



## Science, Technology and ICT Newsletter (NO.77)

### MSIT to Kick Off the 2022 Digital Twin Pilot Project

**The Ministry of Science and ICT (Minister Lee Jong-Ho, MSIT) announced on May 31 that it will begin a pilot project to promote the growth of digital twin\* market with the National Information Society Agency (President Moon Yong-sik, NIA) and National IT Industry Promotion Agency (President Heo Sungwook, NIPA).**

\* Digital twin: A digital twin is a virtual representation of an object or system that is synchronized with the real world and can run simulations on control, analysis, and prediction +to obtain helpful information for decision-making in real life. The technology can be applied to diverse sectors such as manufacturing, safety, environment to enhance efficiency and safety.

The Ministry will invest a total of KRW 25.95 billion this year, which is an increase of KRW 6.45 billion from the previous year, to support three demonstration projects\* and 15 tasks.

\* Embracing 5G-enabled digital twin in the public sector, making the national infrastructure smart, establishing a digital twin-based smart response system for urban flooding.

The two projects that have delivered exceptional outcomes last year, which are the Smart Maritime Logistics System project and the Digital Twin Water Management Platform project, were selected to receive continuous support this year to further upgrade and advance relevant technologies.

The project that conducted an integrated analysis of shipping-ports-logistics data, for the first in the world, seeks to expand the scope of analysis of ship operation data (before: coast→ after: every port) within this year, increasing the accuracy of predicting the port arrival and departure of ships and reducing the time for logistics operation with simulations on moving containers. It is expected that these efforts will contribute to increasing the utilization of smart port logistics systems by Smart Maritime Logistics System.

The Digital Twin Water Management Platform project seeks to make water management smart. The high-precision spatial information from the previous research will be integrated with water depth information of major confluence which will enable precise simulation results to be obtained. The number of embankments to conduct vulnerability assessment will be increased from five to 10 or more to prevent flooding.

In particular, an Information Strategy Planning (ISP) will be established through this project based on last year's empirical results, which will be expanded to the five major rivers across the country from next year through the Ministry of Environment's project.

Another project aims at applying digital twin technology to wind power generators in order to support carbon neutrality efforts.

The project will enable predictive maintenance of wind power generators that use machine-learning to predict failures by creating 3D models of wind power generator parts and installing vibration and heat sensors and battery health prediction devices. Under the project, wind power generation efficiency will also be enhanced with simulations to optimize energy generation.

A pilot project aimed at moving simulation to the cloud with SaaS\* software will be newly implemented to establish an enabling environment for widespread deployment of homegrown digital twin technology.

\* Software as a service (SaaS): SaaS allows users to connect to and use cloud-based apps over the Internet and do not require installing software on the user's PC.

Simulation is a key element of the digital twin technology to support optimal decision making through prediction and simulation. For this year's pilot project, technologies of domestic companies - simulation technology for analyzing fluids such as heat and air, and molecular simulation technology for analyzing the synthesis of catalyst for batteries - were selected to receive support to use SaaS simulation solutions, in an effort to strengthen the technological competitiveness of relevant companies.

Various other projects to prevent disasters and ensure safety were included, from demonstration project to minimize recurring flood damage (Gwangju Metropolitan City), to a project to establish a monitoring platform for aging underground pipelines in industrial complexes (Ulsan National Industrial Complex), to a demonstration project for safety management of public facilities such as Jagalchi Market in Busan.

Deputy Minister Park Yun Kyu of the Office of ICT Policy said, "The MSIT has significantly expanded the number of pilot projects to ensure the effective implementation of the government-wide Strategy to Facilitate Digital Twin, announced in September 2021.

He added, "We will continue efforts to sharpen technological edge and support industrial growth by developing core technologies that can foster an enabling digital twin ecosystem led by the private sector and actively identifying and promoting demonstration projects in emerging areas of science and technology."

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## 1. Going global

### 1.1 The IMPC-INFRAFRONTIER Seoul Meeting 2022 Runs from May 8-10

The Korea Mouse Phenotyping Center (KMPC\*, Director Seong Je-Kyung) will hold IMPC\*\*-INFRAFRONTIER\*\*\* Seoul Meeting 2022 ("IMPC Meeting") attended by world-renowned mouse researchers, academics and major mouse researchers from home and abroad, under the theme of "BioResources for Genomic Medicine" from May 8 to 10 at Four Seasons Hotel Seoul, Korea (Sponsored by the Ministry of Science and ICT).

\* A non-profit corporation supported by the Ministry of Science and ICT to establish Genetically Engineered Mouse (GEM) related infrastructure

\*\* International Mouse Phenotyping Consortium (IMPC): An international mouse phenotyping consortium established in 2011 led by the U.S. and the EU, with the goal of analyzing gene expression

(From Korea, the Korea Mouse Phenotyping Center (KMPC) participates as an institutional member)

\*\*\* INFRAFRONTIER: An EU-funded initiative with the aim to implement a sustainably financed pan-European bioresearch infrastructure that provides capacities for the systemic phenotyping and archiving, etc. of mouse models to the biomedical research community.

The annual IMPC meeting was held in the U.S., Europe, and Asia under themes related to the production of genetically modified mouse and phenotype analysis. This is the second time the event is held in Korea since 2015, with about 200 people from IMPC member institutions, including principal investigators and experts from the industry, academia, and research community from home and abroad.

The IMPC Meeting includes a session to be co-hosted with Nature Metabolism, one of the sister journals of Nature, which is expected to strengthen exchanges with Nature stakeholders, helping to widen the reach of domestic metabolic research and take it to another level.

This year's meeting is held under the theme of "BioResources for Genomic Medicine" and features six sessions covering topics including the developments of IMPC projects, rare diseases and omics in mouse model.

Dr. Radislav Sedlacek, the chairman of IMPC and the Director of Czech Centre for Phenogenomics will give a lecture on the developments of IMPC projects, followed by thematic lectures from Dr. Martin Angelis, the Director of the German Helmholtz Zentrum München, and Dr. Park Woong-Yang, Head of the INFRAFRONTIER project in Korea and Professor of Sungkyunkwan University School of Medicine. The event will also feature lectures from other 22 prominent academics from eight countries.

The session co-organized with Nature Metabolism will feature special lectures from Dr.

Christoph Schmitt, Chief Editor of Nature Metabolism and Dr. Philipp Scherer, The University of Texas Southwestern Medical Center.

During his opening remarks, Deputy Minister Koh Seo-gon of the Office of R&D policy of the MSIT said, "Today's event contributed to building even closer cooperative relationship between bio-resource related organizations from in and outside the country as well as the Nature. It was also an opportunity to effectively promote domestic research results to the global academic community."

He added, "The government will make active efforts to continuously foster mouse infrastructure so as to facilitate the securing and utilization of quality bio-resources."

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## **1.2 Korea Joins the Steering Group for OECD's New Working Party on Artificial Intelligence Governance**

The Ministry of Science and ICT ("MSIT"; Minister Lee Jong-Ho) announced that Director Ko Sangwon of the International Cooperation Research Division of the Korea Information Society Development Institute (KISDI) was elected Vice Chair of the Working Party on Artificial Intelligence Governance (WPAIGO) under the Organisation for Economic Co-operation and Development (OECD) at the Party's first regular meeting held from May 24 to 25 in Paris, France.

The WPAIGO, a new working party under the Committee on Digital Economic Policy (CDEP) of the OECD, will provide a venue for discussions on the implementation of the OECD Principles on Artificial Intelligence and policies for trustworthy AI.

The first steering group will be composed of 12 members, including one chairperson (Germany) and 11 vice chairpersons (Korea, United States, United Kingdom, EU, Spain, Japan, Israel, Mexico, Poland, Slovenia, Turkey) and will take the lead in the activities of the WPAIGO.

With Director Ko being elected as Vice Chair, Korea will be able to participate in OECD CDEP and all five working parties under it, and is expected to continue to strengthen Korea's leadership in global policies for digital economy by actively participating in global discussions on AI governance as well as on cybersecurity, network infrastructure and data governance.

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## **2. Global cooperation**

### **2.1 MSIT to Support Mekong River countries' ability to address climate Change Based on Korea's Experience in Science and Technology Innovation**

The Ministry of Science and ICT ("MSIT"; Minister Lim Hyesook) held the first steering committee meeting of the Korea-UNDP cooperation programme Phase 3 on May 4 (Wed.) with the United Nations Development Programme (UNDP), Mekong River Commission and Mekong Institute to discuss the measures on implementing the project in full.

The MSIT signed a memorandum of understanding (MOU) to promote the Korea-UNDP cooperation programme Phase 3 in September 2021 to respond to developing countries' growing demand for Korea's experience in science and technology development.

The MSIT pledged to support four countries in the Mekong River Basin (Vietnam, Laos, Cambodia and Thailand) in their efforts for sustainable development of water-energy-food resources and climate change response by providing a total of \$4 million through UNDP contributions by 2025.

At today's steering committee meeting, the plan for Phase 3 cooperation programme, the role of each participating organization and detailed implementation plans for each project were discussed.

The participants agreed that active participation from the host countries and local actors is crucial in order to achieve the goal of this programme, which is to strengthen the autonomy and sustainability of the Mekong River region.

In addition, it was mentioned that joint participation from the four host countries in the Mekong River Basin will create opportunities to learn from one another, which will increase the effectiveness of the official development assistance.

The cooperation programme Phase 3 will soon be carried out in full, starting with identifying demand for technology in the Mekong River Basin through local investigations and advisory meetings of experts and stakeholders.

Director Kim Seong-gyu of the International Cooperation Bureau of the MSIT said, "We hope that the programme will serve as an exemplary case for the sustainable development of the Mekong River Basin through an integrated approach to water-energy-food resources."

He said, "The MSIT will actively share Korea's experience in science and technology policies and make efforts to apply excellent technology according to local conditions for a successful implementation of the Korea-UNDP cooperation programme."

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## **2.2 MSIT to Focus on Nurturing World-class AI Talent by Collaborating With US Carnegie Mellon University**

The Ministry of Science and ICT ("MSIT"; Minister Lee Jong-Ho) selected the Sogang University and Carnegie Mellon University Consortium as a project for nurturing world-class professional talent in strategic technology sectors such as artificial intelligence (AI). On May 24 (Tue), the unveiling ceremony of the consortium signboard was held to announce the launch of the project.

The ceremony was attended by those related to the project, including Director Song Sanghoon of the ICT Industry Policy Bureau of the MSIT, President Sim Jong-hyeok of Sogang University, President Jun Sung Bae of the Institute of Information & Communications Technology Planning & Evaluation (IITP) and Director John Kang of Asia Collaboration from Carnegie Mellon University.

The project provides Korean master's and doctorate students in the ICT field with customized local training in major fields of technology, such as AI, at top universities abroad.

Sogang University is the host organization in Korea and Carnegie Mellon University in the U.S., the world's third best university for computer science, will participate as an overseas partner university.

※ Carnegie Mellon University, along with MIT and Stanford University, is a world-class university in the field of computer science, including (ranked third in QS Universities Rankings), and is the first university in the world to open a machine learning department (2002).

The student selection process is currently in progress, and a total of 30 students will be selected by the end of May through procedures including application screening, math and programming tests, and English interviews.

The course will be held for six months from August to February 2023 at Carnegie Mellon University with an intensive curriculum on AI.

The course consists of four months of theoretical training, including AI, machine learning, and computer vision, and two months of practical projects to apply the theories learned.

Professors and researchers from Carnegie Mellon University's School of Computer Engineering and Software Research Institute will directly participate in this training.

Director Song Sanghoon of the ICT Industry Policy Bureau of the MSIT, said, "We plan to collaborate with renowned universities around the world to nurture professional talent who can lead 'super-gap' technology in AI, a strategic sector for the future."

He said, "In the future, we will collaborate with other outstanding overseas universities such as

Carnegie Mellon University and make efforts to help more Korean young talent receive world-class curriculum."

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### **3. ICT Trends of Affiliated Organizations**

#### **3.1 The National Radio Research Agency Announces the Adoption of 4 Information Security Standards as ITU Standards, an Effort Led by Korea**

The National Radio Research Agency under the Ministry of Science and ICT (Minister Lee Jong-Ho, MSIT) announced that at the “International Telecommunication Union’s Telecommunication Standardization Sector (ITU-T) Information Security Study Group 17 (SG17\*)” (Chairman: Mr. Heung Youl YOUM, Professor of Soonchunhyang University) which was held virtually from May 10 to May 20, four international standards including 5G security and security of quantum cryptography communication, developed by Korea were adopted in advance\*\* and three new standard development tasks were approved. It was also announced that Korea was reelected to 17 seats of the ITU-T SG 17 group of Chairmen and Vice Chairmen.

\* SG17(Study Group 17): responsible for standard development in security-related work across all ITU-T Study Groups

\*\* the stage right before the final adoption of standards, finally adopted if there is no objection when circulated by member states

The ITU-T Technical Report on successful use of security standards adopted previously deals with 5G security, the Internet of Things (IoT) security, and security technologies for quantum cryptography communication.

In 5G security, ① security guidelines for IMT-2020 communications system and ② standards for IMT-2020-based vertical service security requirements supporting highly reliable communications with ultra-low latency define key security-related components in the overall 5G communication system and convergence service environment of 5G private network, and propose security threats and functions in relation to this. Thanks to this, when establishing and operating 5G communication system and 5G private network, security will be enhanced.

In IoT security, ③ the standard for security requirements of IoT devices and security gateways analyzes the security threats that may come from IoT devices and security gateways and define relevant security requirements. This standard reflects the standard for information security verification such as domestic devices for connecting to information and communication network. This will be helpful for industry such as domestic IoT manufacturers to advance into and gain dominance in global market in preemptive manner.

In quantum cryptography communication security, ④ the Technical Report on hybrid key agreement using Quantum Key Distribution (QKD) network is a report that analyzes the areas where standardization is required, based on the current status of ongoing standardization activities in international standardization organizations for enhancing interoperability of QKD network with the existing cryptography system. This report will be useful when the domestic cryptography communication industry deploys and adopts QKD network and needs further information.

In addition, three new standardization tasks, including security technologies for protecting

storage infrastructure from malicious codes such as ransomware proposed with technologies of Korea's small and medium-sized enterprises (Namu Soft), and security technologies for responding to targeted email attacks (Kiwon Tech) will be approved at this meeting and relevant research will be conducted from this year.

Two new standardization tasks proposed by Namu Soft and Kiwon Tech develop standards for domestic associations, based on the consulting service on ICT standards provided by the Telecommunications Technology Association (TTA) with the support from the MSIT. This has led to the achievement of them being approved as new standardization tasks in this conference.

Furthermore, as a new research session (2022-2024) has begun since the World Telecommunication Standardization Assembly (WTSA) hosted last March, discussions for restructuring the group of Chairman and Vice Chairmen (five working groups, 12 research groups) under the Study Group 17 has taken place.

Korea was reelected to 17 seats of the ITU-T Information Security Study Group (SG17\*) of Chairmen and Vice Chairmen (one seat for international Chairman, two seats in the working group, 14 seats in the research task group).

\* The Study Group consists of a research task group responsible for developing standards and a working group which reviews and approves standards developed by the research task group.

The National Radio Research Agency said, "we will work together with experts from industry, academia, and research institutes in Korea in taking the lead in international standardization activities, based on our experiences and competency in fostering the Korean cyber security and information security industry in the middle of technological transformation."

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