sharing in fields such as patient transportation, care services for sick children, etc.

- Developing cutting-edge child care/nursing care based on the use of automated transportation, robotics, and smartphones
- Improving the employment environment for younger workers who will play a key role in the future for regions by developing cutting-edge childcare services and applying similar measures for nursing care

Establishing disaster prevention/mitigation infrastructure based on optimization of regional energy supply and demand and infrastructure monitoring

- Enabling flexible, convenient travel through IoT-based vehicle information and use of FCVs, PHVs, and EVs and distributed power functions
- Establishing disaster recovery systems that secure transportation routes and use local energy in regions when a disaster occurs

*FCV: Fuel Cell Vehicle, PHV: Plug-in Hybrid Vehicle*
Building Social Infrastructure for the Regions of the Future

Implementation Roadmap

System

2017
- Developing model regions and open centers
  • Establishing activity centers (Tsukuba University to lead the way in modeling)
  • Joint research with multiple business groups
  • Cultivating highly skilled human resources in regions through courses offered in partnership with communities
  • Building networks with nearby municipalities
  • Implementation projects based on full-fledged co-operation between government, industry, and academia

- Considering regional agriculture infrastructure
  • Planning agricultural projects and support technology infrastructure
  • Expanding agriculture support technology (labor-saving technology)
  • Developing and smartifying data analysis technology

- Considering cutting-edge childcare/nursing care
  • Planning pilot projects for cutting-edge childcare services
  • Considering patient transportation and sick children/nursing care system

- Considering regional disaster prevention and mitigation infrastructure
  • Infrastructure plan centered on IoT-based train information
  • Developing and smartifying data analysis technology

- Proposing new approaches to agricultural work, cutting-edge childcare, and software-based disaster prevention/mitigation models

- Social implementation
  • Creating appealing living environments
  • Creating regional social service industries
  • Promoting and supporting efforts to attract workers

- Improving regional energy resilience

- Improving the female employment rate

- Developing a diverse range of agricultural workers

2020
- Establishing regional innovation centers
- Enhancing model regional centers
- Developing bases in other regions
- Establishing base of skilled regional workers
Developing a Fully Optimized Goods, Products, and Services Platform

Enabling increased capacity to create goods, things, and services, enhanced industrial competitiveness, and improved quality of life

Goods, Products, and Services in Society 5.0

- Developing a model that uses goods as a starting point for generating profit from products and services
- Creators of products and services in cyberspace select ideal suppliers. Suppliers are able to participate in creation of products and services that leverage their own strengths
- Individuals receive goods, products, and services that better meet their needs

Core Activities: Using products and services as well as goods as a starting point for enhancing growth potential

Developing a platform for goods, products, and services

- Modeling the value chain and verifying the profit redistribution system, economic impact, etc.
- Considering how to fully optimize the value chain by conducting various domestic trials and holding conferences
- Establishing public contract research organizations to perform cutting-edge manufacturing

Ensuring that basic technologies in growth fields are prioritized

- Establishing development centers for cutting-edge devices in order to maintain the device design capabilities of Japanese companies
- Developing and promoting cutting-edge material technologies to support the superiority of Japanese manufacturing
- Developing a supercomputing environment in collaboration with industry and academia for AI design, model design, and simulations

Developing an environment to ensure the international competitiveness of small- and medium-sized enterprises

- Validating and supporting best practices through early acquisition and model representation of advanced skills
- Developing and globally deploying technology such as composite 3D printers suited for plastics, metals, compounds made from them, etc.
Developing a Fully Optimized Goods, Products, and Services Platform

**Implementation Roadmap**

<table>
<thead>
<tr>
<th>Structure</th>
<th>Management institutions</th>
<th>Universities</th>
<th>Verifying systems</th>
<th>2020 – 2020</th>
<th>2020 –</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching and verification of needs and seeds</td>
<td>Management institutions</td>
<td>Verification centers</td>
<td>Modeling and data coordination for various processes Platform testing</td>
<td>Management institutions</td>
<td>Contact point for coordination with overseas institutions</td>
</tr>
<tr>
<td>Selection of target fields</td>
<td>Management institutions</td>
<td>Coordinating related domestic measures and industry groups</td>
<td>Management institutions</td>
<td>Developing public cutting-edge fabrication Promoting creation of products and services</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management institutions</td>
<td>Fabrication institutions</td>
<td></td>
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</tr>
</tbody>
</table>

**Government**

- Initiatives to develop cutting-edge materials
- Initiatives to develop cutting-edge devices
- Developing supercomputing environment

**Industry/R&D**

- Providing technical information
- Developing 3D printers adapted to materials of all kinds

**Government**

- Implementing support and technological development measures for SMEs
- Developing databases of technology owned by SMEs

**SMEs**

- Ensuring that basic technologies in growth fields are prioritized
- Enhancing international competitiveness
- Revitalizing regions
  - Making Japan, which possesses cutting-edge devices, an indispensable presence in the value chain
  - Enabling orders to be received via networks that transcend geographical constraints and existing distribution channels and making it possible for regional companies/SMEs to increase sales and hire more personnel

**Government**

- Developing and using databases of technology owned by SMEs

**Establishing platforms for goods, products, and services**

- Providing best practice-based goods, products, and services through collaboration between multiple companies
- Overcoming the “Devil River” and “Valley of Death,” enhancing manufacturing capabilities, and promoting the involvement of products and services companies

**Publicly promoting the range of cutting-edge devices/materials and subjects that should be enhanced**

**Developing public cutting-edge fabrication platforms**

- Developing platforms for goods, products, and services
- Promoting creation of products and services
Infrastructure/Informatics-Based Paradigm Shift

Developing a resilient, sustainable infrastructure and nation and supporting comfortable living through digitalization

Infrastructure in Society 5.0

- Improving labor productivity in the architecture and civil engineering fields by 20% by 2025
- Developing high-quality infrastructure stock through sophisticated infrastructure maintenance and management
- Enabling a more resilient nation and urban development through establishment and management of “virtual Japan”

Core Activities

Developing smart construction and production systems centering on the introduction and promotion of BIM and CIM*

- Aiming to smartify construction and production systems by promoting digitalization through the introduction and promotion of BIM and CIM compliant with international standards and technological development of related software and hardware (robots, etc.)

Developing asset management technology through collection of infrastructure data, AI analysis, etc.

- Contributing to the development of high-quality infrastructure stock by improving the evaluation of infrastructure health based on analysis of big data and application of AI, using the results of existing SIP infrastructure maintenance, upgrading, and management technology as a platform

Establishing “virtual Japan” information platforms that will contribute to urban development and a more resilient nation

- Integrating infrastructure databases, geospatial data (topography, geology, etc.), and real-time data on disasters, weather, traffic, cities, etc. to reproduce lands, cities, areas, and neighborhoods across Japan in cyberspace

*BIM (Building Information Modeling) and CIM (Construction Information Modeling): systems that digitalize information relating to works in the construction and civil engineering fields
Infrastructure/Informatics-Based Paradigm Shift

Implementation Roadmap

<table>
<thead>
<tr>
<th>2017</th>
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<th>2017</th>
<th>2017</th>
</tr>
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<tbody>
<tr>
<td>Introduction/promotion of BIM/CIM and smart construction and production systems</td>
<td>Introducing asset management using infrastructure monitoring systems</td>
<td>Developing high-quality infrastructure stock through AI analysis of infrastructure data, etc.</td>
<td>Establishing information platforms that will contribute to urban development and a more resilient nation (virtual Japan))</td>
</tr>
<tr>
<td>General concept, formulating specifications for the purpose of data coordination</td>
<td>Developing and applying element technologies for the purpose of implementation</td>
<td>SIP infrastructure maintenance, upgrading, and management technology R&amp;D</td>
<td>Considering ideas based on collaboration between industry, government, and academia</td>
</tr>
<tr>
<td>Partial operation of smart construction and production systems</td>
<td>Refining use Improving adoption rate</td>
<td>Integrating data on selected infrastructure and researching the application of AI/big data analysis using that data</td>
<td>Ideas about design, technological development, and operating rules</td>
</tr>
<tr>
<td>Integrated operation of smart construction and production systems</td>
<td>Urban development based on BIM/CIM coordination (application to actual projects)</td>
<td>Accumulating infrastructure data</td>
<td>Development and operation in leading cities</td>
</tr>
<tr>
<td>Nationwide expansion of virtual Japan</td>
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Enabling the Cyberspace That Will Enrich Society 5.0

Contributing to diverse value creation through safe, secure, effective data usage

Cyberspace in Society 5.0

- Linking systems together to function as a synergistic whole* and enabling optimal distribution/arrangement of people and things
- Functioning as a platform for optimizing society as a whole, resolving social issues, improving Japan’s industrial competitiveness, and creating a service model that leads to economic growth

Developing data distribution platforms

- Developing an environment that promotes public-private collaboration which transcends organization- and task-related barriers and sharing/usage of a wide range of data

Developing security platforms

- Developing platforms that ensure the reliability, soundness, and robustness of cyberspace in Society 5.0

Developing digital twin platforms

- Developing platforms for constructing sophisticated models in cyberspace based on big data obtained from sensors, etc.

Developing systems that promote data distribution/usage

- Achieving an environment that enables secure distribution and usage of data by finding the right balance between data protection and distribution/usage

Addressing problems that arise due to the expansion of cyberspace

- Achieving an environment that continues running even when disasters occur, eliminating the digital divide, and supporting appropriate ICT use

Addressing other issues

- Reviewing and enriching architecture, enhancing base technology research, global industrialization, HR development, etc.

Figure: Overview of Cyberspace

*Also known as “System of Systems”
## Enabling Cyberspace That Will Enrich Society 5.0

### Implementation Roadmap

<table>
<thead>
<tr>
<th>Technology</th>
<th>Social Implementation</th>
<th>System</th>
</tr>
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<tbody>
<tr>
<td>2017</td>
<td>2018</td>
<td>2019</td>
</tr>
<tr>
<td>Developing platforms for sectoral and cross-sectoral data distribution</td>
<td>Developing digital twin platforms in various fields</td>
<td>Developing trust platforms and platforms for coordinating cyber-information</td>
</tr>
<tr>
<td>Data distribution technology, data processing technology, and operations management technology R&amp;D</td>
<td>Common data model and interoperable interface R&amp;D</td>
<td>Developing software such as simulation technology and AI</td>
</tr>
<tr>
<td>Developing fee-based data distribution systems (data valuation benchmarks, credit guarantee methods)</td>
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<td>Developing systems relating to AI-based automation of social system operation (explainability, verifiability, etc.)</td>
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<td>Developing fee-based data distribution systems (data valuation benchmarks, credit guarantee methods)</td>
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<td>Using personal data and considering the nature of intellectual property data and promoting its use</td>
</tr>
<tr>
<td>Developing fee-based data distribution systems (data valuation benchmarks, credit guarantee methods)</td>
<td>Developing fee-based data distribution systems (data valuation benchmarks, credit guarantee methods)</td>
<td>Establishing and evolving the Society 5.0 brand</td>
</tr>
<tr>
<td>Developing fee-based data distribution systems (data valuation benchmarks, credit guarantee methods)</td>
<td>Developing fee-based data distribution systems (data valuation benchmarks, credit guarantee methods)</td>
<td>Supporting use by SMEs, eliminating the digital divide, and training highly skilled IT personnel</td>
</tr>
</tbody>
</table>

- **2017 - 2020**: Cross-sectional expansion
- **2025**: Technological expansion and improvement of cross-industry operability

### Key Areas
- **Data distribution technologies**
- **Data processing technologies**
- **Operations management technologies**
- **R&D**
  - Developing fee-based data distribution systems (data valuation benchmarks, credit guarantee methods)
  - Technological expansion and improvement of cross-industry operability

### Additional Activities
- Developing digital twin platforms in various fields
- Developing trust platforms and platforms for coordinating cyber-information
- Establishing the Society 5.0 Management Council (provisional name)
- Establishing and operating test beds
- Optimizing through automated service coordination
- AI-based automated discovery of new solutions
- Ensuring and managing international compliance
- Developing systems relating to AI-based automation of social system operation (explainability, verifiability, etc.)
- Using personal data and considering the nature of intellectual property data and promoting its use
- Establishing and evolving the Society 5.0 brand
- Supporting use by SMEs, eliminating the digital divide, and training highly skilled IT personnel

**Policy & Action**

**Enabling Cyberspace That Will Enrich Society 5.0**
Required Measures 1: Breaking Through the Five Walls

In order to realize Society 5.0, it is necessary to break through “five walls”—the wall of ministries and agencies, wall of the legal system, wall of technologies, wall of human resources, and wall of social acceptance—as well as the wall of industry itself.

Wall of ministries and agencies
- Making the Council on Investments for the Future and Council for Science, Technology and Innovation leaders in realizing Society 5.0 and coordinating the efforts of various ministries

Wall of the legal system
- Based on the Basic Act on the Advancement of Utilizing Public and Private Sector Data, using public and private data to resolve social issues and enhance international competitiveness and developing digital government

Wall of technologies
- Ensuring that government investment in R&D is at least 1% of GDP
- Investing a further 250 billion yen to execute SIP/ImPACT/FIRST-type projects geared toward social implementation of new technologies

Wall of human resources
- Ensuring the development of workers who can contribute to realizing Society 5.0, both in Japan and abroad, based on a long-term HR strategy; carrying out HR development through large-scale joint research projects, etc.

Wall of social acceptance
- Building consensus among various stakeholders involved in Society 5.0 based on consideration of ELSI, demonstrations using test beds, etc.
- Promoting understanding of Society 5.0’s benefits
- Global expansion of Society 5.0 aligned with the cultures and regional characteristics of countries around the world

*SIP: Cross-ministerial Strategic Innovation Promotion Program
*ImPACT: Impulsing PARadigm Change through disruptive Technologies program
*FIRST: Funding Program for World-Leading Innovative R&D on Science and Technology
*ELSI: Ethical, Legal and Social Implications
Required Measures 2: Breaking through the Wall of Industry

Industry has a major role to play in realizing Society 5.0. Society 5.0 will be achieved while increasing the international competitiveness of companies and thus of industry as a whole.

Inter-company cooperation that transcends industries/sectors
- Promoting cooperation through investment in various management resources
- Clarifying and expanding areas for cooperation relating to data and R&D

Ci-creation with universities and R&D institutes
- 3-fold increase in investment in joint research projects, etc., involving universities and R&D institutes by 2025
- Partnering with governments, etc., to begin considering public-private partnership investment schemes

Cooperation and co-creation with venture companies
- Partnering on investments in venture companies, etc., and increasing procurement and personnel exchanges
- Considering the creation and development of venture companies based on university technological research seeds*

*Implemented through the Tokyo University/Keidanren Venture Co-Creation Council, etc.
Society 5.0 is an imperative strategy for revitalizing Japan. This concept will enable Japan to lead the way globally in achieving an abundant society whose citizens have hope for the future and it will also contribute to sustainable development of the world economy through its deployment in other countries.

There are many areas where Society 5.0-oriented initiatives should be implemented. Starting with this action plan, we will promote activities aimed at realizing Society 5.0 in key areas along with a wide range of partners, including governments/municipalities, universities, R&D institutes, and venture companies.

We will also speed up the development of proposals aimed at establishing new social systems, including innovations in working methods, education, and other social mechanisms.

* E.g., life sciences, FinTech