

Innovation Management

Over the years since NEC was founded, we have cultivated our technologies based on NEC's motto of "Better Products, Better Services." In a society that is constantly changing, the technologies in demand keep changing as well; by implementing appropriate innovation management in response to the changes of the times, we can continue to provide the technologies that society demands as products and services and contribute to social value creation. NEC continuously allocates approximately 4% of its revenue to R&D, concentrating its investment in No.1/Only 1 core technologies that are needed for social value creation. NEC will engage proactively in open innovation globally to accelerate the monetization of competitive technologies.

R&D Strategy

At NEC, the Chief Technology Officer (CTO) is responsible for overall technology development, optimizing development investment company-wide, and drawing up an open innovation strategy.

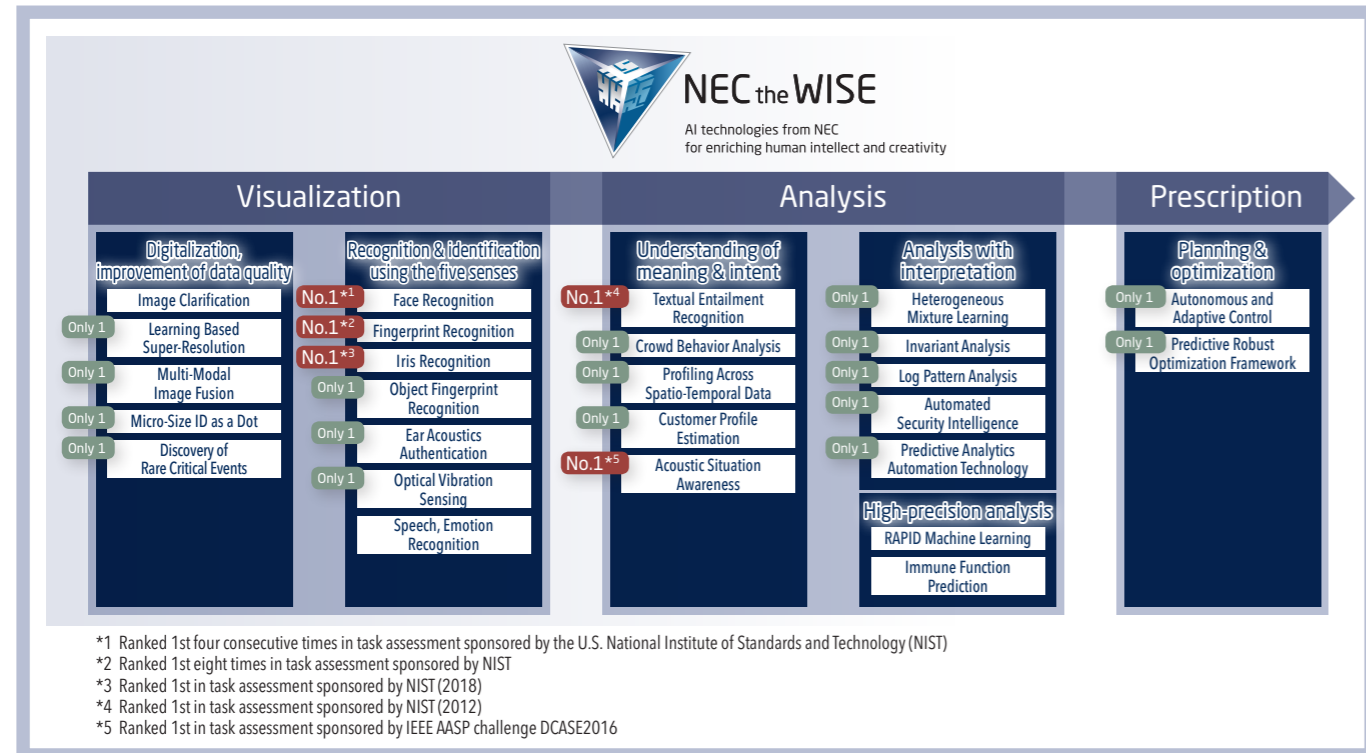
R&D is a source of technological development. NEC's basic approach to R&D is to deliver value to society as quickly as possible by identifying the best solutions we should create for the social issues

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 technologies produced through open innovation.

"Bio-IDiom" and "NEC the WISE" Support Growth Areas in the Mid-term Management Plan 2020

"Bio-IDiom" is our comprehensive brand for biometric authentication products, launched in April 2018. It covers six biometric authentication technologies for face, iris, fingerprint and palmprint, finger vein, voice, and ear acoustic. One of NEC's strengths is in multimodal authentication, which combines multiple biometric authentication

technologies to achieve higher accuracy. By combining these technologies with the "crowd behavior analysis" of the "NEC the WISE" AI technology group, and others, we can create completely new value. NEC will continue to invest intensively in world-leading biometric authentication and AI technologies.



Major Research Achievements

Core Technology	Achievement	Client/Fields to develop
Invariant Analysis	Provided invariant analysis technology for use in satellite and aerospace industries	Lockheed Martin Corporation
Autonomous Learning System-based Anomaly Detection	Launched a security anomaly detection service capable of unknown cyber-attack response	System operations, etc.
Face Recognition	Provided face recognition system for improving services for VIP customers	OCBC Bank, Singapore
Face Recognition	Launched access control solution based on using walk-through face recognition	Commercial facilities, event management, etc.
Heterogeneous Mixture Learning	Forged business collaboration with Japan Weather Association to optimize supply and demand across entire value chain	Food manufacture, food wholesaling, logistics, retail, etc.
Predictive Analysis Automation	Established dotData, Inc. in the U.S. to automate data analysis processes	Data analytics, etc.
Log Pattern Analysis	Commercialized product that performs diverse log analysis, anomaly detection, and causal analysis	System operations, etc.
Machine Learning Data Processing for Vector Computer	Accelerated the execution of statistical AI learning process by more than 50 times compared to conventional technology using data processing for vector computers	Data analytics
High-speed Blockchain	Established the world's fastest blockchain technology, capable of over 100,000 transactions per second	Financial and various other transactions and information sharing

Intellectual Property Strategy

At NEC, because intellectual property is regarded as an essential business resource supporting the 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 IP-based barriers to entry and securing competitive advantage, but also building and using our IP portfolio to strengthen and protect collaborations with customers and partners.

NEC owns some 51,000 patents worldwide (including approximately 22,000 Japanese patents) as of March 2018.

For further information, please refer to Sustainability Report 2018 "Innovation Management"