

Innovation Management



Key SDGs



Why it matters

Under its Corporate Credo “to contribute to society through the development of superior, original technology and products,” Hitachi has focused its efforts on the Social Innovation Business. Our 2021 Mid-term Management Plan sets the goals of creating social, environmental, and economic value for our customers. In fiscal 2020, we established an R&D policy of becoming a global innovation leader in delivering social, environmental, and economic value. By further enhancing Lumada and NEXPERIENCE, a methodology for collaborative creation with customers, and making use of “Kyōsō-no-Mori,”

a new research initiative for open collaborative creation, we will accelerate open innovation and support our customers in resolving their challenges.

Hitachi believes that intellectual property (IP) activities make an important contribution to creating social, environmental, and economic value for our customers. Our Intellectual Property Division takes part in creating solutions that enhance such value, contributes to the global deployment of IP, and leads the way in resolving social issues toward achieving the SDGs and Society 5.0 through IP activities.

What we are doing



R&D

Core initiatives

- Create value at the frontline (promote open innovation)
- Leverage technological strengths for value creation (redesign innovation processes)
- Become a technology leader (promote innovation)

Goals and KPIs

- Expanding collaborative creation “spaces”
- Creating a vision in each region
- Contributing to expanding the Lumada business in each region
- Accelerating innovation in our five core sectors
- Strengthening our technological foundation
- Developing top digital talent in the field of AI: 350 employees by fiscal 2021

Achievements in FY 2019

- Launched Kyōsō-no-Mori, a research initiative for open collaborative creation
- Established a corporate venture capital fund
- Promoted open innovation with governments and academic institutions in each country and region
- Globally expanded “Scale of Digital” business and “Scale by Digital” business
- Promoted development of AI, digital trust, “Beyond 5G/6G” technologies, electrification, and robotics for Lumada CPS and other products
- Developed disruptive technologies in the areas of quantum computing, regenerative medicine, and environment
- Established the Lumada Data Science Lab. by bringing together top data scientists

What we are doing



IP

Core initiatives

- Provide support for creating solutions
- Promote IP activities to resolve social issues toward the SDGs and Society 5.0

Goals and KPIs

- Strengthening solution creation
- Carrying out IP activities based on specific projects that contribute to solving social issues

Achievements in FY 2019

- Developed new method of collaborative creation to drive solution creation using patent information as a catalyst
- Introduced the "IP for society" concept, which promotes the use of IP in certain areas of high public interest to maintain and evolve social norms (for example, allowing free use of IPs to resolve social issues)
- Established the IP Strategy Department to develop and implement IP activities; in fiscal 2020, established a Data Science Group within the department

Key SDGs



Research and Development

Hitachi's R&D Policy and Initiatives

Policy Structure Activities

Over its history of more than 100 years, Hitachi has worked to develop cutting-edge technologies through its R&D activities in an effort to create innovation toward the future, adhering to the company's Corporate Credo of contributing to society through the development of superior, original technology and products. In fiscal 2020, we established an R&D policy of becoming a global innovation leader in delivering social, environmental, and economic value. Building on Lumada as a foundation, we will further accelerate open innovation and grow together with our stakeholders by combining our strengths in operational technology (OT), IT, and products with the technology platforms in the Research & Development Group and external knowledge. Through these efforts, our goal is to enhance social, environmental, and economic value for our customers, as well as to improve people's quality of life.

To realize this R&D policy, the Global Center for Social Innovation (CSI) acts as the frontline function, working closely with the Center for Technology Innovation (CTI) to leverage Hitachi's technology advantages in creating new value. CTI and the Center for Exploratory Research (CER) are pursuing research to create the world's No. 1 technologies and disruptive technologies to become a technology leader.

Achievements Since FY 2019

In April 2019, Kyōsō-no-Mori, a research initiative for open collaborative creation (co-creation), was launched within the Central Research Laboratory. In June, a corporate venture capital fund was established to promote industry-academia-government cooperation and collaboration with startups. In April 2020, the Lumada Data Science Laboratory was established within Kyōsō-no-Mori, bringing together top data scientists to further enhance value through digital solutions.

R&D Policy for FY 2020

Policy	Become a global innovation leader in delivering social, environmental, and economic value	
Creating value at the frontlines	CSI	
Leveraging technological strengths for value creation	CSI-CTI collaboration	
Becoming a technology leader	CTI	CER

Creating Value at the Frontlines (Promoting Open Innovation)

Structure Activities

Hitachi is expanding open co-creation "spaces" in regions of focus to strengthen initiatives in growth areas and in solving social issues, as well as to capture changes in the latest trends and create value by setting a vision for and exploring business opportunities in each region.

Achievements in FY 2019

In fiscal 2019, as part of initiatives to expand co-creation "spaces," Kyōsō-no-Mori was launched within the Central Research Laboratory in April 2019, followed by the relocation of the Silicon Valley Research Center of Hitachi America, Ltd. to a new office building in Santa Clara, California with Hitachi Vantara to strengthen collaboration and establish a development center for digital solutions through open co-creation. We are looking at different business models together with startups through ideathons and hackathons held by such research centers. In October, Hitachi and the New South Wales State Government agreed to establish a "Kyōsō (collaborative creation) Centre" in Western Sydney, Australia, to accelerate the creation of social innovation. We have begun co-creation activities from early 2020 with a view to opening the center in 2023.

As part of our activities to promote regional co-creation, we are engaged in a joint project with Thailand's prestigious Chulalongkorn University to create new services that will help realize a future digital city. A "healthy aging" project in collaboration with Tsinghua University in China is also underway.

To enhance social, environmental, and economic value, projects on the environment and aging were launched under the direct control of the Research & Development Group. Our goal is to generate new value together with the Future Investment Division which is responsible for identifying mid- to long-term focus areas and managing projects based on next-generation technology trends and global changes. Further, the Hitachi-UTokyo Laboratory that has made policy proposals for next-generation grid systems since 2016, has begun studies since fiscal 2020 on a total energy system project to achieve zero carbon, and contribute to raising environmental and social value.

In the past, Hitachi has identified customer issues and promoted end-to-end value creation from vision design to services based on its originally developed co-creation methodology “NEXPERIENCE.” Going forward, NEXPERIENCE will evolve into a methodology that quantifies social, environmental, and economic value, with enhanced risk assessment, to enable collaboration with multiple companies or regional communities to resolve social challenges. We will accelerate value creation through the delivery of solutions by gaining insight into the challenges faced by regional communities and incorporating them into vision design and rulemaking, as well as by working with our global front teams.

Global Open Innovation Network

Region	Research centers
Europe	UK (London & Cambridge), Denmark (Copenhagen), France (Sophia Antipolis), Germany (Munich)
Americas	United States (Santa Clara & Detroit)
China	Beijing, Shanghai, Guangzhou
Asia (Oceania)	India (Bangalore), Singapore, Thailand (Chonburi), Australia (Sydney)

Leveraging Technology Strengths to Create Value (Transforming the Innovation Process)

Structure Activities

In order to create solutions that contribute to enhancing people’s quality of life and our customers’ corporate value, we are working closely with our global frontline teams to expand the Lumada business by leveraging R&D’s technology platforms and knowledge in OT, IT, and products (OT×IT×Products), and globally developing our “Scale of Digital” business centered on the IT sector as well as our “Scale by Digital” business centered on OT and products.

OT×IT specialists have been assigned to each region in North America, Europe, China, Asia Pacific, and Japan to resolve challenges faced by our customers in those regions and promote our “Scale of Digital” business. With this organization, we aim to achieve an *n*-fold expansion by developing digital solutions such as maintenance repair through co-creation with customers.

In relation to our “Scale by Digital” business, we are utilizing Lumada solution cores that can be applied across our five sectors for solution development, such as blockchain or data analytics technology, to connect stakeholders and create value by linking multiple services in areas such as MaaS (Mobility as a Service), IaaS (Infrastructure as a Service), smart manufacturing and logistics.

The MaaS solution, for example, provides value to businesses and people by coordinating the entire regional traffic network and peripheral services through the application of technologies developed for railway systems, such as operation control and scheduling. This is just one example of how we will use OT technology, one of our technology strengths, to differentiate ourselves from our competitors and enhance value creation in each region.

Becoming a Technology Leader (Promoting Innovation)

Activities

Hitachi will accelerate innovation in each of its five core sectors to enhance social, environmental, and economic value by increasing people’s quality of life and our customers’ corporate value. To achieve this, we are using Lumada as a common platform to realize a cyber-physical system that seamlessly connects cyberspace with the real world in real time, focusing on the development of AI, digital trust, and technologies for “Beyond 5G/6G.”

“Explainable AI” technologies that can explain the rationale behind the decisions they reach are being developed and already in use for loan screening in a co-creation with a financial institution. Development of digital trust technologies is also underway, including public biometrics infrastructure using a proprietary hands-free authentication system and confidential information-processing technologies that allow data to be processed while encrypted. For “Beyond 5G/6G” networks and services, we will accelerate co-creation with customers using 5G demo environments in Japan and North America.

We are also strengthening R&D in areas such as robotics and electrification technologies to further advance technology platforms supporting key products such as high-speed trains, elevators, particle beam therapy equipment, biochemical/immunological analysis systems, inverters, and air compressors.

Furthermore, in the area of quantum computers, the Hitachi Cambridge Laboratory has successfully demonstrated fundamental technology that will lead to the fast readout at very low temperatures necessary for quantum computing. Also, through joint research with Myoridge Co. Ltd., known for its technology for culturing iPS-derived differentiated myocardial cells, we have developed new technology to automate 3D culturing using Hitachi’s equipment for automated mass culturing of iPS cells.

Other collaborations include projects with startups to co-create new areas of business through corporate venture capital funds.

In our quest to improve social, environmental, and economic value, Hitachi is focusing on electrification, renewable energies, and hydrogen systems, seeking to become a leading company in environmental value.

For renewable energy, we are developing systems to balance energy supply and demand when large-scale renewable energy systems are introduced, to ensure stable power supply. We are also proceeding with demonstration projects such as in urban areas with our Area Energy Management System using AI and in national projects with the Ministry of Economy, Trade, and Industry and the Ministry of the Environment, Japan, on systems producing and using hydrogen.

By drawing on our combined expertise in OT×IT×Products, Hitachi will strive to develop the world's No. 1 technologies and disruptive technologies and deliver high value to our customers.

Achievements Since FY 2019

In the field of electrification for a zero carbon society, we are working on high-efficiency technologies for electric power systems such as motors and inverters to reduce carbon emissions from electric vehicles and industrial equipment. Our 800 V inverter for EVs that allows long-distance driving won the 62nd (2019) Nikkan Kogyo Shimbun Best Ten New Product Award.

Developing Technology to Prevent the Spread of COVID-19

Hitachi's first priority is the safety and health of all of its stakeholders, including customers, partners, and Hitachi Group employees and their families worldwide, and it is committed to preventing the spread of the novel coronavirus (COVID-19). In May 2020, we began manufacturing face shields for medical use. The Research & Development Group played a central role in designing the face shields, incorporating advice from medical staff at the Hitachi General Hospital in the city of Hitachi, Ibaraki Prefecture. The face shields were provided free of charge on a priority basis to designated medical institutions for specified infectious and class I infectious diseases in Japan. They were also provided free of charge to designated medical institutions for class II infectious diseases.

In response to changes in society and lifestyles brought about by COVID-19, we are pursuing technology and solution development in the environmental and life science areas, as well as in supporting technologies such as measurement technology and digital technology leveraging remote operation or automation, to contribute to a sustainable and resilient society that can coexist with the novel coronavirus.

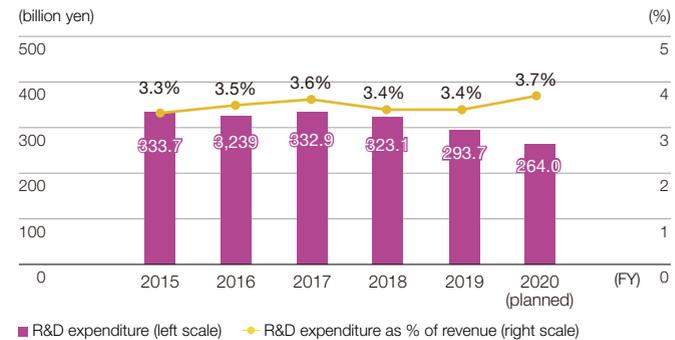
R&D Investment and Fostering Digital Talent

Activities

Hitachi invests around 4% of its revenue in research and development to strengthen its capabilities in the five core sectors of its Social Innovation Business. Corporate-led R&D is focused on co-creation with customers, development of the world's No. 1 technologies and disruptive technologies, as well as expanding common digital platforms and enhancing research capabilities outside Japan to achieve an *n*-fold expansion of the Lumada business, our growth engine, and expand business worldwide.

Further, to meet society's needs associated with advancements in digitalization, Hitachi is strengthening digital expertise, including top digital talent in AI-related areas. In April 2020, in cooperation with the business division, researchers specializing in the fields of AI and data analytics were brought together with engineers and consultants with deep knowledge in OT necessary for practical application to form the Lumada Data Science Laboratory, a new organization for greater collaboration leveraging their individual skills and expertise. The Research & Development Group is focusing on developing top-class digital talent in the field of AI, and intends to increase the number of employees meeting this description from 306 as of the end of fiscal 2019 to 350 by fiscal 2021.

R&D Expenditure



Intellectual Property

Hitachi's 2021 Intellectual Property Mid-term Management Plan

Policy

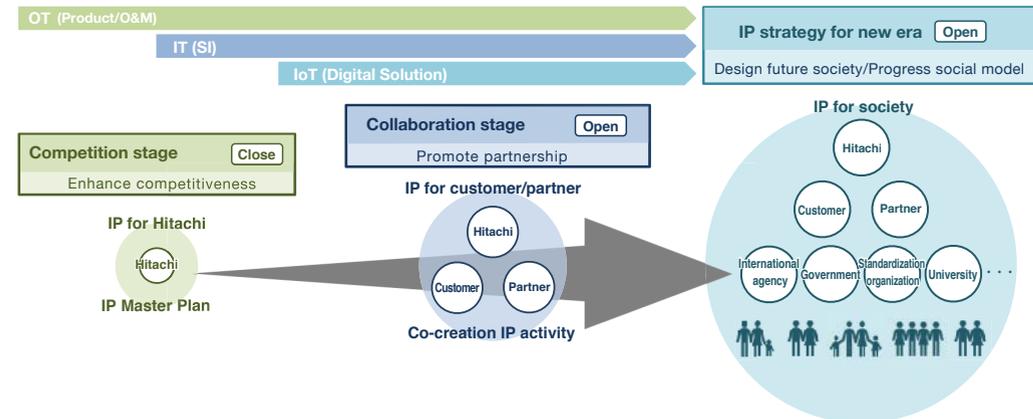
Intellectual property (IP) is a key element of Hitachi's business strategy. Hitachi will promote IP activities to create solutions that enhance value for customers in line with the 2021 Mid-term Management Plan, globally deploy the created IP, and contribute to resolving social issues related to the SDGs and Society 5.0 through IP activities.

Regarding solution creation, our Intellectual Property Division takes an active role, by taking part in the solution development process and developing new collaborative creation methods (Patentathons) using patent information as a catalyst to drive solution creation. It also supports the promotion of open innovation activities designed to create solutions, such as Ideathons and Hackathons, from the intellectual property side.

Regarding global deployment of the IP we have created, the division will contribute to the globalization of Hitachi's business by strengthening international patent applications (PCT applications) that cover inventions that were developed through open innovation with our customers and partners in addition to inventions from our own R&D activities.

Achievements Since FY 2019

Regarding solving social issues, in fiscal 2019 Hitachi introduced the "IP for society" concept, in which it promotes the use of IP in certain highly public domains to maintain and evolve social norms. Moving forward, we will consider further ways to contribute to resolving social issues through IP, including contributions to combating the spread of COVID-19 through measures such as allowing free use of IP related to products that prevent the spread of infection.



Hitachi's IP Strategy

Policy

Under the Social Innovation Business, Hitachi has formulated and implemented an IP strategy that consists of two pillars: IP strategy for competitiveness and IP strategy for collaboration.

IP strategy for competitiveness is centered on acquiring and utilizing patents and other IP rights. "IP Master Plans" customized for the nature of each business are formulated and implemented to enforce competitiveness.

IP strategy for collaboration is an IP strategy based on collaboration. As opportunities for collaborative creation with our customers and partners increase through the use of our IoT platform, Lumada, we have expanded the scope of our IP activities to include not only copyrights, patents, and trade secrets but also information assets such as data and information, and are using IP to promote partnerships and build ecosystems.

Global IP activities have changed rapidly in recent years due to the emergence of gigantic platform companies and advancement of open innovation. From fiscal 2020 onward, we will evolve our IP strategy by closely examining the circumstances of the "new normal" post COVID-19, as well as political, economic, social, and technological trends.



Hitachi Group Codes of Conduct: 6. Protection of Intellectual Property and Brand
<http://www.hitachi.com/corporate/about/conduct/index.html#ank8071860>

Framework for IP Activities

Structure

System

We currently have IP offices in Santa Clara and Detroit in the United States, Beijing in China, London in the United Kingdom, and Singapore to cover our globalized business.

Achievements Since FY 2019

As a control tower for developing and implementing new IP activities based on the focus sectors and regions for investment under the 2021 Mid-term Management Plan, in fiscal 2019 we established the IP Strategy Department within the Intellectual Property Division. The new department plays a central role as a hub in forming a global talent network and works closely with major sites around the world, as well as building close ties with our newly established Corporate Venturing Office in addition to our Strategy Planning Division, the Government and External Relations Group, and the Corporate Brand & Communication Division in Hitachi, Ltd.

In fiscal 2020, a Data Science Group was launched within the IP Strategy Department. The new group is responsible for cultivating IP data scientists who can use IP AI tools to perform comprehensive analysis of IP information (such as patents) along with non-IP information (such as market and R&D information) and propose management and business strategies by showing present business standings and future projections.

Reward System for Employee Inventions

We motivate employees in the R&D field with an ample reward system for new inventions. To make this reward system as fair and transparent as possible, we set standards to evaluate inventions and disclose these standards to employees. We also have a mechanism for receiving inquiries about the rewards, as well as opinions on the reward system.

We have established a special department within the Intellectual Property Division to plan and operate this system, while an internal Invention Management Committee made up of R&D, legal affairs, personnel management, and IP experts ensures that the system operates effectively across the whole Group.

Internal Rewards for Inventors

Invention Information System	System allowing inventors to check the evaluation standards used to calculate rewards for inventions
Arbitration Committee for Invention Rewards	Committee to which inventors can appeal if they disagree with the amount they have been awarded
Business Contribution Awards Annual Top 100	President's awards to the top 100 inventors based on patent rewards received
Patent Contribution Awards Top 50	Ranking of the top 50 young inventors (under 35 years of age) based on patent rewards received within five years of their joining Hitachi

Awards for IP Activities

Activities

At the Intellectual Property Achievement Awards for fiscal 2020, sponsored by the Ministry of Economy, Trade, and Industry and the Japan Patent Office, Hitachi, Ltd. received the Award from Minister of Economy, Trade, and Industry along with high praise for the establishment of our IP strategies for competitiveness and collaboration as well as our active engagement in IP activities to resolve social issues in advance of competitors. This was our first award since receiving the Award from Commissioner of the Japan Patent Office 28 years ago in 1992, and our first time winning the more prestigious Award from the Minister of Economy, Trade, and Industry.

Clarivate Analytics also included Hitachi in its Derwent Top 100 Global Innovators for the ninth consecutive year, and the Japan Institute of Invention and Innovation presented Hitachi with the fiscal 2019 Imperial Invention Prize for our design of the Class 800 high-speed train for the UK. This is the third consecutive year that we have received high honors from the National Commendation for Invention, a prestigious Japanese award for invention established in 1919, and the first time that the Imperial Invention Prize, the highest prize offered by the National Commendation for Invention, has been awarded in recognition of outstanding design. Hitachi, Ltd. has received the Imperial Invention Prize eight times in total, more than any other recipient.

Protecting Our Designs and Brand

Protecting Hitachi's designs and brand is crucial for promoting our Social Innovation Business and supporting our global operations. We take resolute measures against such infringements as making and selling counterfeit goods copying our designs or carrying the Hitachi brand and illegally applying for or registering trademarks similar to the Hitachi brand.

In recent years, we are taking action to identify counterfeiting networks, whose manufacturing methods and sales channels have become more sophisticated and diverse. We are also working with e-commerce site operators on countermeasures against online counterfeit sales.