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" (Revised on June 24, 2014) 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, the dramatic improvement of transport efficiency and comfort, solves various social problems such as traffic accidents and congestion, environmental and energy problems, and is leading to the creation of new markets in the related fields of the automotive industry, information technology industry, and others.

Also, in order to realize a road traffic society that is the safest, most environmentally friendly, and economical in the world, initiatives for the gathering and dissemination of road traffic information, which will be effective for traffic safety measures, congestion measures, disaster countermeasures, etc., are being actively promoted. This is being pursued in accordance with the "Declaration to be the World's Most Advanced IT Nation" that was promulgated by the Cabinet in June, 2013 and revised in June, 2014.

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 all national expressways, as well as most of the toll roads in Japan. The total number of new setup onboard units is 47.56 million as of September 2014 and its usage rate on all national expressways is roughly 89.6%. Congestion at tollgates, which used to account for roughly 30% of the cause for expressway congestion, has been mostly alleviated and has contributed to reductions in CO_2 emissions and environmental burdens. Additionally, measures utilizing ETC are being implemented, such as the introduction of Smart IC dedicated to ETC interchange and discounts for ETC vehicles. In addition to such toll road uses, it is also possible to use ETC 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 units aim to advance travel route guidance and, as of September, 2014, roughly 44.11 million units have been shipped. By providing road traffic information such as travel time, congestion conditions, and traffic restrictions in real-time through VICS, drivers' convenience is improved. This ultimately contributes to better mileage and reduces environmental burdens, including the reduction of CO_2 emissions.

b. Technological Development and Popularization of New ITS Services

(a) Deployment of Smartways

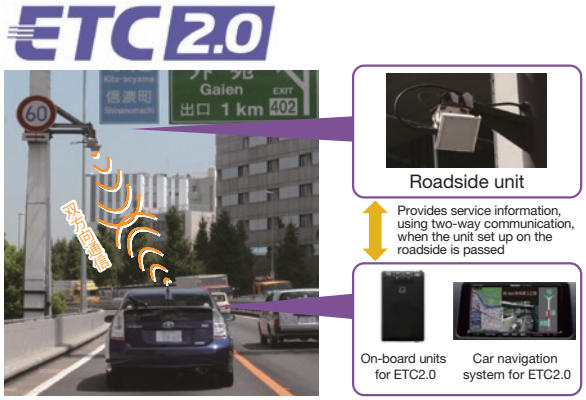
Industry, academia, and government have been working together to deploy Smartway as the next generation of roads. They utilize ITS technology to connect people, vehicles, and roads with information for the purpose of traffic safety, congestion measures, and environmental measures. In 2011, the world's first road-to-vehicle communication service was established with a focus on the expressways of the entire country, providing two-way communication at high speed and

high capacity between the on-board units and the ITS spots.

(b) Deployment of ETC2.0 Service

In addition to the present electronic toll collection, a new service "ETC2.0" that uses the installed ITS spot and on-board units and can provide driving assistance on the expressways, was introduced in October, 2014. The ETC2.0 service provides information services, such as Congestion Avoidance Support (provides an image of the road ahead that is visually easy to understand and has highly accurate real-time, wide area information on congestion), Safe Driving Support (provides information related to hazardous events, such as information about fallen objects and back end of traffic queue, as well as still pictures of weather ahead, etc.), and Post-Disaster Information Support (provides relevant information to user when roads are closed to vehicle traffic). As a new service that uses the route information obtained from ETC2.0, there is a future plan to develop an 'Operation Management Support' for commercial vehicles and to take measures to provide preferential treatment to the drivers who use detour routes to avoid congestion. In addition, private services, such as 'Private parking lot payments' and 'Drive-through payments', are also being considered.

Figure II-10-1-1 Driving support service "ETC2.0" uses Vehicle to Infrastructure cooperative system



Source) MLIT

(c) Consideration on use of big data

To achieve safe, comfortable, and smooth road traffic, in addition to promoting the spread of ETC2.0 services, the collection and analysis of big data consisting of large volumes of probe information, such as travel record and driving behavior record of vehicles, will promote initiatives that contribute to more fine-tuned road management and other improvements.

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

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

2 Realizing a Society that Utilizes Geospatial Information in a Sophisticated Manner

In order to utilize the location and spot information or "geospatial information Note" in a more sophisticated manner through ICT, following the new "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 the necessary geospatial information can be utilized by anyone at anytime and anywhere.

Figure II-10-1-2 Illustration of Telecom Use Type Safe Driving Support Systems (Advanced Safety Vehicle - ASV)

Source) MLIT

Note Information that indicates the position of a 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 commonly used by the entire society as the basis for utilizing various geospatial information, is being rapidly developed and updated with the coordination of various administrative organizations. Various types of information regarding national land are being developed, such as aerial photographs, geographical name information, digital national land information, and continuous monitoring of crustal movements with GNSS-based control stations. In addition, the system is being constructed, enabling prompt assessment and provision of the information on national infrastructure, such as maintenance of information on the topographical classification used as the basic material for developing hazard maps prepared for future disasters, and urgent photography of aerial pictures during disasters.

(2) Initiatives to Promote the Utilization of Geospatial Information

Most of the geospatial information developed is widely provided through the Internet. Also, initiatives are being taken by the industry, academia and government to further promote Geospatial information library that allows for the searching, browsing, and downloading of various information as well as improving GSI Maps [Note 3], which allows for the layering of various information on the web, and further promote the sharing and mutual use with society as a whole. In addition, in order to raise public awareness and to create new industries and services, the industry, academia, and government collaborated and hosted the "Geospatial EXPO 2014"in November 2014, while also carrying out the verification project to effectively use the geospatial information for disaster prevention, disaster mitigation, and regional activation.

3 Realizing an Electronic Government

Following the "Declaration to be the World's Most Advanced IT Nation", various initiatives are being carried out to realize an electronic government. In particular, regarding the online usage, initiatives are being taken to improve convenience for citizens as well as making administrative operations simple and efficient, based on the reform policies to improve the convenience of online procedures.

Regarding automobile ownership procedures, a "One-Stop Service (OSS)" that allows for the execution of various procedures, –such as inspection, registration, automobile parking space certification, and payment of various vehicle taxes—online and at the same time, is being promoted through the cooperation of various ministries, and is currently being implemented for the new registration of brand new cars in 11 municipalities. Based on the "Basic Policy Regarding the Reform of Independent Administrative Institutions" approved by the Cabinet on December 24, 2013, initiatives are underway to realize nationwide deployment and increase the procedures handled by the OSS by the end of FY2017. The examination of the convenience improvement plans using the MY NUMBER in the automobile inspection registration procedures is being promoted based on "Japan Revitalization Strategy" revision 2014 (Cabinet decision in June, 2014) and "Process Schedule of Declaration to be the World's Most Advanced IT Nation" (Cabinet decision in June, 2014).

Note 1 New 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 with geospatial information developed by the Geospatial Information Authority of Japan.

Note 2 Serves as the basis 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 completed the preliminary development in FY2011, and it is currently being updated along with the Digital Japan Basic Map.

Note 3 Web maps operated by the Geospatial Information Authority of Japan (http://maps.gsi.go.jp/). System renewal for smartphone compatibility done in January 2015.

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

The development and opening of optical fiber for the public facilities management and its housing space is being promoted in rivers, roads, ports, and sewage, as a response to the "e-Japan Priority Policy Program". As of October 2014, the total extent of the optical fiber controlled by the government for river and road management was about 37,000 km, and of this a portion of core cable roughly 18,000 km that does not interfere with the facilities management was opened to private sector business, and in 2014 there were new applications for additional use of about 300 km.

5 Sophisticated Water Management and Water Disaster Prevention Utilizing ICT

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

Regarding the monitoring of rivers and their basins, a new type radar, XRAIN (MLIT X Band MP Radar Network), which allows for near real-time observation of local rainfall, is being implemented for rainfall observations. For the observation of flow amount and water levels, the introduction and practical application of new technology such as the ADCP (Acoustic Doppler Current Profiler) 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, utilization of big data including the use of Synthetic Aperture Radars (SAR), postings to the Social Networking Service (SNS), and various location information are being investigated.

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

Further crisis management is being promoted by initiatives like flood simulation and risk understanding (Figure II-10-1-3 Diagram-3) based on "Distributed Rainfall-Runoff Model", an advanced flood prediction model compared to the conventional one, that uses the information obtained through such rain volume, water level, and high precision topographic data.

Also, for the sediment-related disasters caused by heavy rains and other causes, unusual condition are always monitored through means such as rainfall radar that can observe the rainfall situation over a large area at high accuracy, volcano monitoring cameras, and landslide monitoring systems. Additionally, in preparation for the occurrence of deep-seated catastrophic landslide, the development of the "Deep-seated Catastrophic Landslide Monitoring and Warning

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

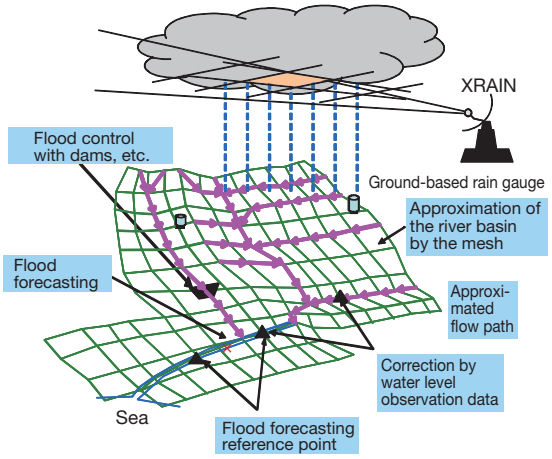


Diagram 2 Flood prediction by distributed hydrological model
Source) MLIT

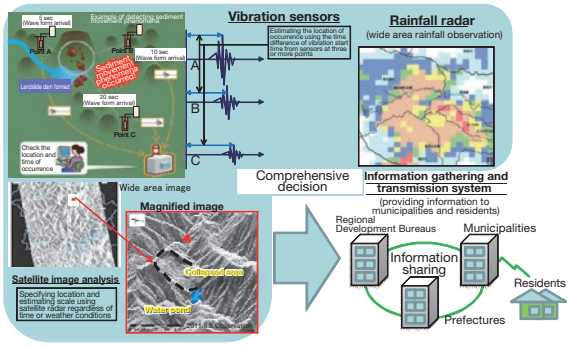


Diagram 3 Deep-seated Catastrophic Landslide Monitoring and Warning System
Source) MLIT

System [Note]" which detects the location and scale of an occurrence at an early stage is being promoted for rapid emergency restoration measures as well as the prevention and mitigation of damages through appropriate warnings and evacuations.

In the sewerage field, investigation to implement improvements in the sophistication and efficiency of site investigations by sensors and robots, efficient drainage management by the consolidation of big data and analysis techniques, and precise facilities operation using simulation technology and prediction techniques are being promoted.

6 Use of Big Data

(1) Public Transportation Activation using Information and Communication Technologies

In the suburban cities, the number of users of public transportation facilities keeps decreasing due to such issues as the declining birthrate, growing proportion of elderly people and depopulation, resulting in the efficiency of public transportation deteriorating from efforts to maintain business, and the regional residents' dependency on private vehicles increasing. On the other hand, public transportation continues to play an important role for users like young and old people requiring a means of transportation.

Facing such a situation, the possibility and the problems of using the big data and Information and Communication Technologies (ICT) were investigated and examined and in FY2013 the "Investigation concerning the Public Transportation Activation using Information and Communication Technologies" advisory committee was started with a 3 year plan to create a new and highly convenient transportation service, as well as to promote the use of ICT in the field of inbound tourism. In FY2014, in addition to sorting data type and use methods, an examination was carried out of the analysis evaluation and "Visualization" methods related to the migration data of people, and of the questionnaire survey technique using ICT, and then the effectiveness of these were verified by doing case studies using actual data in Tsukuba city of Ibaraki Prefecture and the Fukushima Prefecture region. In FY2015, along with providing suggestions for efficient data collection and analysis techniques that can be utilized by the local government and public transportation entrepreneurs, a generic and new business model using the big data is being proposed to support the local route bus operation.

(2) Utilization of Automobile Related Information

Based on "Declaration to be the World's Most Advanced IT Nation" in the "Japan Revitalization Strategy Revision 2014" decided by the cabinet in June 2014, driving information was acquired using the automobile traceability service and telematics that "makes visible" and provides the vehicle history not physically visible, such as the number of owners, repair and maintenance history, accident history. Priority theme status was then given to the Safe Driving Promotion Insurance, which provides incentive by reducing insurance premiums for safe driving practices, and concrete strategies for implementation including the creation of new services that utilize such Automobile Related Information were examined. The "Future Vision Related to the Utilization of Automobile Related Information" was drawn up in January 2015.

In future, the environmental considerations to advance the utilization of Automobile Related Information will be actively promoted, by verifying the effects of introduction of the new service and examining the information handling guidelines, to plan for the achievement of the priority themes, based on the "Future Vision Related to the Utilization of Automobile Related Information".

Note Deep-seated Catastrophic Landslide Monitoring and Warning System quickly detects the occurrence of deep-seated catastrophic landslide using a combination of:
1) vibration sensors to estimate the location and scale of collapses from the ground vibrations by deep-seated catastrophic landslide,
2) satellite image analysis to confirm the location of the collapse and measure the scale, and
3) rainfall radar technology and provides the information to relevant organizations. (Figure II-10-1-3 Diagram-3)

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" revision 2014 (Cabinet decision, June 2014), one of the pillars of the revitalization plan for Japanese industry is the "promotion of science, technology and innovation" and expectations for the role played by "science, technology and innovation" is increasing as seen by the intent to vigorously promote the "Comprehensive Strategy on Science, Technology and Innovation 2014" (Cabinet decision, June 2014).

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 industry, academia, and government as well as comprehensive promotion of cross-sectoral technology research and development in accordance with the Third Ministry of Land, Infrastructure, Transport and Tourism Technology Basic Plan and is actively adopting the resulting outcomes in public works, the construction and transport industry among others.

Figure II-10-2-1 Major Initiatives for FY2014 by Facility Organizations, Special Organizations, and External Bureaus

Organizations, etc.	Summary
Geospatial Information Authority of Japan	The Geography and Crustal Dynamics Research Center conducted research and development for the realization of society of enhanced geographical space utilization, and contribution to the disaster prevention and environment conservation such as "Characteristics of crustal deformation in a strain concentration zone", "Intensive error analysis of GPS timeseries for improving detectability of crustal deformation by GEONET", "Effective creation method of land vulnerability information for the creation of earthquake hazard map", and "Effective ortho image generation by full-automation of aerial photogrammetry."
Policy Research Institute for Land Infrastructure and Transport	Conducted researches such as "Rival country survey for overseas market acquisition in the field of land, infrastructure, transport and tourism", "Relations between commissioning entities for the maintenance, management and renewal of social capital", "Issues related to cargo and passenger transport during widespread disaster."
National Institute for Land and Infrastructure Management (NILIM)	Conducted researches such as "sediment-related disaster and urban flood measures to respond to sudden heavy rain", "disaster prevention", "disaster mitigation", and "crisis management" such as development of building to be continually used immediately following the earthquake", "Maintenance and management of social capital" such as development of maintenance and management technologies for road structures", "Wise usage of existing stocks" such as supports for traffic congestion avoidance and safe driving by utilizing ETC2.0", "Sustainable and vital national and regional lands formation" such as comprehension and analysis of actual situation in ship navigation in global scale by utilizing the satellite AIS, and " Work routine innovation" such as improvement of operational efficiency of civil engineering structures management using 3-dimensional data.
Meteorological Research Institute	Conducted research on understanding the phenomena of weather, climate, earthquake volcanoes, and the ocean as well as predictions to contribute to "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 advancing observation technology for seafloor crustal movements.

(1) Initiatives of 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 the society and policy needs respectively are being conducted with priority and efficiency, while striving for further coordination with relevant organizations including the private sector, and fully based on the sense of carrying out tasks appropriately and efficiently.

(2) Initiatives of Regional Development Bureau

Technical and Engineering Offices as well as 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.

Figure II-10-2-2 Major Initiatives for FY2014 by Incorporated Administrative Agencies under MLIT with a Primary Focus on Research

Incorporated Administrative Agency	Summary
Public Works Research Institute	Conducted research and development to contribute to the efficient creation of quality social capital and the development of Hokkaido such as “Research on prevention, mitigation, and early recovery from more intensified and diverse natural disasters”, “Research on strategic maintenance and management of social capital stocks, and “Research on innovative technology for greener social infrastructure”.
Building Research Institute	Conducted research and development on technologies related to housing, building, and urban planning such as "Research and development related to the promotion of low-carbon housing, building, and cities", and "Research and development on technology to improve the safety of buildings against earthquakes, etc."
National Traffic Safety and Environment Laboratory	Conducted test research related to the safety assurance of land transport and environment preservation, technical standards conformity assessment of automobiles, and technical evaluations related to recalls, including “Promoting the development and commercialization of next generation heavy vehicles” and “Survey on the requirement for communication between a pedestrian and a vehicle.”
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 to contribute to the formation of a safe and secure society, the maintenance and creation of excellent environment in coastal areas, and the creation of an energetic economic society including “Research on community protection from large scale earthquake and tsunami”, “conservation and recovery of ecological system along coastal areas and CO_2 absorption, and “Environmental improvement of enclosed coastal seas”, and “Research on strategic maintenance and management of ports and harbors 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”.

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

Of the important research issues concerning construction technology, issues that are especially urgent and involve a wide range of fields are taken up with the governmental departments taking the lead with the coordination of industry, academia and government to comprehensively and organizationally implement research for the “comprehensive technology development projects” where in FY2014, research and development was conducted for a total of five 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 FY2014 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 preferential tax measures for 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 as well as the further promotion of research and development conducted by MLIT, two types of public invitations 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 6 new issues were adopted and 11 ongoing issues were selected in FY2014.

In regards to the traffic and transportation field, under the “Traffic and Transportation Technology Development Promotion System,” which broadly mobilizes the collective knowledge of the Industry, Government and Academia with an emphasis on conducting the truly necessary fundamental research for the country, public offering for 5 research topics of “Aging measures, prior disaster prevention, disaster mitigation measures, and adequate operation, maintenance and update in transportation infrastructure” etc. was made with 2 new issues were adopted and 5 ongoing issues were selected in FY2014,.

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" 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 further 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 that provide great utilization benefits are designated by the ordering party when the construction is contracted. Also, for new technology that the contract ordering office is actively considering, a provisional unit price that helps with streamlining the contracting process was created for seven technologies from FY2012 to FY2014.

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. In FY2014, a rate revision was made for the administrative expenses based on "Revised quality assurance law" to secure reasonable profits, to be applicable from April 2015. The trial of the "Construction package type cost estimation formula" to improve the efficiency of estimation was started from FY2012, and then extended to FY2013. In response to the no-bidder/over-budget issue of recent years, the overhead cost correction for road maintenance projects in large urban areas and costing formulas that allows the reflection of the bidder's estimates in expected pricing is being implemented on trial basis.

Additionally, the civil engineering work standard percentage was set along with the provision for the civil engineering work estimation points and estimation standards and in FY2014, taking into consideration the change in economic and social environment, the revision of percentage reviewed by the construction division corresponding to small-scale construction for the percentage for maintenance and repair as well as the revision of percentage reflecting the improvement in the construction efficiency based on the latest construction realities were executed.

Also, for construction machinery depreciation costs, field studies were carried out for the construction machinery owned by the contractors and the base value, maintenance and management costs, and operation costs were assessed and revisions are being implemented.

.2 CIM and BIM Initiatives

A three-dimensional model is introduced from the planning, research, and design stages of public works, and it is also linked and developed at each stage of subsequent construction, maintenance, and management so that by sharing information among all the concerned parties of the project, the construction productivity system is made more efficient and sophisticated, while initiatives are being carried out to introduce CIM (Construction Information Modeling) for the improvement of quality assurance and environmental performance of public works, as well as to reduce lifecycle costs. A trial of 11 direct control businesses from all over the country was started from FY2012 as a model business, and its effect and issues are being verified. From FY2014, in conjunction with the trial, the examination for the CIM introduction and promotion is being advanced from the aspects of both system and technology through the cooperation of industry, academia and government.

From FY2010, BIM introduction is being trialled in 3 businesses, to verify the effect and issues of BIM (Building Information Modeling) introduction which can integrate and unify building information as well as visualize design content for the Government building projects. In addition, "Guidelines about Development and Use of BIM models in Government

Buildings Projects", the basic principles and considerations when using BIMs for government buildings projects, was compiled and published in March 2014. In FY2014, the guidelines were applied in 4 businesses and BIM was introduced.

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 respond quickly to disaster recovery, initiatives are being carried out across the nation to implement machinery for maintenance and management, as well as machinery for disaster measures. In FY2014, an extra 30 machines were added and 284 aging machines were updated.

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

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

For the protection of citizens' lives and properties from disasters, the construction of floodgate facilities, storage and drainage pump facilities, and road drainage facilities were furthered, starting around late 1965, and many of the facilities are becoming decrepit. Because such machinery and equipment are expected to function reliably during floods, the "Dam and flood gates facilities technological standard (Draft)", was revised and the "Standards related to bags for flood gates that use a rubber bag in the gate or derricking mechanism" was newly formulated,.

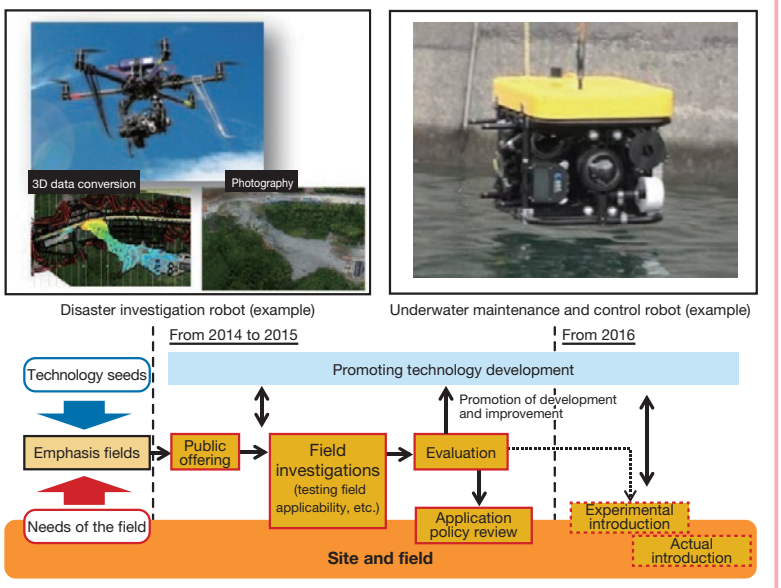
(3) Utilizing the Accomplishments of Construction Technology Development

In order to safely and swiftly carry out restoration activity at disaster sites where the danger of secondary disasters such as large-scale floods, sediment-related disasters, and slope collapses are high, a hydraulic shovel that can be remotely controlled, dismantled, and airlifted was developed, and 11 hydraulic shovels were deployed by FY2014. Also, remote control operation, dismantling with a small crane, and airlift drills by helicopter were carried out, and a total of 258 hydraulic shovels per day were dispatched for the disaster recovery activities of Ontakesan (Mt. Ontake) eruption and earthquake relief activities in northern Nagano.

(4) Promotion of Development and Introduction of Robots for the Next Generation Social Infrastructure

The social infrastructure of Japan is facing problems such as progression of aging, rise in the disaster risks of earthquake, storm and flood damage. Therefore, for the "5 emphasis fields" (Maintenance and management: Bridge, Tunnel, and Water; Disaster Response: Investigation and Emergency Restoration) that require the development and introduction of robots, initiatives are underway for the maintenance and management of the social infrastructure and improvement of effect and efficiency during disaster, by planning for the development and introduction of highly useful robots. In FY2014, robots that can handle the "5 emphasis fields" were publicly invited from the private companies and universities, then from among the applications received, verification and evaluation was conducted on the 101 samples created by 65 people at a direct control site by the "Onsite inspection committee of robots for the next generation social infrastructure" consisting of the experts from the industry, academia, and government, and the results were published.

Figure II-10-4-1 Promotion of Robot Development and Introduction for Next Generation Social Infrastructure



Source) MLIT