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Korea to announce national strategy to become a technology hegemon

The 'National Strategic Technology Nurture Plan' was announced in the first 'National Science Technology Advisory Board Plenary Session' presided by the President Yoon Suk Yeol, on October 28 at Korea Institute of Science and Technology (KIST).

The National Strategic Technology Nurture Plan represents a national policy direction to foster strategic technologies that will contribute to future society and national security in the global tech competition era where new and core technologies determine the fate of national economy, security, and diplomacy. This is also a pan-government collaboration strategy to make Korea lead the technology competition rather than to follow already existing trends.

The National Science Technology Advisory Board is the highest decision-making body of science technology policies, and the President seats in the Chair position. The Board advises on science technology issues and policy directions, and reviews the science and technology innovation policies and R&D investments. This session was the first National Science Technology Advisory Board meeting since the launch of the new administration. The President Yoon participated as the Chair, and the President Lee Woo

Il of Korean Federation of Science & Technology Societies was newly appointed as the Vice Chair. Nineteen Counsellors from the private sector participated and Deputy Prime Minister of Economy and Finance, Minister of Science and ICT, Minister of Trade, Industry and Energy, Minister of SMEs and Startups, Vice Minister for Science, Technology and Innovation, Vice Minister of Education, Senior Secretary to the President for Economic Affairs, and Secretary to the President for Science and Technology participated from the government to discuss the national strategic technology nurturing measures in depth.

Major content of the 'National Strategic Technology Nurture Plan' is as following.

1. Background and Significance

As shown in the global tech competition such as semiconductor export restriction measures of the U.S., science technology determines nation's economy, industry, and further, cross-border alliances and diplomacy.

Accordingly, major countries are embodying national strategies in order to secure the dominance in the tech competition. Countries are selecting ten to twenty strategic technologies that are crucial to the nation, and increasing investments as they reinforce promotion measures including legal enactment and organization establishment.

Science technology is the source of Korea's economic growth and national competitiveness. Based on outstanding technology in semiconductor, display, and communications, Korea could leap to become the economically strong country. In the past, Korea attained economic sovereignty through building strong science and technology nation, but now, Korea is facing a systematic change of digital transformation and unrivalled tech hegemony.

Amid the fierce tech competition, there is rising pressure to countries to secure technology sovereignty by focusing on strategic technologies that have influence on national economy, diplomacy, and security. In addition, national R&D should focus on the performance outcomes to secure the technology super gap and further, aim to widen the gap by strengthening private-government collaboration based on clear national agenda.

Korean government will select the 'National Strategic Technologies' that are important to Korea's economic security and strategic growth, under the vision of "Securing Technology Sovereignty and Future Growth by Nurturing National Strategic

Technologies." Korea also drew up the 'National Strategic Technology Nurture Plan' as a pan-governmental strategy to concentrate the capacity of private and government sectors.

2. Selection of 12 National Strategic Technologies

National Strategic Technologies were selected after a thorough study and investigation based on internal and external circumstances along with the strategic significances in the aspect of supply chain, trade, new industries, diplomacy, and national security. In order to take every technology and security changes into consideration, government conducted additional survey based on the 10 critical and emerging technologies selected last year, and went through expert evaluation and private-government cooperation analysis. Specifically, in the selection process, the Technology Expert Committee of the National Science Technology Advisory Board led the evaluation with their expertise in national R&D policies and projects, and another advisory committee of diplomacy and national security experts gathered to examine the selection process.

In conclusion, 12 national strategic technologies were selected: semiconductor and display, secondary cells, leading-edge mobility, next generation nuclear energy, leading edge bio, aerospace and marine, hydrogen, cybersecurity, AI, next generation communications, leading edge robotics and manufacture, and quantum.

In addition to selecting the 12 strategic technologies, 50 sub-specific technologies, such as AI semiconductor and synthetic biology, to receive intense support were defined, and short term to mid-long term technology development directions were presented. For specific technologies, government plans to set mission-oriented goals to concentrate policy support, such as R&D investment, cross border cooperation, and talent nurture. At the same time, government will supervise them with national assessment including technology performance evaluation, R&D projects, and paper and patent examination.

The National Strategic Technology and the sub-specific technologies will be regularly evaluated and improved in consideration of technology development trends, technology security circumstances, and policy demands.

3. Promotion of the 'National Strategic Technology Project'

The 'National Strategic Technology Project (hereinafter referred to as the Project)' will be promoted to secure irreplaceable supergap technologies by encouraging private and government sectors to work together in goal setting and joint investments.

By setting clear missions that require national effort, industries will participate in overall process including initial goal setting. Further, in accordance to the technology capacity and market maturity, the collaboration between private and government will expand. In addition, a chief expert from private sectors will be given the highest discretion authority over general project design, management, and evaluation. Through detailed performance evaluation, optimal support system will be set to produce more tangible outcomes in five to seven years.

About ten projects will be chosen depending on their urgency and impact. Detailed promotion plans will be specified and announced by the end of this year. Since vast investment is already made to the 12 National Strategic Technologies, the Project will be conducted to enhance mission-orientation and to expand the collaboration with existing R&D projects. The next generation nuclear energy and quantum fields will be the primary 'National Strategic Technology Project' to be promoted.

Starting from next-generation nuclear energy and quantum, Korean government will support prompt planning and commencement of eight additional projects by the end of 2023. During the process, private sectors will voice their suggestions and related ministries will submit the project plan. Then the fast-track method, introduced last September as a part of improvement to the R&D preliminary feasibility test in order to bring swift commencement, will be applied in various occasions.

4. Intensive Nurturing Measures for the National Strategic Technology

I. Focusing on policy and investment supports based on the Strategy Implementation

1) Korea will increase strategic investment by establishing strategy roadmap for each technology.

Korea will continue to expand the R&D investment on the 12 National Strategic Technology, and newly invest 265 billion won to technologies that have urgent need for growth, such as 5G open ran, quantum computing, sensors, and innovative SMR. In order to strengthen qualitative strategic R&D investment, government will establish pan-government strategic roadmap that clarifies national missions and development goals of sub-specific technologies. By identifying each ministries' strategies and goals for each technology, definite measures of R&D investment and international cooperation can be decided. The plans and strategies for each ministry will be connected

to the National Strategic Technology Promotion System to support technology development, regulation innovation, and industry ecosystem creation. To actively support cutting edge materials, parts, and equipment that are necessary in securing competitiveness of the strategic technology, R&D agendas and support system will be promoted while intimately connected with the National Strategic Technology.

2) Korea will support great outcomes by managing mission-oriented R&D investment

Regarding the 12 National Strategic Technologies, 18 ministries and agencies are already promoting related projects, but in order to create more tangible outcomes, the collaboration among ministries and agencies are essential.

Current system of budget allocation and arrangement hinders intimate collaboration, so the integrated pan-government budget allocation method will be introduced to analyse and make R&D projects more mission-oriented. In addition, government will separately manage core projects individually to secure strategic technology, and it will strategically concentrate the budget to guarantee performance outcomes.

Also, in order to promptly and flexibly respond to the fast-changing technology trends, improvements made in the R&D preliminary feasibility test last September will also be applied to the National Strategic Technology R&D projects. Introduction of the Fast-Track system will enable quick project initiation, and dramatic trend changes will be timely dealt by rectifying the submitted plans.

II. Building Fosterage Foundation for the National Strategic Technology

3) Korea will focus on core talent securement

To come up with the systematic talent nurture policies, government will analyse detailed human resource statuses such as the number of domestic and foreign researchers, research institutes, and the level of their studies. Based on the analysis, customized talent securement measures such as regulation improvements, curriculum creation, and system establishment will be promoted in consideration to the level of technology development.

4) Korea will strengthen international cooperation in science technology field

The government will decide major cooperation countries for each technology, and

strengthen strategic partnership through international joint research, talent exchanges, and international cooperation hubs. Specifically, Korea will participate more in the huge R&D cooperation projects where multiple countries take part, and will strengthen allies in science technology field with tech hegemons such as the U.S. and the EU in connection to the nation's diplomacy and security.

In the fields where patent preoccupancy is important, such as AI or 6G, Korea will strengthen policy cooperation with other developed countries through activities in International Organization for Standardization (ISO) and standardization committee. In addition, to lead technology development to lead global standard, government will support nurturing standard experts and developing standards through private-government cooperation. Korea will also reinforce research security system in order to avoid non-ally information leak of core research assets shared among major countries. Particularly, government will draw up researcher guidelines after a thorough foreign case analysis regarding research confidentiality issues.

5) Korea will strengthen industry-academia-research cooperation with the National Strategic Technology Hub

Korean government plans to designate and nurture industry-academia-research cooperation hub in consideration of technology capacity and properties. Research groups within universities will be fostered to lead the cooperation, nurture talent, and accumulate technologies through stable long-term researches, and government will support establishment of corporate collaboration research labs within research institute or on campus to reinforce cooperation in major materials, parts, and fundamental technology development.

The government-funded research institutes will act as the foundation of strategic technology securement and upgrade the roles and responsibilities of themselves in the process. The institutes will invigorate integrated researches with each other, and draw out mission-oriented research tasks via R&D Strategy Committee. In particular, for research fields that lack foundation despite the urgent need for stable long-term support, dedicated research institutes will be designated to speed up the technology chase.

In addition, special zones and districts for local technology innovation where government funded research institutes and universities can collaborate will be established to support strategic industrialization of technologies, such as technology exchange and lab establishments.

III. Establishing Comprehensive Promotion System to achieve Technology Sovereignty

6) Korea will establish private-cooperation-centered strategic technology governance system

Within the National Science Technology Advisory Board, the 'National Strategic Technology Special Committee (hereinafter referred to as the Special Committee)' will be established. It will supervise and arrange overall strategic technology policies by designating strategic technology and establishing basic plans. The National Strategic Technology Project Promotion Committee will be established and operated under the Special Committee to create strategic roadmap for each technology, and specify private-government cooperation strategies.

The private-government joint promotion team will be established under the Office of Science, Technology and Innovation to operate the Special Committee, arrange strategic technology policies, and discover and promote related projects. The team will consist of experts from related ministries and professionals of technology, diplomacy, and security background to jointly work together.

Based on the comprehensive analysis of global industry trend, international standards, and distribution of core researchers, strategic technology policy centers and the National Technology Strategy Centers will be expanded to support pan-government policy design and to act as the think-tank for the technology analysis and strategy establishment.

7) Korea will build strong foundation by legislating 'Special Act on the National Strategic Technology'

In order to build institutional foundation, the 'Special Act on the National Strategic Technology' will be enacted. The Act will provide legal base for designation and management of strategic technologies and collection of private-government capabilities. With the Act, Korea will strengthen all-round support measures such as priority R&D investment, challenging R&D promotion, outstanding talent fosterage, industry-academia cooperation, and international cooperation.

In addition, market-led technologies will be supported under the 'Cutting Edge Industry Act' to receive technology protection and infrastructure aid, and cutting-edge materials will be supported under the 'Special Act on Materials, Parts, and Equipment'.

5. Expected Outcomes and Changes

By promoting the National Strategic Technology Nurture Plan without any setbacks with the goal of securing technology sovereignty and becoming global tech hegemon, Korea will enlarge the number of strategic technology fields that Korea possesses more capacity than 90% compared to that of the most developed country, from three in 2020 to eight in 2027. In consequence, it will contribute to market share expansion and core technologies securement in each National Strategic Technology fields, and lead global super gap technology.

Ultimately, through successful establishment and promotion of the 'National Strategic Technology Nurture Plan,' Korea will become the country with technology sovereignty that leads future economy, new industries, diplomacy, and national security.

In the field of economic security, Korea will secure the highest competitiveness in the cutting edge industries, such as semiconductor and secondary cells, using super gap technology, and preoccupy irreplaceable core technologies of supply chains to leap toward technology hegemon. In the field of new industries, Korea will nurture global enterprises to lead future markets, and foster future innovative technologies that will change our lives, such as AI, space, and quantum. In the aspect of diplomacy and national security, Korea will apply high technology to the army to securely protect our people, and secure our position as global center of technology diplomacy and security alliance.

Minister Lee Jong-Ho of Science and ICT said "Amid the geopolitical composition where science technology is the center of international relationships, government and private sectors should all make full efforts in nurturing the 12 National Strategic Technologies, which are the key links that connects national security and economy." He added, "The Ministry of Science and ICT will realize the future growth and technology sovereignty by collecting wisdom from all sectors and concentrating all the capacities, with the National Science Technology Advisory Board as the center regarding the strategic technologies that determines significant national interest."

Going Global

Korea to be elected as ITU Council member for the ninth time

The Ministry of Science and ICT (MSIT, Minister: Lee Jong-Ho) and the Ministry of Foreign Affairs (Minister: Park Jin) announced that Korea was elected to serve the Council of the International Telecommunications Union (ITU) for the ninth consecutive time. At the election held on October 3 at Bucharest, Romania, Korea was elected to take one seat in the Council among 13 seats designated for Asia and Australia region.

ITU is one of the United Nations Agencies, and it is the oldest and the biggest international organization specialized in the information and communication technology. Since the first election on 1989, Korea was elected for eight consecutive times to serve the Council for 32 years. Korea actively participated at the ITU Council strategic direction setting, budget planning, and decision making processes.

With the pride that the election implies competitiveness of Korea's ICT technology, MSIT will make full efforts to take a leading role in ICT field.

Global Navigation Satellite System Experts to Gather in Korea in 2025

At the 16th Meeting of the United Nations International Committee on Global Navigation Satellite Systems (UN ICG) closed on October 14, the Ministry of Science and ICT ("MSIT," Minister Lee Jong-Ho) and the Ministry of Foreign Affairs ("MOFA," Minister Park Jin) announced that Korea will be hosting the 19th UN ICG in 2025.

The UN ICG, an intergovernmental organization under the UN established in 2005, promotes the use of satellite navigation systems and organizes annual meetings that invite more than 300 government officials and technical experts in the second half of the year in one of the member countries to discuss and adjust satellite navigation systems' signals, services, diffusion, use and performance improvement.

The UN ICG has 13 Members* that have or are developing satellite-based positioning systems or satellite-based augmentation systems, 12 Associate Members** that are related to the development and use of satellite-positioning, and nine Observers***.
* Republic of Korea, United States, Russia, China, European Nation, India, Japan, Italy, Malaysia, United Arab Emirates, Australia, Nigeria, New Zealand
** UN OOSA, CGSIC, etc.
*** ITU, COSPAR, APSCO, etc.

Starting this year, Korea has begun to develop the Korean Positioning System (KPS), which provides the Positioning, Navigation, and Timing (PNT)* information, in order to constitute essential building blocks of the Fourth Industrial Revolution.
* Positioning, Navigation, Timing ** Korean Positioning System

The Korean government pushed for Korea's membership in the UN ICG to secure bilateral and multilateral cooperation channels for signal, frequency services, and technology development with countries that have developed their own satellite navigation systems. As a result, Korea's membership was approved in 2021.

Korea's hosting of the UN ICG annual meeting is expected to contribute to sharing the state of the KPS development and the use of satellite navigation systems, promotion of technology exchange in the satellite navigation domain, and expanding cooperation between Korean experts/businesses and Member countries' experts.

Director General Kwon Hyun-joon of Space, Nuclear and Big Science Policy Bureau said, "Hosting the UN ICG Meeting in 2025 will provide a chance for Korea to play a leading role in the satellite navigation domain, along with the six countries that have their own satellite navigation systems - U.S. (GPS), Russia (GLONASS), EU (Galileo), China (BDS), India (NavIC) and Japan (QZSS). The government will make meticulous preparations to become the seventh full-fledged space power. "

Going cooperation

Korea-Turkey Science and Technology Cooperation Agreement Comes into Effect

The Agreement between the Government of the Republic of Korea and the Government of the Republic of Turkey on Cooperation in the field of Science and Technology ("Korea-Turkey Science and Technology Cooperation Agreement") signed on October 22, 2021 in Seoul, enters into force on October 22, following the completion of the necessary domestic procedures on both sides.

※ (Science and Technology Cooperation Agreement) An Agreement that establishes the institutional foundation between two countries for promoting cooperation in the field of science and technology, such as information sharing, people to people exchanges, and research projects.

The entry into force of the Agreement is expected to expand bilateral cooperation in science and technology, by facilitating talent and information exchanges between the two countries in the field of science and technology, and promoting collaborative projects and joint academic conferences.

※ The Agreement establishes a joint committee to make decisions on areas of cooperation; create a favorable environment for the Agreement's implementation; promote and support the implementation of joint projects; and propose and approve cooperation projects.

With the Agreement with Turkey taking effect, Korea will have a total of 49 science and technology cooperation agreements. The Korean government plans to actively expand trade and people to people exchanges with other countries and pursue more science and technology cooperation agreements to expand cooperation in science and technology.

※ Science and Technology Cooperation Agreements
- (North and South America) U.S., Canada, Brazil, Chile, Argentina, Venezuela, Costa Rica, Paraguay, Colombia, Dominica
- (Europe) Spain, France, Italy, UK, Germany, Finland, Hungary, Russia, Greece, Poland, Ukraine, Slovenia, Turkey, Albania, EU, Czech Republic, Slovakia, Switzerland, Sweden
- (Asia) India, Thailand, Japan, Malaysia, Philippines, Pakistan, China, Kazakhstan, Sri Lanka, Uzbekistan, Vietnam, Bangladesh, Singapore, Australia, Turkmenistan
- (Africa & Middle East) Egypt, Tunisia, Israel, South Africa, Ethiopia

The Second Korea-Australia Tech-Bridge Workshop to be Hosted

The Ministry of Science and ICT ("MSIT"; Minister Lee Jong-Ho) announced that the second Korea-Australia Tech-Bridge Workshop will be hosted in Sydney, Australia.

The second Tech-Bridge Workshop is hosted by the Ministry of Science and ICT of Korea and the Department of Industry, Science and Resources (DISR) of Australia, and is organized by the National Research Foundation of Korea (President Lee Kwang-bok) and the Australian Academy of Technological and Engineering (ATSE). The event will take place for two days from October 24 (Mon) to October 25 (Tue).

※ DISR: Department of Industry, Science and Resources
ATSE: Australian Academy of Technological and Engineering

In the fourth Joint Committee Meeting on Science and Technology held in September 2019, the two sides agreed to host Tech-Bridge Workshop, in which researchers from industry, academia, and research institutes take part, to promote researcher mobility and facilitate cooperative activities between the two countries.

At the second Tech-Bridge event, researchers from Korea and Australia share the current status of research on the development and utilization of cube satellites and freely exchange opinions on carrying out future cooperation.

※ A CubeSat is a micro satellite based around a form factor consisting of 10cm cubes (1 unit, less than 1kg), and it can be manufactured in various forms, if a number of basic units are attached.

※ The first Tech-Bridge event was held under the theme of "Artificial Intelligence Applications in Response to Pandemic" (September 2021, virtual event)

Thanks to the Tech-Bridge Workshop, Korea and Australia will raise understanding of the ongoing research activities in relation to the topic of the event, explore the possibility of implementing future cooperation, and increase networking between researchers of the two countries.

Director General Kim Seong Gyu of the International Cooperation Bureau of the MSIT expressed high hopes for laying the foundation for the two countries to work together in the field of cube satellites, a promising industry that will have more use cases in the future. Director General Kim further commented, "The partnership between Korea and Australia in science and technology will be expanded by fostering researcher exchanges, based on cooperative activities such as Tech-Bridge Workshop."

Achievement

Korean scientists to develop world's first soft actuator used in micro aquabots

The research team led by Professor Cho Jin-Han (Korea University) and Professor Koh Je-Sung (Ajou University) secured the technology that enables manufacture of the high conductivity, high elasticity hydrogel electrodes and successfully developed high-performance low-power soft actuator and insect-scale aquabots.

The research was conducted with support from the Ministry of Science and ICT (MSIT, Minister: Lee Jong- Ho) under the Individual Basic Research Project aid, and it was published in the international journal "Science Robotics" on October 27.

Hydrogel has great functionality and stimuli-response and draws attention as a core element of next generation micro robot actuator. However, in the past, hydrogel actuators worked with the osmotic pressure response of external stimuli, so it was slow in operation and difficult in control to be used in complex robotic systems. Electric stimuli could open possibility of higher performance, but with highly moist property of hydrogel, effective use of electric stimuli was considered limited.

To overcome such limits, research team evenly applied a layer of electrodes on the membrane of hydrogel, and utilized hydrogel's contraction to make wrinkled electrodes. As a result, high elasticity and conductivity were both secured, and the team confirmed that it can be used in soft actuators.

Compared to the soft actuators from the past which required more than 1,000 V to operate, the newly developed soft actuator can be operated with less than 3 V, and yet have more than 100 folds of energy density and more than 10 folds of performance density. Due to such features, it can be used in ultra-light micro robots. The research team applied the technology to actual robot and successfully developed insect-scale aquabots.

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