Research and Development Policy and Japan-Europe cooperation of MIC

October 14, 2015

Global ICT Strategy Bureau, Strategy Bureau of the Ministry of Internal Affairs and Communications (MIC)
Standardization Division
Shuji Yamaguchi, Director for International Standardization
Today’s Agenda

- Current State of Japan’s R & D
- Ideal State of New Information and Communications Technology Strategy
- International Research and Development with the EU
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- Current State of Japan’s R & D
- Ideal State of New Information and Communications Technology Strategy
- International Research and Development with the EU
Japan is actively involved in research and development (R&D) investment

R&D ratio in GDP

Created from [Survey of Research and Development 2014 (Statistics Bureau, MIC)]
(Use the value of the FY2012 except Japan)
Results of Japan’s R&D

- A large number of patent applications have been filed.

Number of ICT-related patent applications per one million people (International applications in 2011 and 2012 based on the Patent Cooperation Treaty)

![Bar chart showing the number of ICT-related patent applications per one million people for different countries, with Japan having 141.9 applications per million people.](chart.png)

However, the ratio of enterprises in overseas cooperation in innovation activities is low.

[Source: Created by the Industrial Science and Technology Policy and Environment Bureau under the Ministry of Economy, Trade and Industry on the basis of Current State of Japan’s Innovation through International Comparison (September 2010, National Institute of Science and Technology under Ministry of Education, Culture, Sports, Science and Technology)]

(Note 2) In the case of Japan from 2006 through 2008 (for three years), the ratio of enterprises in overseas cooperation in innovation activities refers to the ratio of enterprises cooperated with domestic and overseas organizations among enterprises that put new products or new services into the market or introduced new processes.
The ratio of foreign investment for Japan’s R&D is less than 1%. A little more than 5% in the case of the United States (National Science Foundation “Science and Engineering Indicators 2014 ”).

**Sources of R&D investment funds (FY2013)**

- **Total**: 19.5% Public, 80.0% Private, 0.5% Foreign
- **Corporation**: 1.1% Public, 98.3% Private, 0.6% Foreign
- **Public Institute**: 49.8% Public, 50.1% Private, 0.5% Foreign
- **University**: 1.5% Public, 52.6% Private, 0.1% Foreign

[Survey of Research and Development 2014 (Statistics Bureau, MIC)]
Today’s Agenda

- Current State of Japan’s R & D
- Ideal State of New Information and Communications Technology Strategy
- International Research and Development with the EU
1. Background

- The Council for Science, Technology and Innovation started a study on the next science and technology basic plan in order to promote comprehensive and systematic planning of the promotion of science technology.
  → MIC, which will be in charge of the ICT field, will proactively contribute to the study.

- The National Institute of Information and Communications Technology (NICT) became a national R&D corporation in April 2015, with the revision of the Act of General Rules for Incorporated Administrative Agency,
  → A study is required toward the next medium- and long-term goals that will start in fiscal 2016.

2. Study situation

- Japan’s innovations are necessary in the ICT field, which serves as a foundation of all industries, in order to revitalize and continuously develop Japan’s economy. It is important for Japan and NICT to advance its basic and fundamental R&D as an investment to produce seeds for the future.
  
  - An inquiry about the ideal state of a new information and communication technology strategy for five years starting in fiscal 2016 was made to the Information and Communications Council in December 2014.
  - The Technology Strategy Board (chief investigator: Professor Hitoshi Aida, the University of Tokyo) was established in the Department of Information and Communications Technology to summarize an intermediate reports on promotion measures for R&D, achievement expansion, and industry-academia-government corporation, along with important R&D fields and themes.
Promotion of Introduction of ICT in the Entire Society

- The following world’s most advanced ICT is required to make new value creation possible:
  - The conditions of a variety of things along with environmental conditions are understood by IoT devices (e.g., sensors) and sensing technologies (e.g., radars) (to observe society).
  - An enormous amount of information obtained through the above is collected from a wide area using optical communications infrastructure, mobile NW technology (5G/Beyond5G), and peripheral technologies (to connect society).
  - The future is predicted from a big data analysis for the automatic control of a variety of social systems in real time (to make society (value)).
  - Furthermore, the following matters are necessary:
    - Achieving information security to protect networks, information and contents, and social systems from rapidly increasing cyberattacks and achieving disaster tolerance ICT infrastructure to protect people’s lives and property (to protect society (lives, property, and information)).
    - Creating advanced infrastructure technology to grow the seeds of future innovations (creating the future).

- It is appropriate to conduct research and development for the next five years to achieve the world’s state-of-the-art ICT and promote ICT in the entire society, thus aiming to solve problems and create new merits.

- Such ICT promotion in the entire society will develop an IT revolution that occurred in 2000, predict the future based on a huge amount of big data, and aim at the automatization of a variety of social systems and cooperation of systems with humans, i.e., a social ICT revolution.

New merits creation by the world’s most advanced ICT
- Robot-assisted initiatives to achieve the social participation of a wide variety of people, including elderly people and people with disabilities.
- Progress of globally free exchanges through a multi-lingual speech translation system.
- The optimum control of social systems, including transportation and logistics systems, by making use of sensors and big data.
The achievement of new IoT use (IoT2.0) is expected by advancing innovative network technologies, such as those minimizing delays in information transmission from an enormous number of sensors, collecting circumstances in real time, making effective use of artificial intelligence to analyze big data and predict the future, and optimally controlling social systems.

1. IoT use up to now

- Grasping surrounding circumstances
- Data collection
- Big data analysis

Judgment support
Humans
E.g., recommendation service, Infrastructure management/operational support, etc.

2. New IoT use expected in the future → Operating the following cycle at high speed to achieve a good circulation cycle of IoT use.

- Grasping surrounding circumstances
- Data collection
- Big data analysis
- Future forecast (Operation and control planning)
- Social system
  Automatic optimal control (including robots and cars)

Infrastructure technology to support these (innovative network technology, etc.)
4.3.2 Promotion of International Joint Research

Expanding current international collaborative research led by Japan and Europe to a greater scale and increasing participating countries in number to include not only research and development but also demonstration experiments.

Therefore, investigating the needs for joint research with other countries and regions, and making clear technical field settings to contribute to the maintenance of social problem solving and international competitions, and setting alliance countries and selecting joint research schemes so that the effective and global use of wisdom will be possible.

[Extracted from the final report “State of Policy for Information and Communications Technology toward Creation of Innovation” (from the Information and Communications Council on June 27, 2014)]

4.5.1 Promotion of International Joint Research

Promoting international research corporation organically linking with internal expansion of research results and researchers’ international exchange.

In Southeast Asia, in particular, NICT established a virtual research cooperation organization based on research cooperation cultivated with South East Asia, where research organizations and universities in the region participate, to demonstrate a leadership in the research cooperation in the region.

Furthermore, MIC and NICT in pursuit of making Japan a global research and development base will promote joint research with organizations and researchers with global research and development capabilities in Europe and the United States.

[Extracted from the final report “Study of Ideal State of New Information and Communications Technology Strategy” (from the Information and Communications Council on June 28, 2014)]
Today’s Agenda

- Current State of Japan’s R & D
- Ideal State of New Information and Communications Technology Strategy
- International Research and Development with the EU
Cooperation in Europe and ICT Research

- Exchange of ICT research through the holding of a symposium since 2008

1st EU-Japan Symposium
Jun. 8 - 10, 2008 @ Brussels

2nd Japan-EU Symposium
Oct. 13 -14, 2009 @ Tokyo

3rd EU-Japan Symposium
Oct. 20-21 and 2010 @ Tampele

18th EU-JP ICT Policy Dialogue
Jun. 17, 2011 @ Brussels

The ministerial dialogues
May. 3, 2012 @ Brussels

19th JP-EU ICT Policy Dialogue
Nov. 14, 2012 @ Tokyo

Dec. 4, 2013 @ Brussels

Mar. 24, 2015 @ Tokyo

*NICT: National Research and Development Corporation
National Institute of Information and Communications Technology
Overview

- **Dates:** October 16 and November 17, 2014
- **Place:** European Commission communication Directorate General (Brussels)
- **Contents:** Japan-Europe ICT international joint research project
  1. Primary public offering (Starting fiscal 2013) project status report
  2. Secondary public offering (kick-off) project summary description
  3. Discussion of themes in the next public offering (fiscal 2016)

MIC’S Deputy Vice-Minister Takei for Policy Coordination and Director Inoue for Policy Planning Technology Policy Division and NICT’s President Sakauchi participated from the Japanese side. The European Commission’s officials led by Deputy Director-General Stančič participated from the European side.

- **Participants:** Approximately 200 people (registered general participants and presenters)
- **Contents:** Researches of Japan and Europe presented 45 proposals on candidate themes for which a public appeal will be made for the next symposium.

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<thead>
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<th>Japan</th>
<th>Europe</th>
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<tr>
<td>5G</td>
<td>6 cases</td>
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<td>Big data</td>
<td>4 cases</td>
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<td>Test bed</td>
<td>5 cases</td>
<td>4 cases</td>
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<td>Social ICT</td>
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<td>3 cases</td>
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<td>Multi language translations</td>
<td>4 cases</td>
<td>5 cases</td>
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In order to accelerate the international standardization and practical use of R & D results and contribute them to the strengthening of the international competitiveness of Japan, MIC and NICT allocate competitive research funds for joint proposals made by Japan and EU institutions (Strategic Information and Communications R & D Promotion Project (international cooperation type)).

Starting international joint research with the European Commission fiscal 2013.

- Primary public appeal: Fiscal 2013 to fiscal 2015 6 projects (MIC’s three themes and NICT’s three themes)
- Secondary public appeal: Fiscal 2014 to Fiscal 2016 4 projects (MIC’s two themes and NICT’s two themes)

Reference: Framework of joint public appeal

Reference: Joint Statement of the Japan-EU Summit

23rd Japan-EU Summit
Date: May 29, 2015; Location: Tokyo
Attendees: Prime Minister Abe
Donald Tusk, President of the European Council, Jean-Claude Juncker, European Commission, and others

Excerpt of joint statement:
Solid Japan-EU dialogue and cooperation across a broad range of sectors drive our Strategic Partnership along. We welcome the recent developments in the following sectors, including the successful dialogues held since the last Summit in Industry, ICT, Transport and Employment:
- The Japan-EU ICT Policy Dialogue held in March 2015 reaffirmed the importance of developing and ensuring open and innovative digital economy based on multi-stakeholder model of internet governance. **We welcome the signature of the EU-Japan Joint Declaration on 5th generation mobile telecommunications networks (5G) that will enhance cooperation to ensure global interoperability and strengthen collaboration on research activities.**
Within the framework of the FP7, MIC and NICT's six Japan-Europe ICT international joint research projects started in 2013.

<table>
<thead>
<tr>
<th>R&amp;D area</th>
<th>Project name</th>
<th>Research institution (Japan)</th>
<th>Research institution (Europe)</th>
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<tr>
<td>Optical communication</td>
<td>R&amp;D of large-scale programmable software-defined and flexible optical networks (STRAUSS) to achieve sliceable ultra-100G Ethernet systems.</td>
<td>Osaka University</td>
<td>Centre Tecnològic de Telecomunicacions de Catalunya(Spain)</td>
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<td>Fujitsu Limited</td>
<td>ADVA Optical Networking SE (Germany)</td>
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<td>KDDI R&amp;D Laboratories</td>
<td>Telefónica Investigación y Desarrollo (Spain)</td>
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<td>University of Bristol (UK)</td>
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<td>Fraunhofer Gesellschaft e.V. (Germany)</td>
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<td>Wireless communication</td>
<td>Millimetre-Wave Evolution for Backhaul and Access (MiWEBA)—R&amp;D of heterogeneous cellular network to take advantage of millimeter waves</td>
<td>Osaka University</td>
<td>Fraunhofer Heinrich Hertz Institute (Germany)</td>
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<td>Tokyo Institute of Technology</td>
<td>INTEL Mobile Communications gmbh (Germany)</td>
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<td>KDDI R&amp;D Laboratories</td>
<td>Commissariat al Energie Atomique et aux Energies Alternatives (France)</td>
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<td>Panasonic Mobile Communications</td>
<td>Orange Labs Networks (France)</td>
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<td>Politecnico di Milano (Italy)</td>
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<td>Information Security</td>
<td>Nippon-European Cyberdefense-Oriented Multilayer threat Analysis (NECOMA)—R&amp;D of multi-layer threat analysis and cyber defense under Japan-Europe cooperation</td>
<td>Nara Institute of Science and Technology</td>
<td>Institut Mines-Télécom (France)</td>
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<td>Keio University</td>
<td>ATOS (Spain)</td>
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<td>University of Tokyo</td>
<td>FORTH (the University of Crete) (Greece)</td>
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<td>National Institute of Informatics</td>
<td>NASK (Poland)</td>
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<td>Internet initiative</td>
<td>6cure (France)</td>
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<td>Fusion of network and cloud of things</td>
<td>Cloud of Things infrastructure technology (ClouT) to extend the influence of citizens in Smart City</td>
<td>Nippon Telegraph and Telephone East</td>
<td>Commissariat al’ énergie atomique et aux energies alternatives (France)</td>
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<td>Keio University</td>
<td>Engineering Ingegneria Informatica SpA (Italy)</td>
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<td>National Institute of Informatics</td>
<td>University of Cantabria (Spain)</td>
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<td>Nippon Telegraph and Telephone Panasonic System Networks</td>
<td>STMicroelectronics S.r.l. (Italy)</td>
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<td>Santander City Municipality (Spain)</td>
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<td>Genova Municipality (Italy)</td>
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<td>Network Testbed cooperation</td>
<td>FEDerated Test-beds for Large-scale Infrastructure eXperiments (FELIX)</td>
<td>National Institute of Advanced Industrial Science and Technology</td>
<td>Instytut Chemii Bioorganicznej PAN (Poland)</td>
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<td>KDDI R&amp;D Laboratories</td>
<td>Nextworks (Italy)</td>
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<td>Fundacio Privada I2CAT Internet I Innovacio Digital a CATALUNYA (Spain)</td>
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<td>SURFnet bv (Holland)</td>
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<td>European Center for Informantion and Communication Technologies(Germany)</td>
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<td>IMINDS VZW (Belgium)</td>
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<td>Green &amp; Content-oriented Networking</td>
<td>Green content-oriented networking (GreenICN) and applications (GreenICN)</td>
<td>KDDI R&amp;D Laboratories</td>
<td>Georg-August-Universitat Gottingen (Germany)</td>
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<td>NEC</td>
<td>NEC Europe (UK)</td>
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<td>Panasonic Advanced Technology</td>
<td>CEDEO (Italy)</td>
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<td>University of Tokyo</td>
<td>Telekomunikacja Polska-Orange Labs Poland (Poland)</td>
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<td>Waseda University</td>
<td>University College London (UK)</td>
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<td>Osaka University</td>
<td>Consorzio Nazionale Interuniversitario per le Telecomunicazioni(Italy)</td>
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## Within the framework of the Horizon2020, MIC and NICT’s four Japan-Europe ICT international joint research projects started in 2014.

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<tr>
<th>R&amp;D area</th>
<th>Development subject</th>
<th>Research institution (Japan)</th>
<th>Research institution (Europe)</th>
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<tbody>
<tr>
<td>Optical communication</td>
<td>Scalable flexible optical communications for reconfigurable infrastructure Technology R&amp;D (SAFARI)</td>
<td>NTT, Fujikura</td>
<td>University of Denmark (Denmark), University of Southampton (UK), Coriant R&amp;D GmbH (Germany)</td>
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<td>Big data</td>
<td>Research and development of advanced intellectual aggregation platform that will enables the provision of information provided with consideration of privacy (iKaaS)</td>
<td>KDDI R&amp;D Laboratories, KDDI Research Institute, Kokusai Kogyo, Tohoku University, Hitachi Solutions East, RIKEN</td>
<td>ATOS (Spain), CREATE-NET (Italy), University of Surrey (UK), Wings ICT (Greece), Inno Tec (Germany), University of Oulu (Finland), EMT Madrid, City of Madrid and Community of Madrid (Spain)</td>
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<tr>
<td>Smart ICT</td>
<td>Creation of urban-type Smart ICT experiment environment under Japan-Europe cooperation (FESTIVAL)</td>
<td>Osaka University, Kyoto Sangyo University, Knowledge Capital, Institute of Science and Technology, and Ritsumeikan University, Acutus Software, JR west Japanese communication, West Japan Marketing Communications</td>
<td>Commissariat à l’énergie atomique et aux énergies alternatives (France), Universidad de Cantabria (Spain), Engineering Ingegneria Informatica S.p.A (Italy), Easy Global Market (France), Inno TSD (France), Ayuntamiento de Santander (Spain), Sopra (France)</td>
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<tr>
<td>Access Network</td>
<td>Research of next-generation wireless technology using a photonic network technology under high-density user centralized environment (RAPID)</td>
<td>Osaka University, Doshisha University, Electronic Navigation Research Institute, Hitachi, Ltd., Central Research Institute of Electric Power Industry, Koden Techno Info</td>
<td>Universität Duisburg-Essen (Germany), University of Kent (UK), Corning Optical Communications (Germany), Siklu Communications (Israel), Exatel S.A. (Poland)</td>
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Signing of Joint Declaration on Strategic Cooperation over the 5G

(1) Time and location: Wednesday, May 27, 2015, Tokyo/MIC’s conference room
(2) Summary: Japan and EU agreed on strategic cooperation over the next-generation communications network (5G), and Minister Sanae Takaichi for Internal Affairs and Communications signed the Joint Declaration with European Commissioner Günther for Digital Economy and Society under the attendance of Ambassador-designate Viorel Isticioaia-Budura of the European Union (EU) to Japan.

Japanese] MIC: Minister Sanae Takaichi of Internal Affairs and Communications, Director-General Toshiyuki Takei for International and Technology Policy Coordination, Director-General Masahiko Tominaga of the Radio Department, and others

[EU side] Ambassador-designate Viorel Isticioaia-Budura of the European Union (EU) to Japan and others

Overview of Joint Declaration

• In the Joint Declaration, MIC and the European Commission Directorate General for Communications Networks, Content & Technology Promotion of confirmed their cooperation in the following items, in particular, for the promotion the global standardization of 5G, the harmonization of frequency policies in order to ensure worldwide interoperability, and the strengthening of R&D activities.

• Both sides will endeavor to reach a common understanding of the rough definition, major functions, target time schedule etc. of 5G.

• Both sides will cooperate in promoting the formation of global standards relating to 5G with consideration of support to standardization in corporation in international conferences.

• Both sides cooperate in specifying frequency bands that are internationally harmonized.

• Both sides cooperate in supporting and promoting the development of new applications and ecosystems to provide highly potential social value.

• Both sides will cooperate and promote common research activities in the field of 5G, starting with the joint public appeal in 2016, in order to emphasize and seek further possibilities to support the development and standardization of 5G vision.

• Both sides expressed support to the deepening of the exchange between 5G-related industry associations in Japan and the European Union while recognizing the importance of public-private partnership on 5G.
Theme (Planned): (MIC)

- 5G – Next Generation Communication Networks
- EU-Japan cooperation on Novel ICT Robotics based solutions for active and healthy ageing at home or in care facilities

(NICT)

- IoT/Cloud/Big Data platforms in social application contexts
- Experimental testbeds on Information-Centric Networking

Publication date: Late October

For more information, check the website.

NICT http://www.nict.go.jp/info/topics/2015/09/150918-1.html

Europe (information on the public offering appeal of the European Commission)

Thank you all for listening very attentively.