Innovation Management

Policy KDDI Group

KDDI's Approach (Innovation Management)

Advancements in communication are moving toward a ubiquitous network society enabling a new business and lifestyle not dependent on time or location. To achieve this, KDDI's Research and Development (R&D) is developing the most advanced technology in the world to take on these challenges in future information and communication for contributing to society.

Policy KDDI Group

Approach to R&D

In the field of ICT, the speed of technological evolution and globalization continues to accelerate, while trends in technology change at a more dizzying pace than ever.

In this environment, KDDI is making efforts to conduct practical, advanced, long-term R&D in important technical fields related to network infrastructure, platforms, devices and applications with the aim of providing a positive customer experience with an emphasis on the customer perspective and innovation. In addition to basic research, KDDI pursues R&D with a flexible approach ranging from applied research and development to the creation of practical applications, while monitoring global trends in technology and services, and incorporating open innovation technology.

R&D Fields

Research	Future design	Innovation center
Infrastructure	Network architecture	
	Next generation access network	
	Connected networks	
Platforms	Data intelligence	
	Security	
Applications	Media ICT	
	Human communication	
Promotion	Research promotion	

System KDDI Group

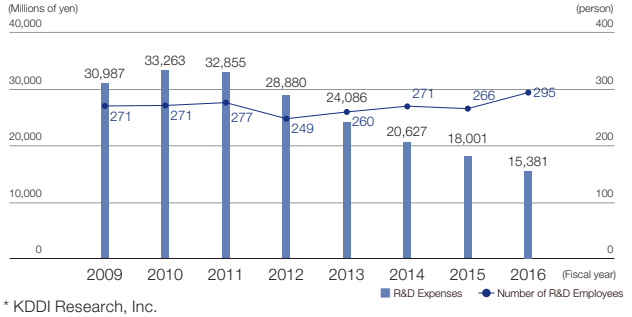
Research and Development Promotion System

KDDI has established the KDDI Research, Inc., a separate organization from technology departments within the head office, with the purpose of operating a research and development framework systematically that can respond quickly to technological innovation, and we are conducting a wide range of activities from basic research to applied research.

A variety of processes are required in order to develop research results into practical applications, including the collection of information, development of individual technologies, evaluation, and design. For information collection in particular, KDDI deploys a staff of researchers specializing in each field in each country and region, and constantly gathers and analyzes the latest information from abroad by coordinating with KDDI Group overseas offices and other organizations such as external research institutions.

Furthermore, with respect to the use of open innovation technology, KDDI is proactively engaged in efforts to facilitate cooperation and cocreation with many stakeholders.

Changes in R&D Expenses and Number of R&D Employees*



* KDDI Research, Inc.

Policy and System KDDI Group

Promoting Open Innovation

To create products and services that will truly give customers a sense of value in the age of IoT* where everything is connected to the Internet, we need to form partnerships with research institutions, universities and companies both in Japan and abroad. KDDI is promoting open innovation from the perspectives of technological innovation inside and outside the company as well as training and development of human resources.

* Internet of Things

KDDI Open Innovation Fund

KDDI Open Innovation Fund is a corporate venture fund operated by KDDI and Global Brain Corporation for investment in promising startups both domestically and internationally. We provide full-scale support for the growth of our partner startups through utilization of our business networks and marketing skills and collaboration with our services including "au Smart Pass".

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We have specialist personnel based in San Francisco, USA, and Seoul, South Korea, where we are looking to invest in startups with the latest technologies or innovative business models.

We will provide wide-ranging support for business development, marketing and localization by companies looking to expand their business in Japan.

Link Website KDDI Open Innovation Fund

KDDI ∞ Labo (Mugen Labo)

In 2011, KDDI launched KDDI ∞ Labo, a program designed to support young engineers who are passionate about creating revolutionary Internet services for use around the world. This program provides total support to teams selected from a pool of applicants. This support ranges from service development support from the perspective of telecommunications carriers to business support and promotion when they start up their business. In addition, KDDI provides a variety of other kinds of support such as communication space within its offices and free loan of terminals required for service development work.

Since 2014, we have been working on industry-academic partnerships that aim to commercialize the research techniques of universities, and initiatives that aim to achieve cocreation through the collaboration of established companies from a wide variety of industries (a total of 36 partner companies including KDDI) and startup companies.

Link Website KDDI ∞ Labo (Mugen Labo)

Next Generation Human Resource Development for the Support of Open Innovation

<CHIRIMEN Open Hardware>

KDDI is participating in an open source community, CHIRIMEN Open Hardware, with the objective of creating IoT using only Web browser technology.

In CHIRIMEN Open Hardware, we are working with experts and students to achieve the above objective by developing CHIRIMEN, a development environment that includes a board computer and the software that functions on the board computer. In the process of development, we will realize and learn new things, and create the seeds of innovation.

Link Website CHIRIMEN Open Hardware

<"Miraiwo Tsukuru" Project>

The "Miraiwo Tsukuru" Project was launched in May 2015 at the KDDI Research, Inc. with the goal of cultivating human resources who can bring about innovation and foster a challenging climate. To bring together human resources from all parts of the organization, researchers have been putting up their hands to participate in the activities of the project. One of the results of the project is the development of an IoT gadget, Charging Robo, which finds and charges smartphones automatically. The IoT gadget won a special prize at Android Experiments OBJECT (organized by Google).

<au×HAKUTO MOON CHALLENGE>

KDDI and the first private-sector lunar exploration team HAKUTO have signed an official partners agreement, and are taking on the challenge of Google Lunar XPRIZE, a lunar exploration race using robots.

Missions on the lunar surface are conducted using remote control from earth, and telecommunications technology plays an important role in lunar exploration. HAKUTO is looking into applying frequency bands that are used in mobile data communication on earth for communication on the lunar surface. This is the first such attempt in the world, and can be considered a major step in extending civil technology developed on earth to space exploration. KDDI is supporting this attempt of HAKUTO, which will be a first in the world, with our technology.

Link Website KDDI's mission in the HAKUTO Project (Japanese)

Policy and Activity KDDI Group

Conducting R&D for the Sustainable Development of Society

Approach to Product Innovation

As the global market becomes increasingly diversified, it is necessary to develop products and services that meet market needs, and achieve differentiation from competitors so that we continue to be a company of choice for our customers. KDDI is working on changing various products, services and processes, and creating new value based on IoT.

Product Innovation Example: IoT Security Technology Using SIM

There are many security issues in IoT such as illegal remote control, identity fraud and data eavesdropping. To use IoT machines more safely, KDDI and the KDDI Research, Inc. focused on the high security tolerance of SIM, and developed encryption key [1] management technology that introduces the high security tolerance of SIM in the communication of IoT machines. Through this technology, it is now possible to maintain remote control by utilizing the characteristics of SIM. The development of encryption key management technology for

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communication of IoT machines using SIM and verification of remote maintenance are the first such attempts in the world [2].

[1] These are values used in encryption so that data cannot be accessed by third parties. Encoding is done using common key encryption and public key encryption.
[2] As of October 20, 2016. Based on KDDI survey.

Other Examples of Product Innovation

Initiative	Developing organization	Content
Unique ID generation technology based on individual differences of acceleration sensors	KDDI Research, Inc.	First attempt in the world* to develop technology that generates unique ID based on individual differences of acceleration sensors that are mounted on wearable devices.
KDDI IoT Cloud data market	KDDI	Service that contributes to the discovery of issues and business opportunities, improvement of service quality through comprehensive analysis of IoT operation data of corporate clients and diverse data.
Experiment to verify mango cultivation using IoT	KDDI, Okinawa Cellular Telephone Company, Skydisc, Inc., University of the Ryukyus	Participation in an experiment to monitor the state of mangoes growing in green houses using IoT.

* As of October 12, 2016. According to research by KDDI Research, Inc.

Approach to Process Innovation and Initiatives

Process innovation is a development method that responds to a rapidly changing market, and it is gaining attention for fundamentally reforming operating processes that supply products and services. In 2013, KDDI started working on agile development within the company, and we are providing services using agile development such as “KDDI Business ID” and “au Denki App”. In October 2016, we established an agile development center with the aim of accelerating development speed throughout the company, and we are increasing the speed and value in the provision of products and services.

Other Example of Process Innovation Initiatives

Initiative	Content
Provision of agile development education program	Agile development education program following the Scrum* method which makes it possible to start IoT business quickly in a small way.
KDDI IoT Cloud Creator	Service that makes use of the agile development method to give thorough support from development to construction, and from operation commencement to tasks and duties in IoT business.

* One of the agile development methods advocated by Dr. Jeff Sutherland of Scrum Inc.

Approach to Environment Innovation

With the adoption and enactment of SDGs and the Paris Agreement (COP21), there are increasing expectations on the role that companies should play in the realization of a sustainable society. As a global company, KDDI considers it an important responsibility to work on solving environmental issues through the development of products that reduce the environmental impact and the provision of services.

Example of Environment Innovation:

Virtual Power Plant Construction and Demonstration Project

KDDI and KYOCERA Corporation’s project to manage power supply and demand using home storage batteries and IoT technologies has been selected as a Virtual Power Plant Construction and Demonstration Project of Ministry of Economy, Trade and Industry.

This project aims to build and develop technology for a virtual power plant (VPP), and establish a related business model in response to the fact that the target of the negawatt power exchange market [1] will be extended to general households. The VPP will function like a power station by integrating and controlling energy resources from the storage batteries in homes and renewable energy from solar power generation among several households.

Through the provision of storage batteries for homes and HEMS [2], a VPP will be built with ENERES Co., Ltd., a core partner, to verify the control of charge and discharge power in storage batteries, negawatt transaction volume, incentive effects and the service fees system.

The project aims to achieve load levelling of electric energy, promote further energy saving, and expand the market for renewable energy.

[1] Business of trading incentives according to the amount of energy saved.
[2] Home Energy Management System – a management system for saving energy used in homes.

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Other Examples of Environment Innovation

Initiative	Developing organization	Content
KDDI IoT Cloud toilet water-saving management	KDDI	Development of service to monitor water data in individual toilet cubicles using IoT, which leads to water saving of 40～50%* compared to conventional toilets.
Tribrid base stations	KDDI	Development of power control technology that uses accumulator batteries to store commercial power supply, solar power generation, and nighttime power supply, and supplies the stored power efficiently on an hourly basis. Link Page_114 Biodiversity Consideration for Building Base Stations
Ecological survey of dolphins in the Ganges	KDDI	Implementation of an ecological survey of endangered river dolphins inhabiting the Ganges river using acoustic technology of underwater robots that was developed to inspect undersea cables. Link Page_114 Research on Behavior of Endangered Ganges River Dolphins

* Estimates based on actual data from valve manufacturers.

Approach to Social Innovation

As social issues become more complicated and diversified, KDDI is working on initiatives in collaboration with various stakeholders while utilizing KDDI's know-how to contribute to solving social issues through business.

Social Innovation Example (1): Smart Fishing Experiment Using Smart Buoys

The KDDI Research, Inc. collaborated with Higashimatsushima Organization for Progress and Economy, Education, Energy (HOPE) to conduct a smart fishing experiment with the aim of ensuring stability and efficiency in set net fishery. In the experiment, smart buoys [1] were installed on the sea surface, and the potential for long-term use of the buoys and the usefulness of the data obtained were evaluated. This is an attempt to create new IoT device related industries through the participation of local companies and by increasing young workers in the fishing industry, a primary industry that is facing problems due to an aging population.

The experiment was conducted as part of an effort to develop smart buoys in the "Smart Fishing Model Project Using Marine Big Data" which is one of the projects under the IoT Project For Daily Living initiated by the Ministry of Internal Affairs and Communications. Going forward, together with the participating members of the smart fishing model promotion consortium [2], KDDI will use the data obtained in this experiment to formulate sailing plans for fishermen, develop forecasts of the relationship among various data, and verify retail models for direct delivery from producing areas among other things.

[1] Designed and developed by HOPE and Ohno Denshi Kaihatsu Co., Ltd.
[2] Smart fishing model promotion consortium: Higashimatsushima Organization for Progress and Economy, Education, Energy (representative executive officers), Higashimatsushima City, Ootomo Suisan, Ohno Denshi Kaihatsu Co., Ltd., Tohoku University, Iwate Prefectural University, Waseda University, KDDI Research, Inc.

Social Innovation Example (2): Social Verification of Multi-Language Speech Interpretation System

KDDI and KDDI Research, Inc. have been conducting a social experiment that makes use of a multi-language speech translation system in sightseeing taxis for foreign tourists visiting Tottori Prefecture from November 2015 with the aim of helping taxi drivers to communicate smoothly with foreign tourists. In December 2016, we also started conducting a social experiment targeted at foreign tourists that makes use of a multi-language speech translation system in Tokyo Sightseeing Taxis* in Tokyo. These experiments aim to overcome disparities in social services that arise from language barriers by making it possible for taxi drivers and foreign tourists to communicate, which has been a long-running problem.

* Taxi service that drives around sightseeing spots in Tokyo. Drivers who have the "Certified Tokyo Sightseeing Taxi Driver Qualification" will introduce tourists to the new attractions of Tokyo while driving.

Social Innovation Example (3): Technological Support for Tsunami Disaster Training Organized by the Ministry of Land, Infrastructure and Transport

KDDI, KDDI Research, Inc., and the Kyushu Branch Offices of KDDI Matomete Office West Japan Co., Ltd. participated in Tsunami Disaster Training (organizer: Chile International Emergency Response Office, Ministry of Land, Infrastructure and Transport) by providing network infrastructure and technological support.

This training was held in conjunction with Valparaíso City in Chile and Hyuga City in Miyazaki Prefecture, Japan to prepare for tsunami disaster, and make it possible to achieve a fast response in association with "World Tsunami Awareness Day" which was established at the 70th United Nations General Assembly in 2015. To connect the disaster training site (Miyazaki Prefecture) and disaster response headquarters (Fukuoka Prefecture), the 3 KDDI group companies provided technological support, and loaned out infrastructure systems and "VistaFinder Mx"*, a remote operations support system developed by KDDI Research, Inc.

*VistaFinder Mx: A remote operations support system that allows videos taken by smartphones, tablets, and mobile PCs to be transmitted remotely from the field over various types of networks, simply, securely, and in high quality.

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Other Examples of Social Innovation

Initiative	Developing organization	Content
KDDI AI Translation	KDDI	Development of an application service that allows translation of English, Chinese and Korean from voice input or text entry.
KDDI TV Interpretation	KDDI	Development of a 3-party interpretation service* on a tablet device that allows an off-site operator to interpret the conversation between a customer service officer and a foreign tourist in a shop.
Project Ikebukuro – a verification experiment targeted at foreign tourists	KDDI, Liquid, Inc.	Commencement of a verification experiment to confirm the identity of foreign tourists when they check into hotels without having to present a passport with fingerprint biometric authentication.

* Available in 12 languages – English, Chinese, Korean, Tagalog, French, Thai, Vietnamese, Portuguese, Spanish, Nepali, Hindi and Russian.

Activity and Result | KDDI

Protecting Intellectual Property

KDDI's commitment to creating and protecting intellectual property and respecting the intellectual property rights of others is defined in one of the basic policies of the KDDI Code of Business Conduct. KDDI has formulated intellectual property handling regulations to ensure the proper management and usage of KDDI' s inventions, trademarks, and other industrial property; software and other copyrighted materials; and technologies, expertise, and other rights protected under the Unfair Competition Prevention Act. In addition, KDDI conducts educational activities every year through group training and e-learning classes, to provide employees with a deeper understanding of the importance of intellectual property, as well as the risks of infringement and its prevention.

KDDI plans and develops communication and IoT services and content as well as payment, energy and finance services, and conducts research and development of communication technology, such as LTE and 5G, as well as security technology that provides privacy protection. As a result of these activities, KDDI holds approximately 2,000 patents in Japan and 200 patents overseas, as of the end of June in 2017. In addition, KDDI has established an invention reward system to secure incentives for inventors based on the Patent Act.

Moving forward, KDDI will continue to bolster its efforts on intellectual property assets and strengthen its competitiveness both in Japan and overseas.

Breakdown of KDDI's Patents (as of the end of June 2017)