Mid-term Management Plan 2024 | Innovation Strategy

Innovation Strategy in the Mid-term Management Plan 2024

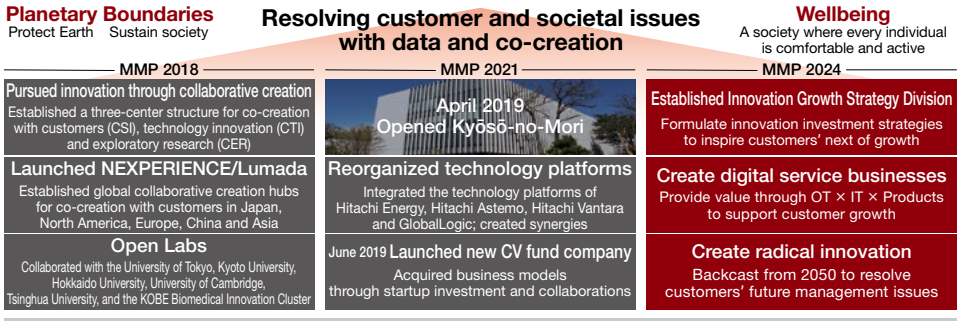
In the Mid-term Management Plan 2024, we will be focusing on generating innovation through digitalization to achieve global business growth. During the Mid-term Management Plan 2021, we opened Kyōsō-no-Mori and expanded co-creation with customers, while reorganizing technology platforms and acquiring business models through startup investment and collaborations. To further accelerate these initiatives under the Mid-term Management Plan 2024, the newly established Innovation Growth Strategy Division will formulate innovation investment strategies that will inspire the next of growth for customers, and under this strategy, promote the creation of digital service businesses and radical innovation.

Expanding Hitachi Group Investments in Innovation

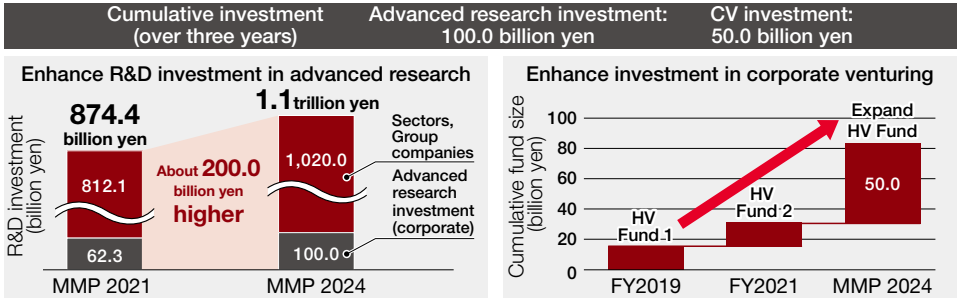
Under the Mid-term Management Plan 2024, we will expand investments in innovation across the entire Hitachi Group for further growth. A cumulative total of 100.0 billion yen will be invested in advanced research during the three-year plan, expanding Groupwide R&D investment to 1.1 trillion yen. We will also invest an additional 50.0 billion yen in corporate venturing (CV). Through these investments, Hitachi aims to create radical innovation to solve future societal issues.

Innovation Promotion Structure for DX/GX Global Growth

Fully leveraging the Hitachi Group's technology platforms, human capital and the customer network, we will create DX/GX innovations under a global structure. The Research & Development Group with a highly diversified workforce of 2,300 people, will be leading the creation of innovation through digitalization and other technologies. Together with Hitachi Ventures GmbH (HVG), we will work to create innovation that will solve issues faced by customers and society through collaborations with leading startups in a wide-range of fields. The Global Intellectual Property Group is promoting the establishment of a new intellectual property platform to provide value to global customers under experienced global leadership. We will accelerate global business growth together with Hitachi Energy, GlobalLogic, and business units in each region.



CSI: Center for Global Social Innovation, CTI: Center for Technology Innovation, CER: Center for Exploratory Research, CV: Corporate Venturing



Innovation Growth Strategy Division
Formulate and execute innovation investment strategies that stimulate further customer growth
Keiji Kojima, President & CEO

Research & Development Group 2,300 people
Drive innovation with digitalization and technologies to provide value through co-creation
Norihiro Suzuki, CTO and GM of the R&D Group

Global Intellectual Property Group 200 people
Establish intellectual property platform to provide value to global customers
Stephen Manetta, CIPO

Asia
India: Strengthen digital engineering
APAC: Focus on green buildings and smart cities

Europe
Create the environment business in collaboration with Hitachi Energy and Hitachi Rail
Participate in the European Environment ecosystem
Hitachi Energy: Gerhard Salge, CTO

North America
Enhance creation of digital service businesses through cooperation with GlobalLogic, Hitachi Vantara and Hitachi Digital
GlobalLogic: Sunil K. Singh, CTO

China
Expand industrial GX/DX business in collaboration with local group companies
Strengthen decarbonization efforts
Hitachi China: Yasushi Harada, CTO

Japan
Promote customer co-creation targeting DX/GX, establish world-leading technology platforms, create radical innovation addressing planetary boundaries and wellbeing

Generating Digital Service Businesses with the Lumada Growth Model

Under the Mid-term Management Plan 2024, we will further develop the Lumada growth model to co-create innovation together with customers and promote digital services that address our customers' next management challenges. To ramp up the Lumada growth cycle, we will deepen our understanding of captured signs and changes in society and customers, draft together with our customers visions for new growth, and provide innovations to realize that growth. In the Lumada growth model, we will promote the categorization of business segment characteristics and operations as well as work with the global front teams to strengthen marketing activities, to materialize and scale up through co-creation.

Backcasting from 2050 to Generate Radical Innovation

In formulating the Mid-term Management Plan 2024, we explored future societal issues through repeated discussions with international organizations, universities, customers and startups. Based on these discussions, we understood that the societal challenges that need to be addressed as we approach 2050 are "an environmentally-neutral society," "a society which supports an active 100-year lifespan of its citizens," and "the co-evolution of digital technologies, people and society," and set them as areas of focus. We are addressing these concerns through such initiatives as "energy storage and supply" and "direct air capture" to realize a carbon-negative society; "minimally invasive cancer treatment" and "designed cells" to overcome cancer and intractable and infectious diseases; and "Ultra Big Data Management" and "silicon quantum computers" to facilitate a data economy and computing innovation. Hitachi will be taking on the challenge of creating radical innovation to resolve future issues by backcasting from 2050.

Value	Present	2030	2050
Environment	Arrival of a hydrogen-based society realizing carbon neutrality • Carbon pricing • Hydrogen mobility	• Carbon neutrality • Full-scale utilization of hydrogen energy	Environmentally-neutral society • Energy storage and supply • Direct air capture
	Development of a circular economy facilitating zero waste and a comprehensive recycling-based society • Restrictions on plastics	• Transition to bio-based and resource recycling	
Safety, Security & Healthcare	Eradication of cancers with biomedical technologies • Overcome COVID-19 pandemic	• Expansion of regenerative medicine, Cell therapy market expansion	Society with active, 100-year lifespans • Minimally invasive cancer treatments • Designer cells
	Advances in AR/VR enabling flexible workstyles • Remote work	• Remedy gaps using avatars and online education	
Resilience	Advances in AI leading to the automation of a wide range of operations • RPA acceleration due to labor shortage	• AI governance	Co-evolution of digital technologies, people and society • Ultra Big Data Management • Silicon quantum computer
	Acceleration of technology development cycles using quantum computers • Risk analysis, Traffic control	• Material and new drug developments	

Accelerating Outside-in Innovation through Startup Investments

Through investments and collaborations with startup companies, Hitachi will achieve radical innovation and acquire groundbreaking business models contributing to the expansion of the Lumada business. In 2019, we established Hitachi Ventures GmbH (HVG) and launched the first fund. We have now launched a second fund and invested in 17 companies. In May 2022, HVG CEO Stefan Gabriel was ranked 19th on the Top 50 Powerlist by Global Corporate Venturing. Under the Mid-term Management Plan 2024, we will expand innovation ecosystems with customers, startup companies, academia and others. Specifically, we will focus on three areas identified in backcasting from 2050: "achieving a decarbonized and carbon-negative society," "overcoming cancer and intractable and infectious diseases," and "promoting the co-evolution of digital technologies, people and society."

Collaboration themes to accelerate radical innovations	
Decarbonized society Carbon negative	• New approaches in carbon removal technologies • Negative-emission business model • Improved efficiency of artificial photosynthesis (photocatalysts and new devices)
Overcoming cancer and intractable and infectious diseases	• Fusion of biopharmaceutics and radiotherapies • Designed cell innovation technologies (genetic design, cell manufacturing and evaluation of cell functions)
Co-evolution of digital technologies, people and society	• Metaverse/Web 3.0 applications and business models (societal infrastructure and industrial fields) • Quantum applications and use cases • Quantum service business models

R&D Strategy

Basic Policy of Hitachi's R&D

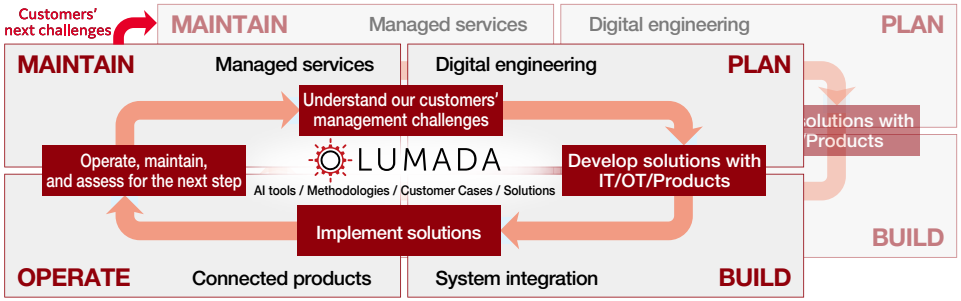
Hitachi's R&D strength is that it has established a value creation cycle based on owning platform technologies for OT × IT × Products, and know-how, and pursuing technology development through co-creation with customers and partners, adding to greater know-how.
Under the Mid-term Management Plan 2024, Research & Development will work closely with Hitachi Digital, the Global Environment Division and the Innovation Growth Strategy Division that are leading the growth strategy across the Hitachi Group. We will accelerate our initiative for the co-creation of value to further advance the Social Innovation Business, focusing on "Digital," "Green," and "Innovation" as the growth drivers. By generating innovation which will drive the Lumada growth model, we will contribute to the growth of our global business as well as create the next pillars of growth through radical innovation backcasted from 2050.

Accelerating Value Co-creation

We will develop Hitachi's unique co-creation approach, NEXPERIENCE, into a methodology to resolve societal issues and deploy the Lumada growth model. Through activities such as those in our university joint laboratories, we are capturing the *kizashi* (signs) of change in society and customers, to develop visions and business scenarios.
Initiatives in fiscal 2021 included participating in the Transition to Zero Pollution panel discussion hosted by Imperial College London in the United Kingdom to promote consensus-building on expectations and issues regarding a decarbonized, recycling-oriented society. Transition to Zero Pollution aims to achieve net zero emissions by 2050 (the state where the amount of CO_2 produced is equivalent to that removed from the atmosphere). Additionally, forums and roundtables were held at the H-UTokyo Lab. and Tsinghua University in China to discuss the realization of a carbon neutral society in each region. In fiscal 2022, we are proactively engaged in the creation of new innovations, including the establishment of a joint research center with Imperial College to accelerate the development of decarbonization and natural climate solutions.

Creating Growth Drivers

Hitachi is developing data-driven solutions under the Lumada growth model. By implementing the Lumada four-quadrant value co-creation cycle, our goal is to create growth drivers that support customer businesses. In Research & Development, we are furthering our understanding of customers' next business challenges while promoting the co-creation of innovations and digital services to resolve these issues. The Lumada growth model will be deployed worldwide together with GlobalLogic and others.



Examples of Value Co-creation in Finance and Public Services

	Current issue: Operational excellence	Next challenge: Create new demand
PLAN	Optimize work processes with design thinking	**Design cross-industry financial and public service products based on OT know-how**
BUILD	Increase work process system efficiency using "AI (RPA, dialogues, automated responses)," awarded first place in an international competition (SemEval2020)	**Launch of Sustainable Finance Platform as inter-industry coordinated services using IoT and blockchain technology, implement an inter-industry coordinated IoT information distribution system**
OPERATE	Hitachi's "Explainable AI" analyzes and evaluates operational data, and supports the implementation of AI in work systems, continuous operations and improvements	**Data analysis with assured security in DFFT and Blockchain/NFT discussed at first GTGS hosted by the World Economic Forum**
MAINTAIN	Hitachi's sensitivity analysis service automatically analyzes the voice of customers, and provides customer service improvements through product planning, sales strategies, risk countermeasures, and so on.	**Offer value distribution services leveraging metaverse and Web 3.0**

AI: Artificial Intelligence, RPA: Robotics Process Automation, GTGS: Global Technology Governance Summit, DFFT: Data Free Flow with Trust, NFT: Non-Fungible Token

Examples of the Value Creation Cycle in the Fields of Energy, Railway and Transport

	Current issues: Innovations in asset management	Next challenge: Promote user transition to CN
PLAN	Optimize facility costs with design thinking	**Consider asset optimization, including gas and hydrogen, based on a CN scenario created through shared understanding of issues with stakeholders in an industry-academia co-creation forum hosted by H-UTokyo Lab.**
BUILD	Deploy Hitachi's digital maintenance platform and digital twin equipment diagnoses and management systems to maintain and improve analysis accuracy in line with changes in equipment status	**Co-create and verify using the area energy management verification environment created at Kyōsō-no-Mori by combining Hitachi power generation, power storage, and equipment maintenance technologies**
OPERATE	Implement remote and automated equipment inspections using "image diagnostics AI technology" that has achieved the highest level in an international competition (TRECVID2020)	**Introduce DERMS to implement grid-edge control systems using technology such as Hitachi's grid edge solution for distributed energy sources**
MAINTAIN	Provide condition-based services with Hitachi's APM which was selected as a Leader in the IDC MarketScape 2020–2021 Vendor Assessment	**Provide multi-energy optimization service with EaaS and MaaS**

APM: Asset Performance Management, CN: Carbon Neutrality, DERMS: Distributed Energy Resource Management System, EaaS: Energy as a Service, MaaS: Mobility as a Service

Hitachi Product Strengths

Hitachi is promoting the provision of value to customers through OT × IT × Products. In terms of products, during the Mid-term Management Plan 2021, we were able to establish the top global technologies, winning prominent awards for high-speed railways, in-vehicle inverters, particle beam cancer treatment systems, and biochemical immune-assay systems.

In the Automotive System business, we are working on gearless, high-efficiency drive systems and multi-port EVs realizing the industry's most substantial size and weight reductions. Regarding the drive system (in-wheel motor), we aim to reduce energy loss by 30% compared to previous motors, and have been selected for support by the Japanese government's Green Innovation (GI) Fund, aiming for even higher efficiency.

In the measurement and analysis systems business (Hitachi High-Technologies), we will enhance the competitiveness of our semiconductor inspection and manufacturing equipment while integrating and analyzing data generated from equipment in processing, inspection, measurement and analysis to provide feedback on manufacturing processes and products to realize customer process innovations. Through co-creation with customers, we will use the data generated from products for predictive diagnostics, analytics visualization and optimizing operating conditions to contribute to reduced development time, improved yields in manufacturing, and increased productivity for customers.

Further Evolution of Lumada

In conducting R&D to further evolve Lumada, Hitachi is engaged in the creation of Lumada cyber-physical systems (CPS) that link the digital and physical spaces in real time. We are also focusing on the key technologies of AI, 5G, beyond 5G, security, electrification, and metaverse/Web 3.0. For the area of security, we are developing Public Biometric Infrastructure (PBI) technologies realizing data free flow with trust (DFFT) and promoting enhanced security for crypto assets. Regarding metaverse/Web 3.0, which will support future societal infrastructure, we will accelerate co-creations with startup companies.

Creating the Next Pillars of Growth

By backcasting from 2050, Hitachi is taking on the challenge to generate radical innovation for the next pillars of growth: "an environmentally-neutral society," "a society which supports an active 100-year lifespan of its citizens," and "the co-evolution of digital technologies, people and society."

To realize a decarbonized and carbon negative society, we are working to realize a large-scale, low-cost hydrogen production system; high-efficiency artificial photosynthesis; and a fuel production cycle fed directly by CO_2.

For "overcoming cancer and intractable and infectious diseases," we are working to develop even more advanced cancer therapy through technology such as automated positioning of particle beam radiotherapies. Furthermore, we are developing designed cells based on genetic modification and cell measurement technologies.

For the "co-evolution of digital technologies, people and society," we will further enhance ultra-high-speed database engines to realize data extraction performance speeds more than 100 times faster than conventional systems.

We are also accelerating developments for bio transformation (BX) and quantum transformation (QX), which will follow DX and GX.

Intellectual Property (IP) Strategies

Becoming a Global Leader in IP Activities

Under the Mid-term Management Plan 2021, in line with the stated vision of becoming a global leader driving enhanced value through the use of intellectual property and the goal of realizing IP-driven social innovations, we engaged in value-based (Environment, Safety & Security, Resilience) intellectual property activities. In the Mid-term Management Plan 2024, we established a new vision to become a global leader that resolves societal issues and grows our DX and GX businesses using intellectual property. We will achieve further advances and growth in the our Social Innovation Business through the protection and use of intellectual property centered on Green, Digital and Innovative initiatives.

Additionally, in fiscal 2022, the name of the Intellectual Property Division was changed to the Global Intellectual Property Group. The position of Chief Intellectual Property Officer (CIPO) was newly established to lead Hitachi Group intellectual property activities, and Stephen Manetta, who brings a wealth of experience in global intellectual property management was appointed as CIPO. By sharing insights gained from regional intellectual property activities at a global level, and identifying beneficial insights, we will promote the creation of new value leading to innovation.

Stephen Manetta
CIPO and General Manager, Global Intellectual Property Group

Hitachi formulates and executes an intellectual property strategy based on three pillars: "Competition," "Collaboration," and "IP for society."

"Competition" is the intellectual property strategy based on competition, centering on acquiring and using intellectual property rights with a focus on patent rights. We are formulating and strengthening the intellectual property master plans tailored to each business.

At the same time, "Collaboration" is an intellectual property strategy based on collaborative creation. As co-creation activities with customers and partners increase, we have expanded the scope of our IP activities to include copyrights, patents and trade secrets, as well as information assets such as data and information, to promote partnerships and build ecosystems.

"IP for society" involves activities utilizing intellectual property in specific fields of a highly public nature to maintain and evolve social norms. We will promote the creation of ecosystems and partners and contribute to the improvement of social value.

New Initiatives Linked to Innovation

We are also promoting activities that contribute to innovation by analyzing intellectual property information. For example, we are promoting the following initiatives in the environment field: Market analysis based on number of inventions by all applicants (Figure 1). Each dot represents a theme, with market growth potential estimates (horizontal axis) based on the compound annual growth rate (CAGR) of the most recent inventions, while market scale estimates (vertical axis) are derived from the cumulative number of inventions, which are then divided into four quadrants to analyze the degree of market maturity. For each theme, Hitachi's technology share (Figure 2) is estimated (horizontal axis) based on the ratio of Hitachi inventions among total inventions, while the degree of oligopoly is estimated (vertical axis) based on the ratio of top 10 companies among total inventions, from which we can analyze Hitachi's positioning. By combining these metrics (Figure 3) and identifying themes in areas where markets demonstrate high growth potential and Hitachi has a high technology share (orange area at upper left), we contribute to innovation activities by identifying growth areas where we can utilize Hitachi's powerful existing technologies to make proposals and share with other business divisions.

Figure 1: Number of inventions and growth potential in the environmental field

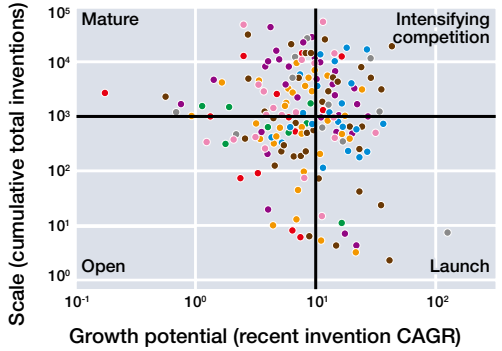


Figure 2: Hitachi technology's positioning in the environmental field

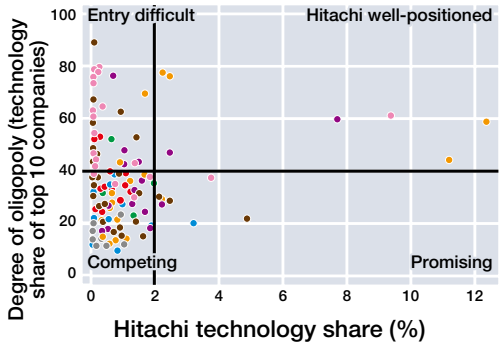


Figure 3: Hitachi's strategy matrix

Hitachi superiority \ Degree of market maturity	Intensifying competition	Launch	Open	Mature
Hitachi well-positioned	Theme A (e.g., smart grids)	Theme B (e.g., railway power regeneration)	…	…
Promising	Theme C (e.g., combined renewable energy and storage)	Theme D (e.g., IT infrastructure resilience)	…	…
Competing	…	…	…	…
Entry difficult	…	…	…	…