

# Innovation Management

NEC has adopted “Relentless Pursuit of Innovation” as one of its Principles. The word “Innovation” here denotes more than technological innovation; it refers to the creation of social value through contributing to solutions for social issues. NEC provides value to society not only by managing innovation across entire value chains but also by strengthening technological capabilities and commercializing and rolling out products and services.

## Policy

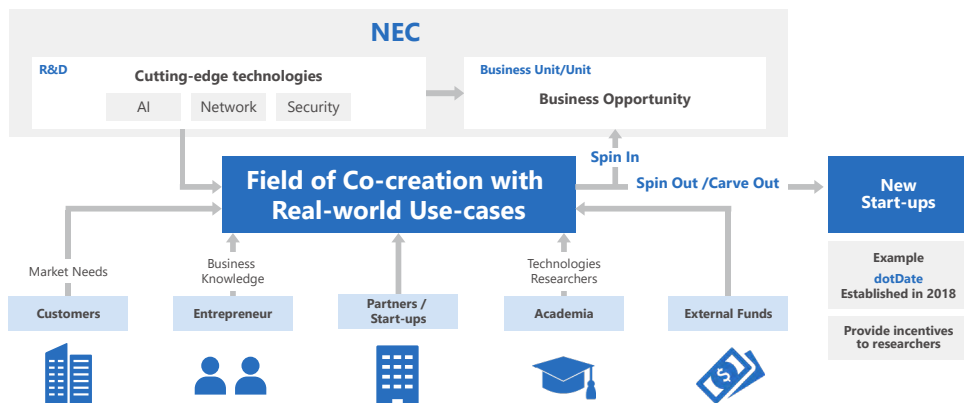
Under the direction of our Chief Technology Officer (CTO), we have formulated a technology strategy for the next stage of growth in social value innovation. We will continuously allocate approximately 4% of our revenue to R&D and make concentrated investments in NEC’s proprietary No. 1/Only 1 core technologies.

Further, we are promoting “ecosystem-oriented R&D” that encourages a fusion of inbound and outbound types of open innovation. We try to attract customers, start-ups, and venture capital companies by exposing our technologies at an early phase to incorporate complementary technologies and funds from them in order to accelerate our R&D activities.

In addition, we will actively promote packaging of common technologies based on R&D results, commercialization of technologies across our conventional business framework, and global open innovation, working to accelerate monetization of competitive technologies.

## Ecosystem-enabled R&D Centered on NEC’s Latest Technologies

Expose NEC’s technologies externally at an early phase, taking in complementary technologies from start-ups and funds from customers/venture capital to accelerate R&D. Open innovation of an Inbound/Outbound fusion type.



## Strategy

We will engage in the following strategies for NEC’s initiatives in technology development and business development, including intellectual property.

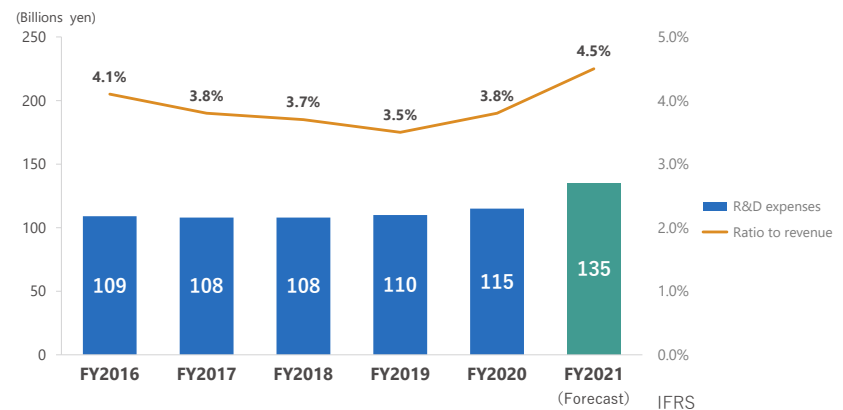
### ● Technology Development Strategy

At NEC Corporation, the CTO is responsible for overall technology development, optimizing development investment Companywide, drawing up an open innovation strategy, and formulating open innovation strategies and process design.

R&D is a source of technological development. NEC’s basic approach to R&D is to deliver value to society as quickly as possible by identifying the best solutions it should create for social issues presented in the SDGs and other guidelines, then efficiently and rapidly aligning the necessary technology assets to realize them. These technology assets include NEC’s No. 1/Only 1 core technologies that have been refined to a high level based on technology trends, as well as outstanding technologies actively incorporated from outside through open innovation.

We have set our investment in R&D at approximately 4% of revenue. To ensure that these investments are used effectively and efficiently, we are investing also in collaborations with external research institutions, in addition to concentrated investments in key business areas. In fiscal 2021, R&D expenses were 3.8% of revenue.

## R&D Expenses



Scope: The NEC Group

### Concentrated Investment in Strong Technology Areas

We are concentrating investment in two areas of technology: data science and ICT platforms. NEC Corporation has many unique and competitive technology assets in these two areas, and we believe that continuously building strength in these areas will improve our competitive edge in delivering solutions for society.

In the data science field, we are working on AI and advanced real-world recognition that harmoniously assist humans in making complex decisions. At the same time, by predicting the future of increasingly multifaceted, fluid social systems, we are contributing to the DX of social systems as a whole. Further, we will move forward with R&D on common data infrastructure that ensures the safe, secure distribution of data.

In the ICT platform field, our R&D is focusing on creating innovative network technologies and sensor and computing technologies that have the remote capabilities and immediacy, robustness, and dynamism needed for further introducing DX in the computing and networking area as well as the security area.

Moreover, as part of our concentrated investment in strong technology areas, we will continue to strengthen “NEC the WISE” as a cutting-edge AI technology brand, along with our Bio-IDiom brand for biometric authentication products.

“NEC the WISE” expresses our determination to address prominent and complex social issues by combining the many AI technologies of which NEC is proud.

The brand name “NEC the WISE” was derived from likening the many AI technologies that NEC boasts to “wise people.” The name expresses our hope that humans will be able to work seamlessly with various AI technologies, or “wise people,” and use the resulting next-level insights to help resolve increasingly complex social issues.

NEC has six biometric authentication technologies. In addition to world-leading face recognition, fingerprint and palmprint recognition, and iris recognition, we offer finger vein recognition, voice recognition, and ear acoustic recognition. All of our biometric authentication products are marketed under the Bio-IDiom brand. Moreover, one of NEC’s advantages is multimodal authentication—combining multiple biometric authentication technologies to achieve higher accuracy and greater convenience in personal authentication.

We take pride in our ability to provide completely new social value and user experiences by combining these AI, video analytic, and biometric

authentication technologies. NEC will continue to invest intensively in world-leading biometric authentication and AI technologies.

- Trustworthy AI That Works in Tandem with People to Maximize Their Capabilities “NEC the WISE” Solutions and Services
- Biometric Authentication: Products & Solutions

### ● Standardization Strategy

To increase business opportunities, NEC strategically engages in standardization activities that help make society more receptive to advanced technologies such as AI. In addition, we are reinforcing businesses by strengthening and utilizing standardization-related patents.

### ● Intellectual Property Strategy

At NEC Corporation, because intellectual property is regarded as an essential business resource supporting our Group’s competitiveness and stability, as well as for contributing to co-creation with our customers, we strive to strengthen and protect not only our patents and know-how but also the designs and trademarks that support our global brand.

To create and develop social value, we are not only building intellectual property-based barriers to entry and securing competitive advantage but also building and using our intellectual property portfolio to strengthen and protect collaborations with customers and partners.

We own some 46,000 patents worldwide (including approximately 21,000 Japanese patents) as of March 2021.

### ● Business Development Strategy

We are promoting a transition into new business models that transcend existing business frameworks and the development of business from NEC’s core technologies.

We will realize significant social value and sustained growth through business development that establishes and implements new business models by taking social issues, in-house core technologies, or leading-edge business models as starting points, formulating hypotheses on issues, and then verifying the hypotheses through practical field testing.

Among these activities, NEC not only establishes businesses in-house but also promotes business development activities through various schemes, including joint ventures, spin-outs, and carve-outs.

### Business Models Driven by Social Issues

NEC will collaborate with internal and external stakeholders to gain insights into such long-term megatrends as the SDGs. We will then apply future casting to generate hypotheses on the business fields that we should tackle, a process that we refer to as “Designs of the Future.” Lastly, we will reconfigure in-house assets and incorporate external assets in an endeavor to create businesses of the future.

### Business Models Driven by In-house Core Technologies

In fields where new business models have yet to be established, NEC will use technologies that offer it opportunities to realize its core competence. Based on such technologies, and by adopting approaches to business development that are unconstrained by conventional in-house practices, we will rapidly create new businesses that have significant social value and which will become future mainstays.

### Introduction of Leading-edge Business Models

Focusing on issues for which our existing portfolio does not provide customers with sufficient value, we will augment our portfolio by incorporating leading-edge business models created by venture companies. Furthermore, we will use these new business models to drive reform in our own business models.

In October 2020, NEC and Vista Equity Partners (Vista) jointly established SaaSpresto Ltd., which is developing a software as a service (SaaS) business for Japan’s market. Vista’s private equity portfolio includes more than 60 software companies, mainly in the United States, which provide SaaS technology products and solutions to more than 200 million users worldwide.

SaaSpresto was established as one of NEC’s DX initiatives. Aiming to help even more customers accelerate their DX, we are using the SaaS format to roll out the wide range of proven, high-quality cloud computing services—both industry-specific (vertical) and non-industry-specific (horizontal)—offered by Vista’s companies. In addition, we will help solve customers’ future issues by drawing on expertise in the United States and many other countries to provide services in anticipation of customer needs that have yet to become apparent in Japan.

- NEC and Vista Equity Partners establish a joint venture and strategic partnership to aid digital transformation of businesses in Japan.

● **Social Value Design® from the Perspective of Individuals and Society**

To create new social value, we need to illustrate what society should be in the future, for example, by creating a city vision from the corporate, government, and community points of view. To address these needs, it is imperative to find ways to increase the value of systems and services from a social perspective in addition to individual points of view. NEC has incorporated this way of thinking based on “Social Value Design” into the planning and development of new products and services and is thereby creating innovation.

**Implementation Framework**

NEC has created a CTO position to establish a Companywide perspective in its effort to optimize development investment Companywide, and link its corporate strategy with the planning of collaboration strategies with others. The CTO has overseen the establishment of a technology development promotion framework for examining and promoting technology development strategies in cooperation with business units and the Central Research Laboratories.

NEC is accelerating value creation and new business development. As part of these efforts, in April 2021 we integrated the R&D Unit and the Business Innovation Unit to establish the Global Innovation Unit. By integrating the R&D and engineering capabilities of the former R&D Unit with the business development capabilities of the former Business Innovation Unit, we are further accelerating the commercialization of technologies and promoting the creation of synergies through the lateral deployment of core infrastructure technologies.

In addition, NEC is accelerating R&D by deploying technologies outside the Company earlier and involving external partners. For example, NEC has established NEC X, Inc., which uses the Company’s personnel and technologies as the basis for advancing commercialization through open innovation in the Silicon Valley ecosystem. Other initiatives include our formation of a consortium of six companies from different industries to establish BIRD INITIATIVE, Inc., which is increasing the pace of new business creation through R&D based on co-creation.

Also, through collaboration with other units, the Global Innovation Unit is accelerating the establishment of businesses that capitalize on our core technologies to create social value.

✍️ Formation of a consortium of six companies from different industries to establish BIRD INITIATIVE, Inc., which is increasing the pace of new business creation through R&D based on co-creation

● **The Global Innovation Unit—Forming Unprecedented New Combinations That Drive Social Change—**

The Global Innovation Unit is uniting R&D and business development activities to develop innovative businesses. By thinking outside the box and combining diverse expertise in new ways, the unit is creating new social value globally.

Also, our ongoing efforts to offer this new social value is advancing social implementation of trailblazing technologies and fostering a shared vision of the future.

**R&D Bases Tasked with Creating Social Value Globally**

With a view to leveraging the merits of a global network of bases to create No. 1/Only 1 technologies and formulating social solutions both for developed and emerging countries, we have established R&D bases in Japan, North America, Europe, China, India, Israel, and Singapore, as shown in the chart below.

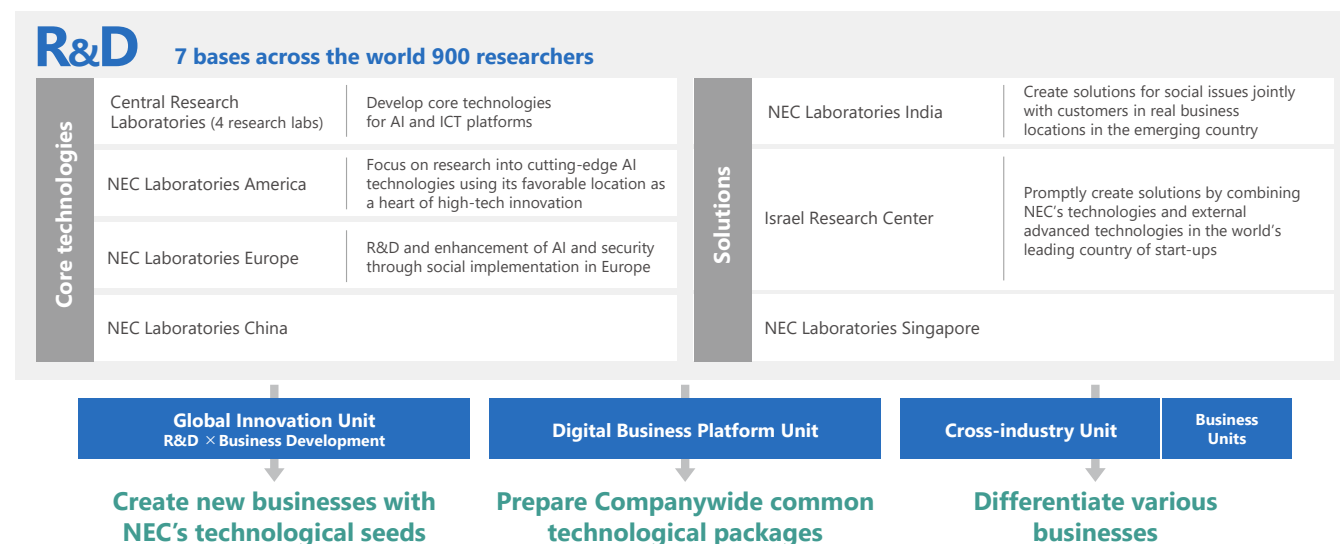
**Intellectual Property Management Division: Strengthening NEC’s Intellectual Property Capability**

With our sights set on global business expansion, we have established intellectual property centers in North America, Europe, and China, which focus efforts on building our intellectual property portfolio. Moreover, for its social solutions businesses, NEC is implementing Groupwide projects focused on strategic patents to acquire strong, utilizable patents. With these patents as a core, we will establish a comprehensive IP portfolio that encompasses all of our businesses. In terms of strengthening and protecting our global brand, we are ensuring the proper communication of our corporate brand statement and the protection of rights.

**Human Resource Development and Training**

In promoting innovation management, we consider human resources to be the source of innovation.

NEC is working to attract leading researchers by providing ample opportunities for active roles and remuneration. In 2015, we introduced the post of research fellow, which has no upper limit on compensation. In 2019, we introduced the Selective Compensation Program for Professional Researchers, with no upper limit on compensation for non-managerial employees, in our effort to acquire and develop top-level R&D talent.



In addition, as our focus shifts from manufacturing to the creation of intangible value, we are actively working to develop personnel who can use NEC Corporation's core technologies to create new businesses.

In April 2020, certain personnel with high levels of expert knowledge and ability in certain fields outside of technology and research, and who contribute to the Company's business by demonstrating the ability to make an impact in and outside the Company, were appointed to a new officer class professional position—"corporate executive."

#### ● **Developing Human Resources Who Can Use Core Technologies to Create Social Value**

To create social solutions businesses, we need to cultivate and strengthen researchers who not only have specific core technology expertise but also possess broad and diverse domain knowledge as well as a business mindset. To broaden our scope on the creation of new value, we are working on strengthening the development of global human resources, bolstering efforts to hire domain specialists, and developing leaders who are equipped with the business acumen to drive business forward. Aiming to strengthen our human resources tasked with tackling advanced global issues, we are implementing measures to raise the percentage of researchers with global business experience to 70%.

In the creation of social solutions businesses, it is also necessary to have not only specialist knowledge of specific technologies but also wide-ranging knowledge of the social issue domains where these technologies will provide value to society. We are therefore also strengthening and accelerating our mid-career recruitment programs.

We are also endeavoring to accelerate the realization of social solutions businesses by strengthening the ability of our in-house human resources to promote business development through the exchange of personnel between our business and research divisions. In particular, in AI technologies and security technologies we conduct training of human resources by top engineers and nurture project leaders and technology architects through personnel exchange in order to strengthen business development capabilities. By integrating technological and social viewpoints through the introduction of the new Global Innovation Unit in fiscal 2022, we have adopted an organizational structure that facilitates and expedites business incubation.

At the same time, NEC is working to develop human resources who will lead the commercialization of core technologies. In fiscal 2018, we established the role of "business designer" to create new businesses and

support their acceleration. We also established the Business Designer HRM (Human Resource Management) Promotion Committee made up of general managers of divisions responsible for business development of the Global Innovation Unit and each business unit. The committee defines the skill set of a business designer and establishes training systems, as well as formulating measures for rotation and expert specialist qualifications. By implementing and improving these measures, NEC Corporation will develop human resources who will bolster its business development capabilities.

#### ● **Human Resource Development Aimed at Strengthening Core Technologies and Enhancing Diversity**

To reinforce our researchers in key areas, we have been working at the Central Research Laboratories to further bolster the research teams working in the fields of data science, security, biometrics, and networks. Our international research laboratories are actively recruiting top local talent while our research labs in Japan are continuing to step up recruitment of doctoral degree holders.

In fiscal 2022, we will continue with our policy of hiring applicants with PhDs at around 50% of new hires, and we will be recruiting more graduates from leading international graduate schools such as the Indian Institute of Technology. As a result of these policies, 20%–30% of our new recruits have comprised "global human resources" over the past few years.

We are also instituting organizational reforms that will facilitate major innovations by engaging in multifaceted and mutually respectful discussions with specialists in a wide range of fields, regardless of their gender or nationality.

For example, for Japanese researchers, we are promoting a shift to global human resources by using training programs inside and outside NEC, such as assignment to U.S. graduate schools to undertake research and work-study programs and training abroad in emerging countries in cooperation with NPOs. We are also strengthening recruitment not only in information science but also in the physical sciences, which provide excellent training in the proper processing and use of data. Likewise, we are also strengthening recruitment of diverse talent in the humanities, law, and other fields to realize solutions to issues based on cooperation between humans and AI.

## Open Innovation

To expand the scope of value for social value creation, we are actively promoting open innovation with research institutions around the world, as well as commercialization partners, start-ups, and others. By promoting collaboration with external partners and specialist institutions, we envisage the development of the technologies needed for new businesses that are difficult for NEC Corporation to develop alone, as well as our vision for the future, and then backcast from there to study the key business areas in the next generation.

- ✍ NEC releases "WISE VISION Endoscopy" in Europe and Japan
- ✍ NEC and D-Wave Begin Joint Quantum Product Development, Marketing and Sales
- ✍ NEC, NICT, and ZenmuTech use quantum cryptography to encrypt, transmit, and back up electronic medical records

## Measures and Main Fiscal 2021 Activities

#### ● **Major Research Achievements for No. 1/Only 1 Core Technologies**

- ✍ NEC face recognition engine provides highly accurate results even when face masks are worn
- ✍ NEC develops touchless, multimodal biometric authentication terminal with the world's highest level of precision
- ✍ NEC publishes design blueprints for SARS-CoV-2 vaccines using its Artificial Intelligence technology

#### ● **Results of Intellectual Property Activities**

NEC participates in various patent pools and is building a system to provide its patents to industries in a form that is easier to use.

For details of the results of NEC's intellectual property activities, please refer to the following.

- 🌐 NEC Receives the Top 100 Global Innovator Award for a 10th Consecutive Year from Clarivate Analytics (Formerly Thomson Reuters) (Clarivate Analytics website)