

Concepts and Progress of “Fourth Industrial Revolution Smart Defense Innovation”

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South Korea's national defense is confronted with various challenges and constraints, including uncertainty in North Korean threats, growing potential threats in the Northeast Asian region, spreading transnational and non-military threats, a demographic cliff and a subsequent shortage of military service resources, and restrictions in financial resources due to economic downturns.

Cutting-edge technologies of the Fourth Industrial Revolution (4IR), which are represented by Artificial Intelligence, Internet of Things, Cloud, Big data, and Mobile (AICBM), have been utilized and integrated in various fields and are expected to create sweeping transformations of national systems and the society as a whole. On the other hand, these changes present tasks for the ROK military, which is under difficult conditions to carry out defense policies, to prepare urgently against changing patterns of warfare and future operational environments caused by 4IR technologies.

Against this backdrop, there is greater need for the ROK military to overcome challenges in national defense by making full use of various environments embracing the 4IR. In this regard, opportunity factors include South Korea's existing world-class information and communication technology (ICT) infrastructure and technological prowess, promotion of the 4IR at the national level and national consensus building. The Ministry of National Defense (MND)

has been pushing ahead with innovation by actively utilizing 4IR-era science and technology. In accordance with the 'Defense Reform 2.0,' first announced in last July by the Moon Jae-in administration, the MND launched the 4IR 'smart defense innovation promotion group' in January, 2019.

Progress of “Smart Defense Innovation” Initiative

The 4IR, characterized by hyper-connectivity and intelligence made possible by digital technologies such as AI and big data, outruns previous revolutions in its scale, scope, and influence. Indeed, the 4IR has caused innovative changes in our everyday lives, from national systems, industries, and society to even quality of life.

Accordingly, the ROK government articulated a future vision of ‘a Human-centered Fourth Industrial Revolution based on national consensus’ and presented 4IR response plans addressing industrial innovations—in industry sectors such as medical, manufacturing, vehicles, and energy—and social issues—such as transportation, welfare, environment, and safety.

Likewise, the MND determined to overcome challenges caused by uncertain security environments and a sharp decrease in military service resources due to a demographic cliff, making full use of ongoing efforts such as nation-wide promotion of the 4IR and construction of world-class ICT infrastructure. To put in concretely, the MND set “active utilization of 4IR-era technology to overcome resource constraints and adapt to future operational environments” as one of the three pillars of the Defense Reform 2.0 and outlined relevant reform projects.

The MND, recognizing the need for a new integrated framework to provide comprehensive plans and stronger impetus in applying 4IR-based technology to defense, launched the “smart defense innovation promotion group” on January 14, 2019. And then, the MND selected tasks by innovation field as well as core projects that merit accelerated implementation. For the selected tasks and projects, the MND proceeds with budget plans for next year and for the 2020-24 mid-term period. On July 4, the Presidential Committee on the Fourth Industrial Revolution tabled an "Implementation Plan for the 4IR Smart Defense Innovation " and passed it at the 12th plenary session.

Since the dawn of history, state-of-the-art military science and technology has been recognized as the driving force behind military power that decides the outcome of war and development in weapons systems. Historically, nations possessing advanced military technology

have won and taken supremacy. Evidence of this is observed in cases like Iron Age civilizations superseding Bronze Age civilizations in 10th century BC, China's conquest of Central Asia through its invention of gunpower in the Middle Ages, or Western industrial powers' colonization of the East beginning in the 18th century.

The ROK military has continued to make technology-based military innovation efforts. For instance, in the 1990s, the concept of Revolution in Military Affairs (RMA) emphasized fundamental changes to the nature of warfare through application of military technical innovations, combined with changes in military doctrine and operational and organizational concepts. Recently, Creative National Defense aimed to create innovative value by infusing humans' creative thinking and advanced science and technology into all aspects of defense-related tasks. Up to this day, the ROK military has made periodic leaps steadily.

● **Past Efforts for Technology-based RMA**

Concepts	Main Contents
Creative National Defense (2015-17)	Infusing creativity and advanced science and technology into defense-related tasks; creation of innovative value
Green Growth (2008-12)	Development of energy & environmental technology and integration with existing duties; pursuit of growth
Network-Centric Warfare (2000s)	Pursuit of swift and decisive operational capabilities through information superiority in command and control/situation awareness(C2/SA)
Revolution in Military Affairs (1990s)	Combination of military technical revolution with military operational and organizational concepts; pursuit of transformation in the conduct of war

In this respect, the 4IR Smart Defense Innovation is in line with the ROK military's previous efforts for technology-based RMA. However, an overriding concern for the driving power makes different from the past. The ROK military aims to quickly apply 4IR technology to every field of defense taking into consideration of application scope, transformative effect and

development speed of the 4IR technologies, characterized as hyper-connectivity, hyper-convergence, and intelligence.

Concepts and Implementation Strategy

First, the MND will employ a “selection and concentration” strategy to focus on specific and feasible technical scope in pursuit of creating innovation engine with tangible results. Specifically, the MND will establish a scope of defense innovation based on 4IR technology, such as intelligence, unmanned technology, high-tech, and precision, and concentrate on the selected areas. In addition, the MND will designate core businesses and brands in the light of their potential ripple effects with tangible results and actively oversee implementation status to reflect them in budget plans.

Second, the MND will improve ‘culture and system’ by amending relevant laws and regulations and redefining roles and responsibilities (R&R) between organizations. To this end, the MND plans to identify necessary requirements for institutional improvement to ensure project completion and technology application, such as improvement of the wireless password policy and R&D system, and to proceed with the plan. The MND will also examine and pursue necessary adjustments in R&R between organizations and institutions following changes in science and technology in 4IR-era.

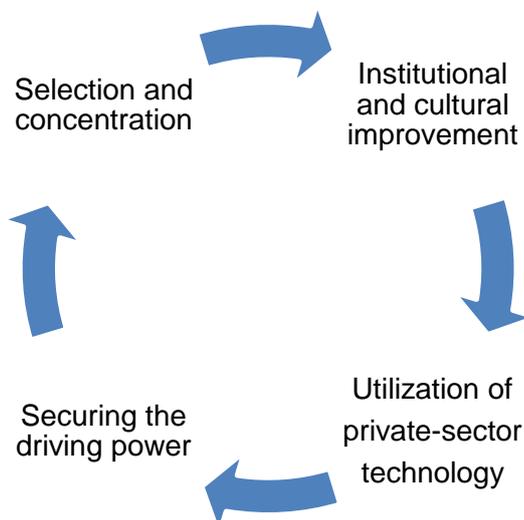
Third, the MND is taking measures to ‘secure the driving power.’ Through selective prioritization and implementation of essential projects, the MND intends to enhance executive ability and devise an implementation concept and mid- to long-term implementation strategies simultaneously. Selected projects as well as smart defense innovation plan will be reflected in next year's budget and 2020-2024 mid-term defense plans. That is, the MND plans to devise business plans and mid-to long-term roadmaps to proceed with its overarching goal of the smart defense innovation systematically.

Fourth, a ‘utilization of private sector technology’ is another important strategy. The MND will actively utilize private-sector 4IR technologies and experiences to accelerate their application to defense and forward defense innovation at the national level.

Lastly, to expand utilization of private sector technology in defense R&D, the MND plans to supplement related systems. In order to employ 4IR technology and products for military use, the MND plans to improve conditions to utilize the Advanced Concept Technology Demonstration

(ACTD) system. The MND will also create favorable conditions for supporting private-sector technological advancement, including the offering of test beds.

- **New Strategies for Fourth Industrial Revolution Smart Defense Innovation**



Three Key Areas	Eight Main Tasks
Innovation of Defense Management	Development of Live-Virtual-Constructive (LVC)-based combat-oriented warriors and units
	Improvements of quality of life for soldiers based on big data analysis
	Improvement of efficiency through effective management of defense resources
	Civil-government-military win-win cooperation in main tech sectors
Innovation of Technology and Infrastructure	Establishment of hyper-connected networks
	Securing superiority in cyber domain
Innovation of Weapon Systems	Securing core leading technology in weapon systems
	Securing weapon systems utilizing 4IR technologies

Through forward-thinking visions and implementation strategies, the MND defined three key innovation areas of defense management, technology and infrastructure, and set eight relevant tasks. The MND will drive momentum to carry out these tasks, beginning with a designation of 60 basic projects that merit urgent implementation and reflect them in defense budget plans.