Coordination of research

1. Introduction

The basic attitude of the research policy of the National Institute for Land and Infrastructure Management (NILIM) includes to technologically cooperate and unite with a wide range of industries, academia, and the public sector to produce new technologies. The attitude of the research is to recognize one's strengths and weaknesses and build efficient research systems in cooperation with other organizations. One of the important roles of the NILIM is to coordinate the joint research of the industry, academia, and the public sector. Many research projects are being conducted with the coordination and cooperation of government agencies, private companies, and universities. This paper introduces the main systems and research projects.

2. Examples of coordinating and cooperating researches with relevant government organizations

The NILIM is conducting many research projects directly linked to the implementation of policies using project budgets and other budgets in cooperation with the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). General technological development projects (the general project) and the budget for administration costs are examples that support especially large-scale research themes. The general project covers especially urgent research projects that are applicable to a wide range of fields among important research projects on construction technologies. The administration department is in charge of implementing relevant plans, and comprehensive and organized research projects are conducted through the cooperation of industry, academia, and the public sector. The budget for administration costs is the budget

Table 1: General technological development projects conducted in FY 2017

Topic	Research period	Assigned departments and centers
Development of strategic stock management technologies for regional and secure living functions	2015–2017	House, City, Construction
Technological development to improve the use of current buildings by streamlining fire management and evacuation regulations	2016–2020	Construction, City
Research on the improvement of construction productivity through the full use of ICT	2017–2020	Social capital management
Development of technologies to design and construct mixed–structure buildings using new wooden materials	2017–2021	Construction

Table 2: Research conducted using the budget for administrative cost in FY 2017

Topic	Research period	Assigned departments and centers
Research on the improvement of the efficiency of wastewater treatment systems using the performance of current facilities in sewage treatment plants	2015–2017	Sewage system
Development of methods to strategically reduce the risk of disasters in cities under climate change	2015–2017	River
Research on the high–precision method to forecast the onset of landslide or mudflow using real-time observation and monitoring data	2015–2017	Landslide/mudflow
Research on the method to evaluate the safety and recyclability of construction materials damaged in fire triggered by an earthquake	2015–2017	Construction
Development of evaluation standards for evacuation support technologies for the elderly and handicapped in shared housings during natural disasters	2015–2017	House
Development of methods to evaluate low-carbon urban development by improving the thermal environment of cities using plants	2015–2017	City
Development of methods to forecast container sea route network to respond to changes in the structures of marine transportation	2015–2017	Ports and harbors
Development of simple methods to evaluate the performance of wooden houses	2016–2018	Construction
Development of methods to evaluate the energy saving effects of automatic control technologies of construction facilities	2016–2018	House
Research on securing the safety of ports and harbor zones against damages of high tide	2016–2018	Coast, ocean, disaster management
Research on methods to practically evaluate currently operating ports and harbor facilities to elongate their service lives and effectively use them	2016–2018	Ports and harbors
Research on the improvement of on-site productivity in social capital development process	2016–2018	Social capital management
Research on technologies to support water management activities	2017–2019	River
Examination of road-vehicle coordination system to build next-generation ITS including automatic driving	2017–2019	Road traffic
Development of technologies to improve facilities to secure the health and safety of evacuees in evacuation shelters	2017–2019	Construction
Study of facade design method to improve the energy consumption performance of buildings	2017–2019	House
Development of technologies to analyze and evaluate urban structures based on diversifying living support functions	2017–2019	City
Development of technologies to diagnose the possibility of allowing vehicle traffic after an earthquake	2017–2019	City
Research on methods to quickly inspect and restore airport pavements after an earthquake	2017–2019	Airport

allocated to implement general research projects directly assessed by the Ministry of Finance and to create new policies. Table 1 lists topics of the general projects conducted in FY 2017, and table 2 research projects conducted using the budget for administration cost.

3. Examples of joint research projects with private companies and universities

Types of joint research projects include joint research projects of the NILIM and other organizations, outsourced research projects in which research projects are entrusted to other organizations, such as universities that are already conducting research projects, as well as other types of cooperative research projects to maximize outcomes using limited research resources. Joint research projects are roughly categorized as follows.

1. Systematized research projects within the NILIM
[1] Joint research, [2] Contracted research (public offering at research facilities),
[3] Contracted research (public offering in councils),
[4] Budge allocated from other ministries (SIP)

II. Established as a system outside of the NILIM
[5] Technological research cooperative

III. Not a regulated system but established as a system at a certain level
[6] Public offering of new technologies, [7] Social experiment, [8] Study sessions

IV. Studies conducted through various means of operation
[9] Cooperation with the implementation of the policies of the MLIT, [10] Cooperation with local government projects, [11] Study session with the academia and the private sector

Table 3 lists the implementation status of [1] joint research projects in FY 2017. The table below lists the number of research projects conducted as [2] contracted research (public offering at research facilities) and [3] contracted research (public offering at councils). Table 4 shows main joint research projects conducted with private companies and universities including ones listed in the tables below.

Type	Name of councils	Number of research projects
Public offering at research facilities		3
Public offering at the MLIT council		
	New Road Technology Meeting	23
	R&D of River Sediment Control Technologies	10
	Sewer B-DASH	18
	Council for the Development of Next-generation Infrastructure Inspection Systems	1

Table 3: Joint research projects conducted in FY 2017

Themes of joint research	Partners	Research period	Assigned departments and centers
Research on zero-energy houses	Building Research Institute, Japan Sustainable Building Consortium	2009–2017	Houses and construction
Joint research on methods to evaluate energy conservation performance of houses and buildings	Building Research Institute, Institute for Building Environment and Energy Conservation	2012–2017	Houses
Joint research on the evaluation of the permeation resistance of river levees	Public Works Research Institute	2014–2017	Rivers
Joint research on the application of the statistical information of people's behavior based on the operation data of mobile phone base stations on traffic planning	NTT Docomo	2014–2017	Social capital management City
Joint research on the study on earthquake risk management at airports	Shinozuka Research Institute	2014–2017	Airport
Joint research on the development of emergency restoration system for ports and coastal disaster management facilities after the onset of major disasters and the development of marine transportation system for emergency aids	Disaster Prevention Research Institute, Kyoto University	2015–2017	Ports and harbors, coast and ocean, disaster management
Research on technological standards in the field of construction, housing, and cities	Building Research Institute	2016–2021	Construction, Houses, City
Joint research on the advancement of technologies to evaluate the risk of landslide/mudflow	Osaka University, Fujitsu Laboratories, Chuden Engineering Consultants, Eight-Japan Engineering Consultants	2016–2017	Sediment damage
Joint research on methods to evaluate technologies to investigate road structures below the road surface	Public Works Research Institute, prefecture of Kyoto, Kyoto University	2016–2017	Road structures
Joint research on ways to use condition forecasting methods using road bridges inspection data	Kyoto University, prefecture of Kyoto, Public Works Research Institute	2016–2017	Road structures
Research on the early detection of landslide/mudflow using observation and monitoring data in river basins in mountains	National Institute of Advanced Industrial Science and Technology	2016–2018	Sediment damage
Joint research on the development of methods to monitor landslide/mudflow using Daichi 2, the advanced land observing satellite	Japan Aerospace Exploration Agency	2017–2019	Sediment damage
Joint research on the technological development for the practical application of next-generation cooperative ITS	Automobile manufacturers, Electrical manufacturers, relevant foundations, highway companies, and among others in 29 companies and 32 organizations	2017–2019	Road traffic
Joint research on the use of AIS data in the development and use of ports and harbors	Service Center of Port Engineering	2017–2019	Ports and harbors
Joint research on the experiment to verify the earthquake resistance of mixed-structure buildings constructed using new wood materials	National Research Institute for Earth Science and Disaster Resilience	2017–2021	Construction

Table 4: Examples of joint research projects conducted with private companies and universities in FY 2017

Type	Title	Objective and type of cooperation	Participants	Research period	Assigned departments and centers
[3][4]	R&D on infrastructure structures and inspection devices for the advanced inspection of social infrastructures	・Provision of fields using robot technologies developed by the private sector ・Use of specialized organizations based on the adaptability of technologies	Joint research group (Public Works Research Institute, private organizations)	2016–2018	Social capital management
[3]	Sewage system innovative technology experiment project (B-DASH project)	Use of local governments, private companies, and universities for the practical application of innovative technologies which are yet to become common in sewage systems	Joint research group (universities, private companies, other national institutes, local governments, etc.)	2011–	Sewage system
[4]	Reinforcement of resilient disaster management and damage reduction functions "Development and application of technologies to observe, analyze, and forecast water-related disasters"	Use of advanced meteorological observation technologies and special organizations on localized heavy rain forecasting technologies for the social application of technologies to forecast damages caused by localized heavy rain	National Institute of Information and Communications Technology, Osaka University, National Research Institute for Earth Science and Disaster Resilience, Japan Weather Association, Railway Technical Research Institute, etc.	2014–2018	River and sediment damage
[6]	Experiment conducted through public offering to prepare required functions of in-vehicle sensing system	An experiment was conducted through public offering to examine necessary functions for road management concerning being developed in private companies	Private companies (9 parties)	2016–2017	Road traffic
[7]	Social experiment on ETC 2.0 vehicle operation management support service	Service providers and distribution companies were selected through public offering, and experiments were conducted to realize ETC 2.0 vehicle operation management support service	private companies (9 service providers, 20 distribution companies)	2015–2017	Road traffic
[8]	Regional road economy strategy workshop and regional workshop	・Use of administrative needs and knowledge of universities by examining unique themes of individual regions ・Matching with administrative needs to promote innovation in road policies	universities, MLIT, Regional Development Bureaus	2015–	Road traffic
[9]	Cooperation with local governments implementing area management in the research on road traffic safety in residential roads	Technological cooperation for the effective implementation of road traffic safety measures (local government: Implementation of measures, NILIM: Technical consultation, etc.)	Cities of Yokohama, Hamamatsu, and Kurume	2016–	Road traffic
[10]	Cooperation with local governments in studies on the identification of road traffic conditions	・NILIM conducts traffic analysis, and local governments (road administrators) and businesses conduct stakeholders meetings to solve problems under proper allocation of roles.	Prefecture of Ibaraki	2013–	Road traffic

4. In the end

In addition to the above, research projects are being conducted under various types of cooperation and coordination, such as research projects and the revision of technical standards conducted through the cooperation of industry, academia, and the private sector as the committee activities of the academic societies. The NILIM is going to conduct research projects through various types of cooperation among industry, academia, and the private sector to produce better research outcomes and realize their social applications.