

Chapter 10

Utilizing ICT and Promoting Technology Research and Development

Section 1 Promoting Innovation in the Field of National Land and Transport Utilizing ICT

Information technology initiatives in the fields of land, infrastructure, transport and tourism within the “Declaration to be the World’s Most Advanced IT Nation” (Cabinet decision June 14, 2013) are being promoted in coordination with the IT Strategic Headquarters (Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society) headed by the Prime Minister.

1 Promoting ITS

Intelligent Transport Systems (ITS), a system created through the integration of people, roads, and vehicles using the latest Information and Communications Technology (ICT), enables advanced road use, the safety of drivers and pedestrians, dramatic improvement of transport efficiency and comfort as well as solving various social problems such as traffic accidents and congestion, environmental problems, and energy problems and is leading to the creation of new markets in the related fields of the automotive industry and information technology industry among others.

Also, in order to realize a road traffic society that is the safest, the most environmentally friendly, and the most economically efficient in the world in accordance with the “Declaration to be the World’s Most Advanced IT Nation” decided by Cabinet in June 2013, initiatives for the gathering and dissemination of road traffic information which will be effective for traffic safety measures, congestion measures and disaster countermeasures, etc. are being actively promoted.

a. The Spread of ITS in Society and its Effect

(a) Promotion of ETC and its Effects

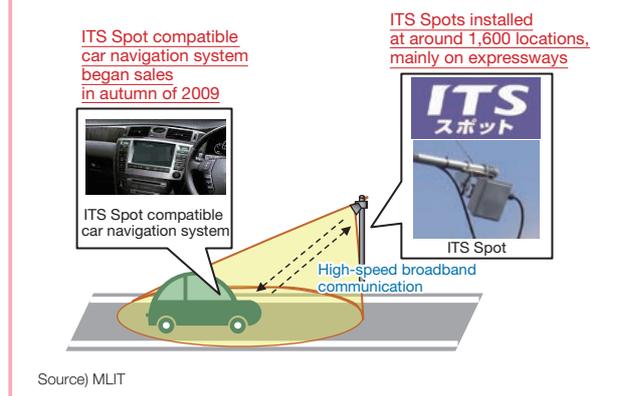
Electronic Toll Collection (ETC) is now available on toll roads across Japan and the total number of new setup onboard devices is 44.53 million as of December 2013 and its usage rate on all national expressways is roughly 89.3%. Congestion at tollgates that used to account for roughly 30% of expressway congestion causes is mostly relieved and contributes to reductions in CO₂ emissions and environmental burdens. Additionally, measures utilizing ETC such as Smart IC which is an ETC only interchange and discounts for ETC vehicles are being implemented and in addition to toll roads, its also possible for parking payments and boarding procedures for ferries, showing the spread and diversification of services utilizing ETC.

(b) Improvement of Providing Road Traffic Information and its Effects

Vehicle Information and Communication System (VICS) compatible onboard devices aim at the advanced travel route guidance and as of September 2013 roughly 39.58 million units have been shipped. By providing travel time, congestion conditions, traffic restrictions, and other real-time road traffic information, VICS improves drivers’ convenience and contributes to better driving gas mileage that also leads to reducing environmental burdens including the reduction of CO₂

Figure II-10-1-1

Creating a Diversity of Services Through High-Speed Broadband Communication Between ITS Spots and Compatible Car Navigation System



emissions.

b. Technological Development and Popularization of New ITS Services

(a) Nationwide Deployment of Smartways

Industry, academia and government have been working together to further the Smartway project as the next generation of roads that connect people, vehicles, and roads with ITS technology for the purpose of traffic safety, traffic congestion measures, and environmental measures. Specifically, beginning in 2011 a variety of services is being offered nationwide through ITS Spots mainly installed on expressways.

The three basic services of dynamic route guidance (providing wide area congestion information), safety driving support (providing information on fallen objects, the end point of congestion, weather, etc.), and ETC were realized through ITS Spot compatible car navigation system. Also, in some models it is possible to provide local tourism information through an internet connection and there is anticipation for expansion into a variety of services such as cashless payments for parking and other services as well as support for logistics. In addition, investigations are under way regarding driving route confirmations that contribute to the support of vehicle operations.

(b) Explorations for the Realization of Next Generation ITS

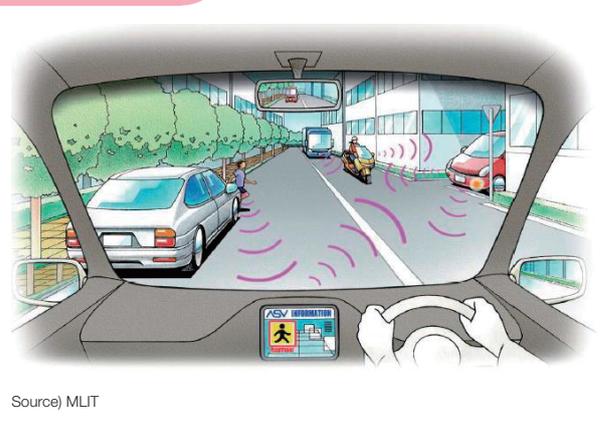
To realize safe, comfortable, and smooth road traffic, in addition to promoting the spread of ITS spot services, the collection and analysis of big data consisting of large volumes of probe information such as driving history and behavior history of vehicles will promote initiatives that contribute to more fine-grained road management among other improvements. Also, for traffic congestion relief through the use of cars equipped with ACC (Adaptive Cruise Control), technical assessments and other activities through public and private sector partnerships and the results of investigations into issues regarding automated driving on expressways among other matters were compiled.

(c) Promotion of the Advanced Safety Vehicle (ASV) Project

Regarding the ASV promotion plan, efforts are under way for the development, commercialization, and widespread adoption of Advanced Safety Vehicles (ASV) that enable drivers to drive safely by using advanced technology such as ICT technology. Specifically, investigations for the promotion of technical development in areas of driver irregularity response system, drivers' overconfidence, system consolidation, and safe driving support systems using vehicle-to-vehicle/pedestrian-to-vehicle communication among others are under way.

Figure II-10-1-2

Illustration of Telecom Use Type Safe Driving Support Systems (Advanced Safety Vehicle - ASV)



2 Realizing a Society that Utilizes Geospatial Information Sophisticatedly

In order to utilize and use location and spot information or “geospatial information”^{Note} in a more sophisticated manner through ICT, following the “Basic Plan for the Advancement of Utilizing Geospatial Information” enacted by Cabinet Decision on March 27, 2012, initiatives are being promoted to realize a “G-spatial Society (Sophisticated Utilization of Geospatial Information Society)” where anyone is able to utilize necessary geospatial information anytime and anywhere.

Note Information that represents the position of specific point or area in geospace (including temporal information pertaining to said information) as well as any information associated with this information. Also called G-spatial information (Geospatial Information).

(1) Maintaining and Updating Geospatial Information as the Foundation of Society

The Digital Japan Basic Map^{Note 1} and Fundamental Geospatial Data^{Note 2} which can be used as the basis for utilizing various geospatial information is being rapidly developed and updated with the coordination of various administrative organizations. Also, various types of information regarding national land are being developed such as aerial photographs, geographical name information, national land numerical information, and continuous monitoring of crustal movements with GNSS-based control stations. Additionally, a framework is being developed to make it possible to quickly grasp and provide information on national land such as gathering parameters to correct reference points and location information for reconstruction following the Great East Japan Earthquake, developing maps, development of information that will serve as a foundation for the development of hazard maps in preparation for future disasters such as landform classifications, and emergency shooting of aerial photography following a disaster.

(2) Initiatives to Promote the Utilization of Geospatial Information

Most of the geospatial information developed is widely provided through the Internet. In addition, initiatives are being taken to further promote Geospatial Information Libraries that allows for searching, browsing, and downloading of various information as well as further improve the GSI Maps^{Note 3}, which allows for layering of various information on the web, and sharing it widely with society along with promoting initiatives involving the private sector, public sector, and academia to further promote mutual use. Also, guidelines are being publicized regarding the handling of private geospatial information on individuals and the promotion of secondary usage; additionally, industry, academia, and government worked together to host the “Geospatial EXPO 2013 Japan” in November 2013 to raise public awareness and create new industries and services.

3 Realizing an Electronic Government

Following the “New Strategy for Information Communication Technology”, various initiatives to realize an electronic government are being implemented. Among these, for online uses, initiatives to promote convenience for citizens as well as improving the efficiency of administrative operations are being taken such as the promotion of business process reform plans.

Regarding automobile ownership procedures, a “One-Stop Service (OSS)” that allows for the execution of various procedures online and at once such as inspection, registration, automobile parking space certification, and payment of various vehicle taxes is being promoted through the cooperation of various ministries and is currently available for the new registration of brand new cars in 11 municipalities. Based on the “Basic Policy Regarding the Reform, etc., of Independent Administrative Institutions” approved by the Cabinet on December 24, 2013, initiatives are under way to realize nationwide expansion and increase the procedures handled by the OSS by fiscal 2017.

4 Development and Opening of Optical Fiber for the Management of Public Facilities and Its Housing Space

In order to facilitate the creation of the world’s most advanced information and communications network in response to the “e-Japan Priority Policy Program”, the development and opening of optical fiber for the management of public facilities and its housing space was promoted.

Optical fiber for the management of public facilities serves the purpose of making the management of public facilities more efficient as well as fast and stable provision and sharing of large capacity data and is being developed in rivers,

Note 1 Newly electronically compiled maps that serve as our nation’s basic maps instead of the traditional paper maps including the 1:25,000 scale topographic maps. In addition to depicting our national territory appropriately, it serves as the most fundamental information of our national land’s conditions and this geospatial information is developed by the Geospatial Information Authority of Japan.

Note 2 Serves as a reference for the position determined for geospatial information on the digital map such as positional information for the geodetic control points, coastlines, boundaries of public facilities, and administrative boundaries. Criteria and standards are defined by ministerial ordinances of MLIT. The Geospatial Information Authority of Japan carried out the preliminary development by fiscal year 2011 and it is currently being updated along with the Digital Japan Basic Map.

Note 3 A web map (<http://cyberjapan.jp/>) that allows for the browsing of maps, etc., over the internet. Geospatial information provided can be overlaid on various map data such as the Digital Japan Basic Map.

roads, ports, and sewage. The optical fiber managed by the nation for the management of rivers and roads is open to private sector businesses within a scope that does not interfere with facility management and in fiscal year 2013 roughly 500km were open to applications for those seeking usage.

5 Sophisticated Water Management and Water Disaster Prevention Utilizing ICT

In light of new developments in information technology of recent years, new technology is being applied to the field to further the sophistication of water management and water disaster prevention.

Regarding the monitoring of rivers and their basins, for rainfall observations, a new radar, XRAIN (MLIT X Band MP Radar Network), which allows for near real-time observation of local rainfall data is being implemented and for the observation of flows and water levels, the introduction and practical application of new technology such as the ADCP (a flow rate meter that uses the Doppler effect of ultrasound) and image analysis (Figure II-10-1-3 Diagram 1) that utilizes CCTVs among other images is being promoted. Also, to assess the extent of inundation when disasters occur, the use of Synthetic Aperture Radars (SAR) and utilization of big data including various location information such as social media activity is being investigated.

Also, in addition to obtaining high precision topographic data through aerial laser profiling (LP), initiatives to improve the efficiency and effectiveness of maintenance and management through the utilization of image data obtained through Mobile Mapping Systems (MMS) are also being promoted.

The information obtained through these such as rain volume, water level, and high precision topographical data was integrated into flood simulations and risk assessment (Figure II-10-1-3 Diagram 2) using the “Distributed Rainfall-Runoff Model”, an advanced flood prediction model to further crisis management. In addition to this, a model to visualize the flow of underground water three-dimensionally based on data such as topography, geology, and surface water was created and the results of this was used for the evaluation of future underground water management policies regarding the regions of Chikugo and Saga plains under the land subsidence prevention guidelines.

Also, concerning for the surveillance of sediment-related disasters in the normal time, the abnormal signs are monitored through means such as rainfall radars, volcano surveillance cameras, automated landslide monitoring systems, and other sophisticated tools utilizing ICT. Additionally, in preparation for the occurrence of

Figure II-10-1-3

Example of ICT Utilized for Sophisticated Water Management and Flood Prevention



Diagram 1 Measuring the Water Level and Flow Rate Using Image Analysis of Video
Source) Fujita Lab, Kobe University Faculty of Engineering

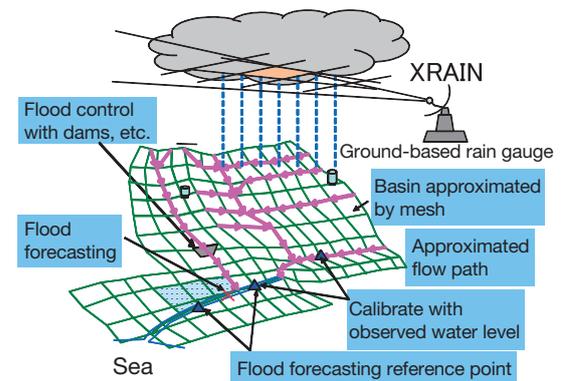


Diagram 2 flood prediction by distributed hydrological model
Source) MLIT

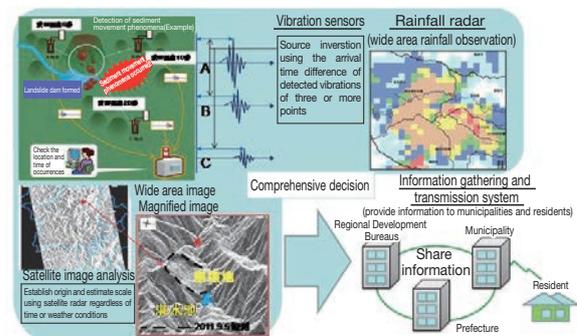


Diagram 3 Catastrophic Landslide Monitoring and Warning System
Source) MLIT

catastrophic landslides, the development of catastrophic landslides monitoring and warning systems^{Note} (Figure II-10-1-3 Diagram 3) are being furthered to contribute to rapid emergency restoration measures as well as the prevention and mitigation of damages through appropriate warnings and evacuations.

In the sewerage sector, investigations are under way for the sophistication and increased efficiency of on-site surveys through means such as sensor robots, efficient sewerage operations through technology including the collection and analysis of big data, and appropriate facility operations through technology including simulation and prediction.

Section 2 Promoting the Research and Development of Technology

1 The Position of Technological Research and Development in Technology Policies and Comprehensive Promotion

In the “Japan Revitalization Strategy (Cabinet decision, June 2013)”, one of the pillars of the revitalization plan for Japanese industry is the “promotion of science technology innovation” and expectations for the role played by “science technology innovation” is increasing as seen by the intent to vigorously promote the “Science Technology Innovation Comprehensive Strategy (Cabinet decision, June 2013)”.

The Ministry of Land, Infrastructure, Transport and Tourism takes into account the government’s overall policy including the “Fourth Science and Technology Basic Plan” to further improve the framework for coordination between the private sector, academia, and government as well as comprehensive promotion of cross-sectoral technology research and development in accordance with the Ministry of Land, Infrastructure, Transport and Tourism Technology Basic Plan and is actively reflecting the resulting fruits in public works as well as the construction and transport industry among others.

(1) Initiatives at Facility Organizations, Special Organizations, External Bureaus, and Incorporated Administrative Agencies

Facility organizations, special organizations, external bureaus, and incorporated administrative agencies under MLIT which are mainly tasked with research are as shown in this figure. Incorporated Administrative Agencies serve the public interests and possess transparency and independence; research that meets policy needs are being conducted with priority and efficiency while striving for further coordination with relevant organizations including the private sector and carrying out tasks appropriately and efficiently.

Figure II-10-2-1 Major Initiatives for Fiscal Year 2013 by Facility Organizations, Special Organizations, and External Bureaus

Organizations, etc.	Summary
Geospatial Information Authority of Japan	The Geography & Crustal Dynamics Research Center, Geospatial Information Authority of Japan implemented research and development that contributes to disaster prevention and the environment as well as the realization of a society that actively utilizes geospatial information in an advanced manner are carried out, such as estimating the fixed state of plate boundaries along with changes, ionospheric correction technology for the sophisticated monitoring of crustal movements with satellite interference SAR, and defining the basic technical specifications and efficient ways to develop three-dimensional GIS data for public indoor spaces.
Policy Research Institute for Land Infrastructure and Transport	Conducted studies and research for the purpose of widely contributing to policy creation in the field of land, infrastructure, transport and tourism. In fiscal 2013, studies and research such as “Survey of Competing Countries to Increase Market Share in the Fields of Land, Infrastructure, Transport and Tourism”, “Research on Strengthening Regional Vitality through Mutual Cooperation at the Apartment or Regional District Level”, “Maintain and Develop Measures for Public Transport”, and “Regional Vitalization Measures with the Entry of LCCs” were conducted.
National Institute for Land and Infrastructure Management	In order to contribute to the realization of a beautiful, safe, and vibrant country, research regarding “disaster prevention and mitigation measures” including seismic measures priority evaluation methods and tsunami damage mitigation measures, “strengthening international competitiveness” including international expansion measures for technology and standards, and environmental measures such as evaluation methods for energy-saving technologies were conducted.
Meteorological Research Institute	Conducted research on understanding the phenomena of weather, climate, earthquake volcanoes, and the ocean as well as predictions such as “strengthening measures for typhoons and torrential rains”, “strengthening measures for earthquake, volcano, and tsunami disasters”, and “strengthening of measures related to climate change and global environment”.
Japan Coast Guard	Conducted testing and research for equipment and materials used for coast guard duties, testing and research for forensic science at sea, and research and development of technology for monitoring seafloor crustal movements.

Note Large-scale slope collapse monitoring and warning systems use a combination of:

- 1) vibration sensors to estimate the location and scale of collapses from the ground vibrations that occur following slope collapses,
- 2) satellite image analysis to confirm the location of the collapse and measure the scale, and
- 3) rainfall radar technology to quickly detect the occurrence of large-scale sediment disasters-related and broadcast the information to relevant organizations.

Figure II-10-2-2

Major Initiatives for FY 2013 by Incorporated Administrative Agencies with a Primary Focus on Research Under MLIT

Incorporated Administrative Agency	Summary
Public Works Research Institute	Implemented research and development to contribute to the efficient creation of quality social capital and the development of Hokkaido such as "research on prevention, reduction, and early recovery from more intensified and diverse natural disasters," and "research on innovative technology for greener social infrastructure."
Building Research Institute	Conducted research and development on technologies related to housing, architecture, and urban planning such as "Research and Development Related to the Promotion of Low-Carbon Housing, Architecture, and Cities", and "Research and Development on Technology to Improve the Safety of Architecture Against Earthquakes, etc."
National Traffic Safety and Environment Laboratory	Conducted test research related to the safety assurance of land transport and air transport and environment preservation, including "promoting the development and commercialization of next generation heavy vehicles," and "survey on driver irregularity response system", technical standards conformity assessment of automobiles, and technical evaluations related to recalls,
National Maritime Research Institute	Conducted research on ensuring the safety of marine transport, preservation of marine environment, marine development and advanced marine transport including, "research for advanced analysis technology for high precision reproduction of marine accident occurrence conditions," "research on green evolution of ships that contribute to revolutionary technology to reduce the environmental burden," and "research on advancing and developing a safety evaluation method on renewable marine energy production systems."
Port and Airport Research Institute	Conducted research and development that contributes to the formation of a safe and comfortable society, conservation and formation of a benign coastal environment, and the formation of a vital economic society such as "Development of Prediction Technology for the Degree of Damage Caused by Earthquakes and Tsunamis for Tsunami Disaster Prevention Facilities", "Research, Experiments and Analysis to Establish Measurement Methods for CO2 Absorption and Emissions as well as Carbon Sequestration Volume in Coastal Areas", and "Proposals for Testing Methods Regarding the Strength and Compression Characteristics of Cohesive Soil for the Design of Port and Airport Facilities".
Electronic Navigation Research Institute	Implemented research and development for advancing air traffic management systems such as "expanding the capacity of airways," "expanding the processing capacity of congested airports", and "safety and technology that connects air and land."

(2) Regional Development Bureau Initiatives

Technical and Engineering Offices and Port and Airport Technology Investigation Offices coordinate with relevant offices in their jurisdiction for tests and research of civil works material and water quality, hydraulic tests and design for the effective and efficient development of facilities, development of environmental monitoring systems, and other matters for technology development as well as the utilization and promotion of new technology tailored to the region.

(3) Promoting research and development technologies of construction, traffic and transportation fields

Regarding important research issues concerning construction technology that are especially urgent, issues that involve a wide range of fields are taken up and the governmental departments take the lead with the coordination of industry, academia and government to implement research comprehensively and organizationally for the "comprehensive technology development projects" where in fiscal year 2013, research and development is being conducted for a total of six issues including the "development of function continuity technology for the disaster site buildings."

Also, for the traffic and transportation fields, technological research and development that contributes to ensuring safety, improving convenience, and protecting the environment are being promoted efficiently and effectively with the coordination of industry, academia and government and in fiscal year 2013 the "promotion of comprehensive technology development for advanced control and management systems in the field of transport" is being undertaken.

(4) Supporting Private Sector Technological Research and Development

To promote private sector investments in research and development, support is given through special tax treatment regarding experiment and research expenses.

(5) Promoting Public Invitation Type Research and Development Subsidy Systems

To promote technological innovation in the construction sector, for the "Construction Technology Research and Development Subsidy Program" that invites the public to make proposals for technological research and development that contributes to the sophistication and strengthening of international competitiveness of construction technology under MLIT's authority, two types of public invitation are made, public invitations for technology development that solves policy issues (aiming to implement in 2-3 years) and public invitations for technology development in response to earthquakes (aiming to implement in 1-2 years) and in fiscal 2013, 3 new issues were adopted and 23 issues were carried over.

Also, in the sector of traffic and transportation, the “Fundamental Research Promotion Program for the Transport Sector” implemented by the Japan Railway Construction, Transport and Technology Agency (Independent Administrative Institution) was abolished in fiscal 2012 and a “Transportation Technology Development Promotion Program” was newly established to focus on the implementation of truly necessary basic research by widely consolidating the knowledge of industry, the public sector, and academia. In fiscal 2013, this program invited the public for research topics regarding five research themes including “Pre-Disaster Prevention and Disaster Mitigation as well as Optimal Maintenance and Upgrading for Transport Infrastructure” and five topics were adopted.

2 Promoting the Utilization and Adoption of New Technology for Public Works

(1) New Technology Utilization System for Public Works

In order to actively utilize promising new technology developed by private sector businesses, a “new technology utilization system for public works, etc.” that utilizes the New Technology Information System (NETIS) is under operation. Up to now, there were 21 recommended technologies and 47 runner-up recommended technologies chosen as innovative new technologies that will raise the level of technology concerning public works. Also, to promote efficiency of maintenance and management in the field, for the adoption of new technology in the field and the promotion of further technological development, NETIS is leveraged to set technical themes to use and evaluate the submitted technologies in the field.

(2) Supporting the Utilization of New Technology

In order to promote the utilization of new technology in public works and other areas, utilization is evaluated at every design stage and technology with greatly benefits from utilization is designated by the ordering party when construction is contracted. Also, for new technology that the contracting office is actively considering, a provisional unit price that helps with streamlining the contracting was created for three technologies by fiscal 2013.

Section 3 Improving Construction Management Technology

1 Improving Costing Technology for Public Works

For the purpose of ensuring the transparency of public works, various price data standards are made public. Also, from fiscal year 2012, to improve the efficiency of cost estimation, the “construction package type cost estimation formula” has been implemented on a trial basis and extended to fiscal year 2013. Furthermore, in response to the no-bidder/over-budget issue of recent years, overhead cost corrections for road maintenance projects in large urban areas or costing formulas that allows the reflection of the bidders estimates in expected pricing is being test implemented. Also, from fiscal year 2012 for the purpose of improving the reciprocity between the contractor and contractee, when there is a change to the contract amount, the unit prices and other matters for estimating the monetary amount or partial payments will be agreed upon by negotiations before hand for the purpose of facilitating smother negotiations following design changes or partial payments as part of the “total value contract and unit pricing agreement formula” being implemented.

Also, in addition to stipulating the public works construction costs and estimation standards, the public works construction standard unit price is established and in fiscal 2013, to respond to the aging of social infrastructure, unit prices for bridge repairs were newly established and the unit price of maintenance and repairs were revised and indirect construction cost rate were placed under review. Also, for construction machinery etc., rent, field studies are carried out for the construction machinery, etc., possessed by the contractor and the base value, maintenance and management costs, and operation costs are assessed and revisions implemented.

2 CIM and BIM Initiatives

A three-dimensional model is introduced from the planning, research, and design stages of public works and for the construction that follows, a three-dimensional model is linked and developed at each stage such as the subsequent construction, maintenance, and management so that by sharing information between all the stakeholders of the project, the construction productivity system is made more efficient and sophisticated while initiatives to introduce CIM (Construction Information Modeling) for the quality assurance and environmental performance of public works as well as reduce lifecycle costs are carried out. In fiscal 2013, testing was implemented and expanded for the schematic design, preliminary design, and construction stages for an evaluation of CIMs from both a legislative and technical perspective.

Also for government buildings services projects, it is expected that the efficient and effective utilization of BIM (Building Information Modeling) for the lifecycle of government facilities will contribute to ensuring the quality of government facilities, reduction of lifecycle costs regarding the improvement and preservation of facilities, and contribute to customer satisfaction toward government facilities. For this reason, from fiscal year 2010, tests were begun for three directly managed projects as BIM utilization projects and the effects and issues regarding BIM implementation are being evaluated. In addition, “Guidelines for the Creation and Use of BIM models in Government Buildings Projects”, for the basic principles and considerations when using BIMs for government buildings projects, was compiled and published in March 2014.

Section 4 Technology Development for Construction Machinery and Mechanical Equipment

(1) Development and Supply of Construction Machinery

In order to carry out appropriate maintenance and management of rivers and roads managed by national government and quickly respond to disaster recovery, efforts are being made to implement machinery for maintenance and management as well as disaster measure machinery across the nation.

Also, in order to improve the efficiency, conservation of labor, and safety of construction associated flood control projects and road development projects, studies and research and development for construction machinery and construction are being undertaken.

(2) Streamlining and Improving the Reliability of Maintenance and Management of Machinery

For the protection of lives and properties of the citizenry from disasters, the construction of floodgate facilities, storage and drainage pump facilities, and road drainage facilities was furthered starting around late 1965 and many of the facilities are becoming decrepit. For this reason, in addition to preservation to perform overhauls based on the time elapsed from installing the facilities to running time, analysis of vibration values measured during the inspection of facilities and the development of inspection and monitoring technology such as component analysis of lubricating oil are continued to be tested in the field to strive for extending the life of machine equipment and improving reliability.

(3) Utilizing the Fruits of Construction Technology Development

In order to safely and swiftly carry out restoration work at disaster sites where the danger of secondary disasters such as large-scale floods, sediment-related disasters, and slope collapses, a hydraulic shovel that can be remotely controlled as well as taken apart and airlifted was developed. By FY2013, eleven hydraulic shovels have been deployed.

(4) Introduction and Development of Robots for Social Infrastructure

For issues faced by Japan such as aging infrastructure, preparedness for disasters such as earthquakes and floods, as well as population decline, low fertility, and aging society, initiatives to improve the effectiveness and efficiency of the maintenance and management of social infrastructure as well as disaster responses through Japan’s strengths in the field of robot technology are underway by striving for development and implementation that is rooted in the field. In fiscal 2013, the “Robot Development and Introduction for Next-Generation Social Infrastructure Study Group” (July 2013) was jointly hosted with the Ministry of Economy, Trade and Industry to create the “Robot Development and Introduction for Next-Generation Social Infrastructure Priority Areas” (December 2013) was formulated. Following this, the newly held five specialized subcommittees (bridge maintenance, tunnel maintenance, underwater maintenance and management,

disaster investigation, and emergency restoration) under the “Robots for Next-Generation Social Infrastructure Field Investigation Committee” the items to be targeted by initiatives for the promotion of development and implementation were fleshed out and goals were debated for the formulation of public offering procedures.

Figure II-10-4-1

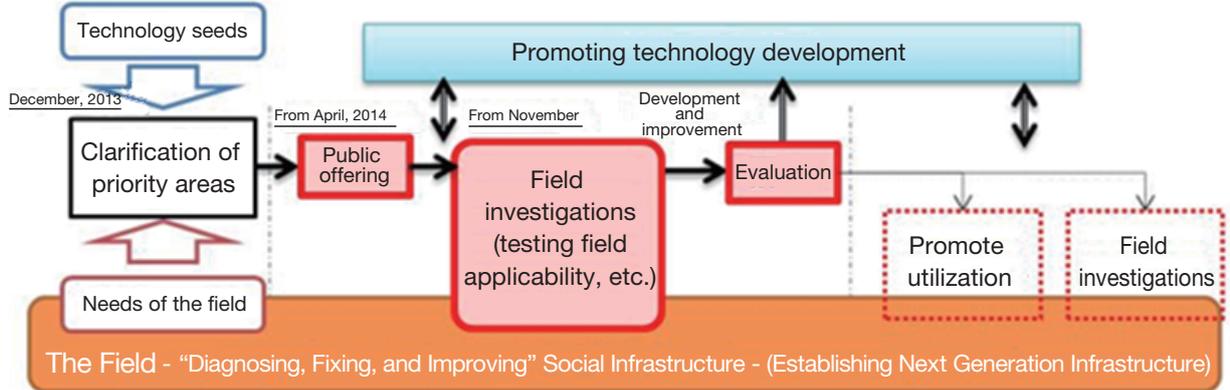
Promotion of the Robot Development and Introduction for Next Generation Social Infrastructure

《Examples of technology seeds》



Flying type robots (example)

Traveling type robots (example)



Source) MLIT