"**Beyond Korea No.1**"

ktl Korea Testing Laboratory

2020. 10. 29.

Director of Digital Business Development Center

Jin-Yong KIM

Korea's only public comprehensive testing and certification organization.

" Beyond Korea No.1 "

Background of Establishment

Korea Testing Laboratory

- 1966. 4.13
- Financial assistance from UNESCO
- Fine Instrument Center (FIC)
- Improvement of industrial accuracy and quality

On April 13, 1966, Minister Park Chung-hoon of the Minister of Commerce and Industry, representative W.R Lucas of the UN Development Programme (UNDP), and UNESCO chief advisor John E. Steel signed the Operation Plans for the Korea Fine Instrument Center.

※Reference

Korea Institute of Science and Technology (KIST)

- 1966.2.10
- KOR-US Joint Statement with former US President Lyndon Johnson
- Korea Institute of Science and Technology (KIST)
- Serving as a seed to expand the country's R&D capacity
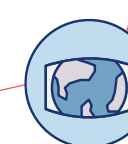
History

1966.04

National industrialization foundation
Establishment of the Korea Fine Instrument Center (FIC)

1983. 08

Leading SME Technical Support
Changed to the Korea Industrial Technology Center (KIMM)

1999. 03

International comprehensive test certification body
hanged to the Korea Testing Laboratory (KTL) under the Institute for Industrial Technology Evaluation and Planning (ITEP)

1989. 10

Specialization in Industrial Technology Test Evaluation
Changed to the Quality Evaluation Center under the Korea Quality Evaluation Center (KAITECH)

2006. 11

Global Corporate Support Organization
KTL established as an independent corporation

2015. 03

KTL Headquarters relocated to Jinju Innovative City in Gyeongsangnam-do

Key Responsibilities

01 **Supporting Government R&BD** — KTL supports national industrial development through research and development projects related with government-funded R&BD and establishment of system engineering and test and evaluation..

02 **Ensuring Public Safety** — KTL provides testing and performance evaluation services in order to ensure the safety of the national infrastructure, companies, and consumers.

03 **Supporting for Industries** — KTL supports the growth of companies through certification services, K-STAR company business, technical training, and fostering measurement standards.

Private Sector

Electronics	Environment	Correction
Medical devices	Materials	S/W communications

State Infrastructure Projects

Aerospace	Space	Rail
Defense	ICT	Energy (wind, solar, nuclear)

To objectively and accurately verify whether R&D outcomes meet the performance and safety requirements required in the domestic and international markets
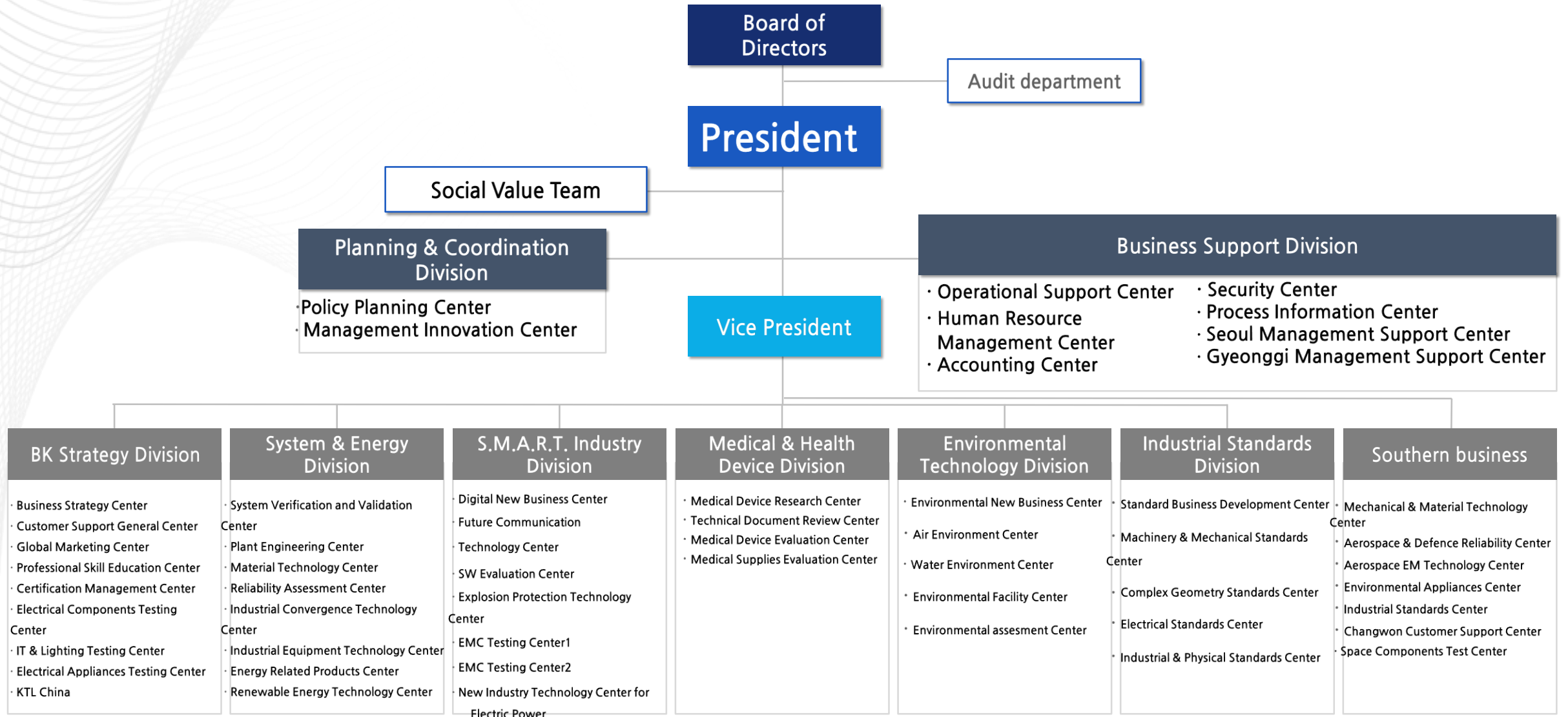
* Expertise accumulated for 54 years as Korea's only public institution that conducts comprehensive testing and certification

To secure national security, enhance export competitiveness, and contribute to the development of national infrastructure projects

Organization chart

Board of Directors

Audit department

President

Social Value Team

Planning & Coordination Division
· Policy Planning Center
· Management Innovation Center

Vice President

Business Support Division
· Operational Support Center
· Human Resource Management Center
· Accounting Center
· Security Center
· Process Information Center
· Seoul Management Support Center
· Gyeonggi Management Support Center

BK Strategy Division
· Business Strategy Center
· Customer Support General Center
· Global Marketing Center
· Professional Skill Education Center
· Certification Management Center
· Electrical Components Testing Center
· IT & Lighting Testing Center
· Electrical Appliances Testing Center
· KTL China

System & Energy Division
· System Verification and Validation Center
· Future Communication
· Plant Engineering Center
· Material Technology Center
· Reliability Assessment Center
· Industrial Convergence Technology Center
· Industrial Equipment Technology Center
· Energy Related Products Center
· Renewable Energy Technology Center

S.M.A.R.T. Industry Division
· Digital New Business Center
· Future Communication
· Technology Center
· SW Evaluation Center
· Explosion Protection Technology Center
· EMC Testing Center1
· EMC Testing Center2
· New Industry Technology Center for Electric Power

Medical & Health Device Division
· Medical Device Research Center
· Technical Document Review Center
· Medical Device Evaluation Center
· Medical Supplies Evaluation Center

Environmental Technology Division
· Environmental New Business Center
· Air Environment Center
· Water Environment Center
· Environmental Facility Center
· Environmental assesment Center

Industrial Standards Division
· Standard Business Development Center
· Machinery & Mechanical Standards Center
· Complex Geometry Standards Center
· Electrical Standards Center
· Industrial & Physical Standards Center

Southern business
· Mechanical & Material Technology Center
· Aerospace & Defence Reliability Center
· Aerospace EM Technology Center
· Environmental Appliances Center
· Industrial Standards Center
· Changwon Customer Support Center
· Space Components Test Center

Domestic network

01
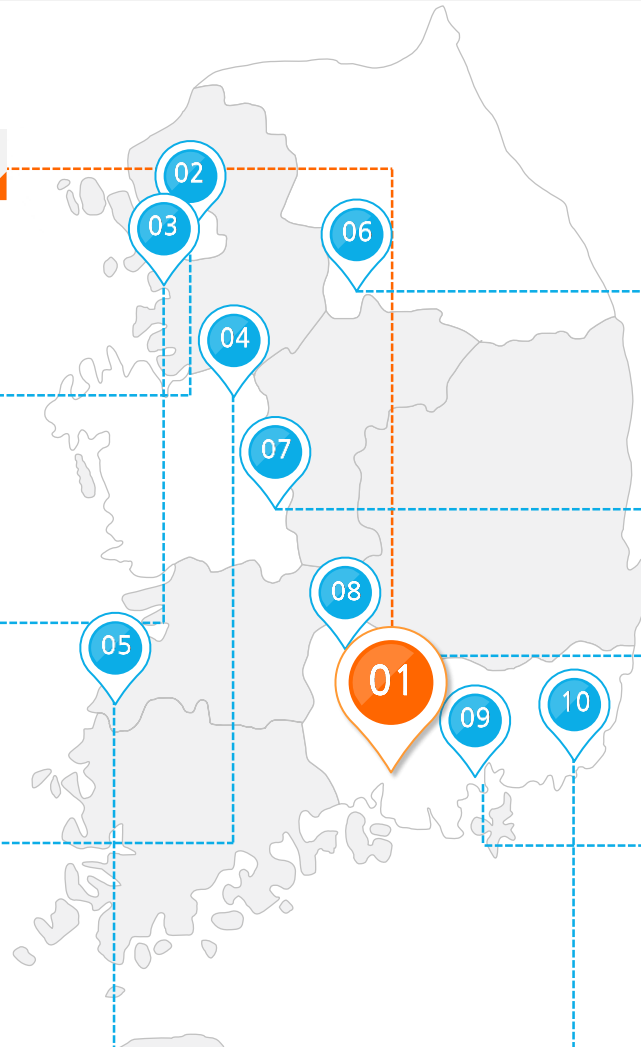KTL Headquarters

02
Seoul Branch

03
Gyeonggi-do Branch

04
Cheonan Branch

05
Jeollabuk-do Branch

06
Gangwon-do Branch

07
Daejeon Branch

08
Geochang Branch

09
Changwon Branch

10
Busan Branch

Call center 080-808-0114

33

Overseas network

USA

UAE

Shanghai

Shenzen

USA Office (Fairfax)

UAE Office (Dubai)

Shanghai Branch

Testing Labs in China (Shenzen)

34

Government R&BD Support

KTL supports national industrial development through research and development projects related with government-funded R&BD and establishment of system engineering and test and evaluation.

Government R&BD Support

Project Name	Ministry
Establishment of the verification basis for space component conformity	Ministry of Science and ICT
Establishment of the testing and evaluation basis for aviation technology to overcome extreme electromagnetic environments	Ministry of Trade, Industry and Energy
Establishment of a comprehensive support center for smart healthcare	Ministry of Trade, Industry and Energy
Establishment of an advanced safety system for performance venues	Ministry of Culture, Sports and Tourism
Establishment of a basis for testing and evaluation of new materials and components for the aviation industry	Ministry of Trade, Industry and Energy
Establishment of a safety evaluation framework for integrated IT convergence products	Ministry of Trade, Industry and Energy
Study on conformity verification of railway vehicle parts and modules	MOLIT Ministry of Land, Infrastructure and Transport
Development of a fume/nitrogen oxide analyzer for vehicle maintenance and inspection	Ministry of Environment

Government R&BD Support

The Role of KTL and the 4th Industrial Revolution

❯ Standardization and standards developments on the devices and systems from the 4th industrial revolution

❯ National industrial development and support for businesses through proactive adoption of technology

- Development of reference model and certification system for Smart Factory
- Support on the commercialization of the wearable smart device supplying companies with reliability testing
- Research on S/W conformance testing in IoT· Network ·Automotive sectors

SMART Laboratory Establishment

❯ Application for artificial intelligence and deep learning technology

- Certified report automation system Claydox
- Certiplanner, a testing automation platform

New business and specialized industries by zone

Space Test Center Establishment

- Research and development in the field of space test center certification
- Securing technological competitiveness through procuring original technologies and localization of space parts
- Jinju, Gyeongsangnam-do, 27.1 billion won

Establishment of Aviation EMC Engineering Technology Center

- Development and verification of the testing methods and the engineering technologies for aviation parts, modules, and systems in the extreme electromagnetic environment
  - Support US certification acquisition subject to the Federal Aviation Administration (FAA)
    - Jinju, Gyeongsangnam-do, 25.3 billion won

IT Convergence Products Safety Evaluation Center Establishment

- Development of functional safety and performance, reliability, and evaluation system
- Improve technology competitiveness of companies with IT convergence products and support commercialization
- Hwaseong, Gyeonggi-do, 29.0 billion won

Medium and Large Sized Secondary Battery Test Certification Center establishment

- Establish of testing infrastructure for energy systems
- Set-up of secondary battery testing infrastructure used in electric vehicles and energy storage system
- About 17.9 billion won funded by Cheonan, Chungcheongnam-do

Public Safety

KTL provides testing and performance evaluation services in order to ensure the safety of the national infrastructure, companies, and consumers.

Public Safety

Category	Agencies	Business Areas	Category	Agencies	Business Areas
01	Ministry of Trade, Industry and Energy	Electrical and electronic products (KC), bio, and energy	07	Public Procurement Service	Professional inspection on procured goods
02	KATS Korean Agency for Technology and Standards	KOLAS testing, calibration, inspection, etc.	08	KoreaCoastGuard	Professional inspection on marine waste
03	Ministry of Employment and Labor	Explosion-proof safety certification	09	Ministry of Oceans and Fisheries	Designated testing of goods for ships, etc.
04	Ministry of Science and ICT	Electromagnetic wave and software evaluation	10	Ministry of Environment	Accuracy and precision testing of environmental measurement devices
05	Ministry of Culture, Sports and Tourism	Performance venue assessment, sports goods certification	11	National Institute of Environmental Research	Waste analysis
06	Ministry of Food and Drug Safety	Medical equipment and supplies license testing	etc	Local governments, private associations, etc.	Verification of related facilities and products, etc.

Domestic/International Certification Services

The KTL Improves product quality and promotes the opening of new markets by providing domestic/international certification services

❯ **Domestic Certification Services**

· K Mark Certification
· KC certification

❯ **International certification services**

· Issuance of international certifications

❯ **Consulting on acquisition of international certification**

· Agency service in the international certification process
· Support for the acquisition of international standard certification

❯ **Korea-China FTA TBT comprehensive support project**

· Comprehensive support project based on the conclusion of Korea-China FTA

28

A table of contents

Definition

4ᵗʰ Industrial Revolution

"We stand on the brink of a technological revolution that will fundamentally alter

the way we live, work, and relate to one another.

In its scale, scope, and complexity, the transformation will be unlike anything

humankind has experienced before."

By. Mr. klaus schwab(World Economic Forum, Davos chief)

Productivity will be highly improved, and there will be a change in a fundamental industrial
structure due to the AI technology

people, place, and product are hyper-connected based on
AI technology.

4th Industrial Revolution

4. Core Technology of the 4th Industrial Revolution

Contents	WEF(World Economic Forum)	Industry 4.0	OECE(The Next Production Revolution)
Technique	• Unmanned Transportation • 3D Print • High-Tech Robot Engineering • Advanced Materials • IoT/Remote Monitoring • Blockchain/Bitcoin • Sharing Economy • Genetic Engineering • Synthetic Biology • Bioprinting	• Big Data and Analysis • Autonomous Robot • Simulation • IoT • Cyber Security • Cloud • 3D Print • Virtual Reality	• Big Data • Cloud Computing • IoT • Artificial Intelligence • 3D Print Simulation

KIET(Korea Institute for Industrial Economics and Trade), 2018

Mid- to Long-term roadmap for the Intelligent Information Society

1 Roadmap for the Intelligent Information Society
- to promote a development and application of AI which is the key technology in the 4th industrial revolution

2 Response plan on 4th I.R. (2017.11)
- to allow for the newest ICT technology to be used in a various sectors like health care/manufacturing/cities

1 Roadmap for the Intelligent Information Society

focused on the promotion of the digital data and AI technology which is the key in the 4th industrial revolution

12 strategies mission

- securement of base technology of intelligent information
- network environment setup for hyper-connectivity

Mid- to Long-term roadmap for the Intelligent Information Society

Vision   Implementing the human-centered 4th Industrial Revolution where anyone can participate and benefit

Utilization

Intelligent Innovation Project

Medical care	Cities
Manufacture	Traffic
Transportation	Industrial Innovation	Social Problem Solving	Welfare
Energy	Environment
Finance / Distribution	Safety
Agriculture / Fisheries	National Defense

sectors like health care/manufacturing/cities
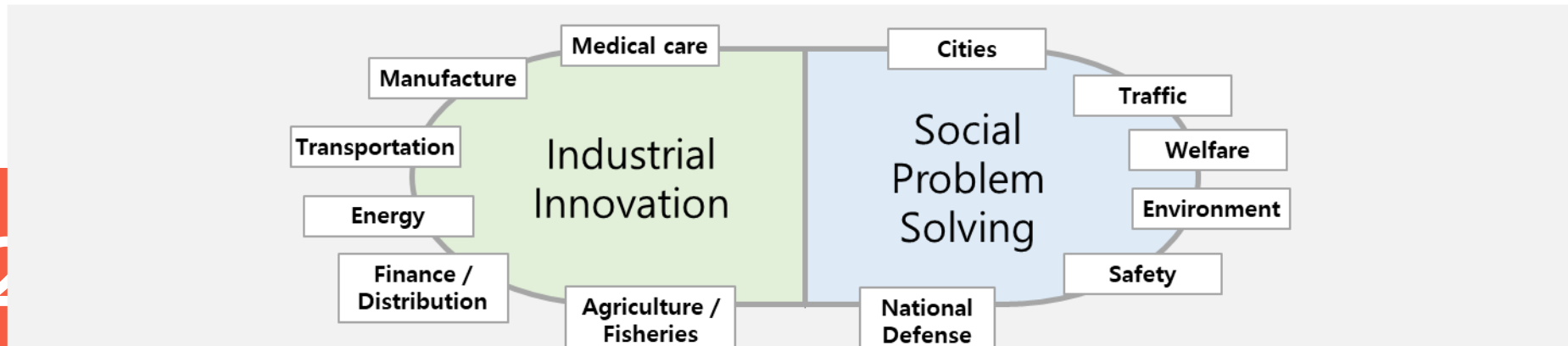
Foundation

[Technology] Securing the Technology for Growth Engines	[Industry] Creating Industrial Infrastructure and Ecosystems	[Society] Response to Changes in Future Society
• Securing Intelligent Technology Competitiveness • Fostering Innovative Growth Engines • R&D System Innovation	• Building a Hyper-Connected Intelligent Network • Strengthen Data Production and Sharing Foundation • Improving Regulations on New Industries • Venture Company and Local Base Growth Motorization	• Support the growth of core man of ability • Future Society Education Innovation • Expansion of job safety environment • Cyber Adverse Function, Strengthen Ethical Response

Dual Operation System

1	the Committee of 4th industrial revolution under direct presidential control
2	Task force for intelligent information society under Ministry of Science and ICT

Committee of 4th I.R. under direct presidential control and task force for intelligent information society

Dual operation system

1 Committee of 4th industrial revolution under direct presidential control

- 11th of Oct, 2017 launched
Based on the regulations on the establishment and operation of the 4th Industrial revolution committee
- 1 Chairman 1, under 30 Members

- Review and coordination on policies, boosts the public consensus,

R&D, establishment of national strategies and infrastructure,

promotion of new industry/service sector, advance in law and

regulatory system

Dual operation system

2 Task force for intelligent information society under Ministry of Science and ICT

- The TF is composed of the relevant experts who were dispatched from the organization

- Based on Article 2 of the Regulations on the Installation and Operation of the Intelligent Information Society Promotion Team

- Establishment and implementation of mid- to long-term comprehensive measures for the intelligent information society, diffusion and foundation of intelligent information technology

<Response to changes in Korea's 4th Industrial revolution>

- In 2018 : Selection of the 12 new growth industries and
- announcement of acceleration of industrial innovation growth

-In 2019 :   Regulatory Sandbox   System Implementation

2. How to respond to 4th I.R. by the Korean Government

Response to changes in Korea's 4th Industrial revolution

Regulatory Sandbox

Department	Date		
	Enact	Revision	Enforce
MSIT(Ministry of Science and ICT)	13.08.13	18.10.16	19.01.17
MOTIE(Ministry of Trade, Industry and Energy)	11.04.05	18.10.16	19.01.17
FSC(Financial Services Commission)	18.12.31		19.04.01
MSS(Ministry of SMEs and Startups)	04.03.22	18.10.16	19.04.17

- To develop emerging and converging technology and to make the society stable

- Ministry of Science and ICT, the Ministry of Trade, Industry and Energy, the Ministry of SMEs(small and medium enterprise) and Startups, Financial Service Commission

  - About 70 cases reviewed
  - 15 pilot project for demonstration special cases
  - 7 temporary permissions
  - 37 regulatory exemptions accepted

Research in 2019 for 33 indicators for 4th industrial revolution

AI Speakers and IoT device Connections

- AI speaker users have been increased in double compared to the users in 2018 in the area of hyper-connective intelligent network
- In IoT area, the total number of devices connected to IoT including smart meter, IoT, and home network subscribers has been increased 33.2% compared to the previous year

The number of Open API users and AI companies

- The number of Open API user is 12 million,

- The number of AR & VR application uploaded to App market is 7,065 in 2019

Research in 2019 for 33 indicators for 4th industrial revolution

The precision of Map for vehicle

- Autonomous vehicle precision map area :
1,741㎢
(28.9%↑) compared with 2018,

- Advanced road system for autonomous
vehicles(C-ITS) : 323km
(267%↑) compared with 2018
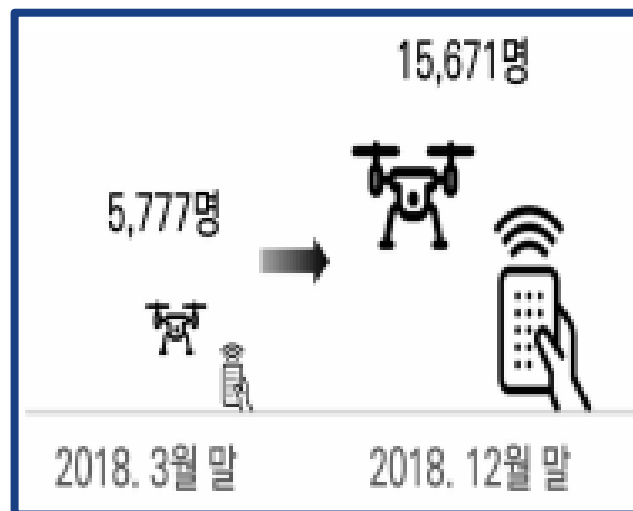
Changes in the number of drone control license

-15,671
increased about 10,000 compared with 2018 Mar.

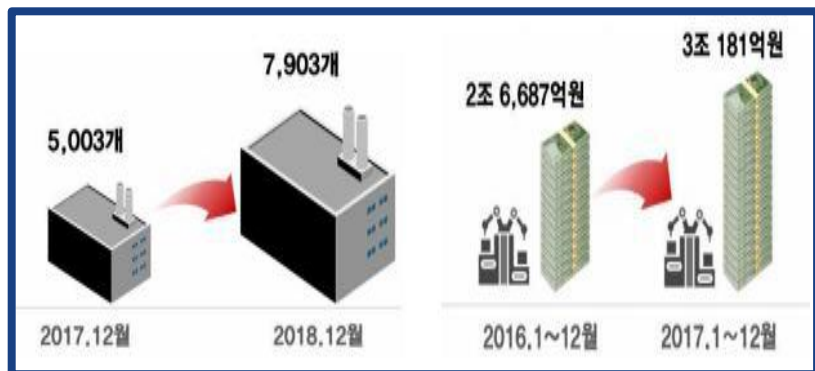-Commercial drones : 7,177대
60% increase compared with 2017
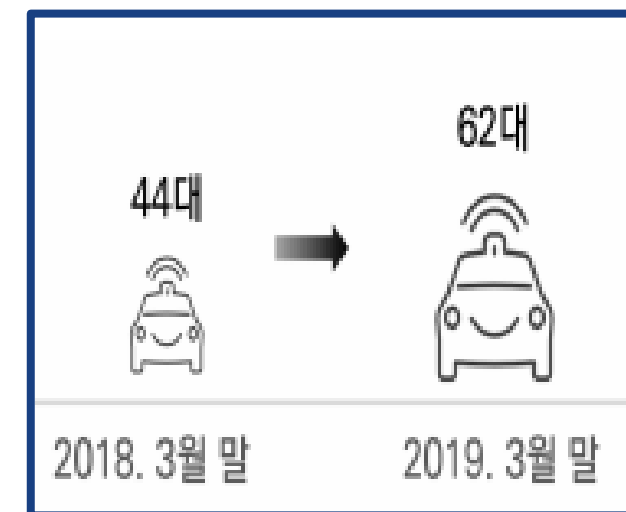
Changed in the number of temporary permission for autonomous vehicle
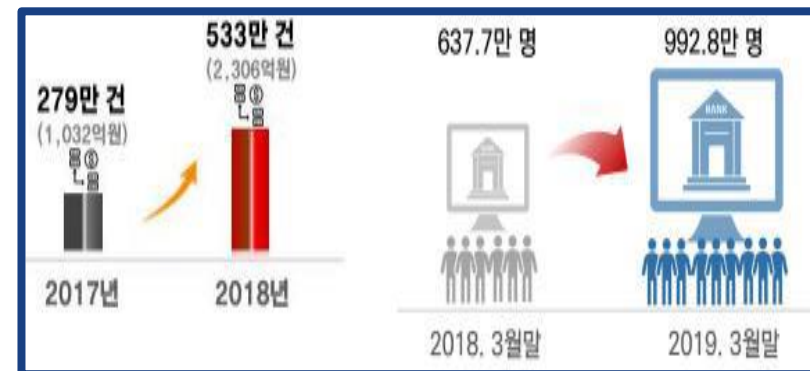
- 62
40.9% increased with 2018

Research in 2019 for 33 indicators for 4th industrial revolution

Changes in the number of Smart factories and Manufacturing robot

-Smart factory, as of December 2018, were established 7,903
-manufacturing robots at Smart factories has increased 13.1% to 3.18trillion won in 2017

Changes in the number of Simple payment and Simple remittance service

- Simple payment and Simple remittance service In 2018, 5.3 million a day(91% increase), 230.6 billion won(123.4% increase)

-Internet bank accounts and subscribers about 16 million(73.1% increased)
9.93 million subscribers(55.7% increased)
- Fin Tech companies increased by 4.9% to 301

2. How to respond to 4th I.R. by the Korean Government

Research in 2019 for 33 indicators for 4th industrial revolution

Changes in the number of
Hospitals participating in 'Health
information Exchanges'
& Energy Management

- (Hospitals) In 2019, Mar.
  1,306(77.3% increased)
- (Energy) In 2019, Mar. 564(34.3%
  increased)

Changes in the number of
Gardening facilities and
Livestock farm applied to
smart farms

- Gardening facilities : 4,900ha(22.2% increased)
  - Livestock farm : 1,425(77.9% increased)

SANDBOX

A system that eases regulations so that new technologies or ideas can be implemented freely

Definition

"the process of relaxing regulations and reviewing laws and institutions to discover new items"

Purpose

To develop new technologies and new industries by easing regulations and cost for specific industries and promoting market access for new products and services using new technology

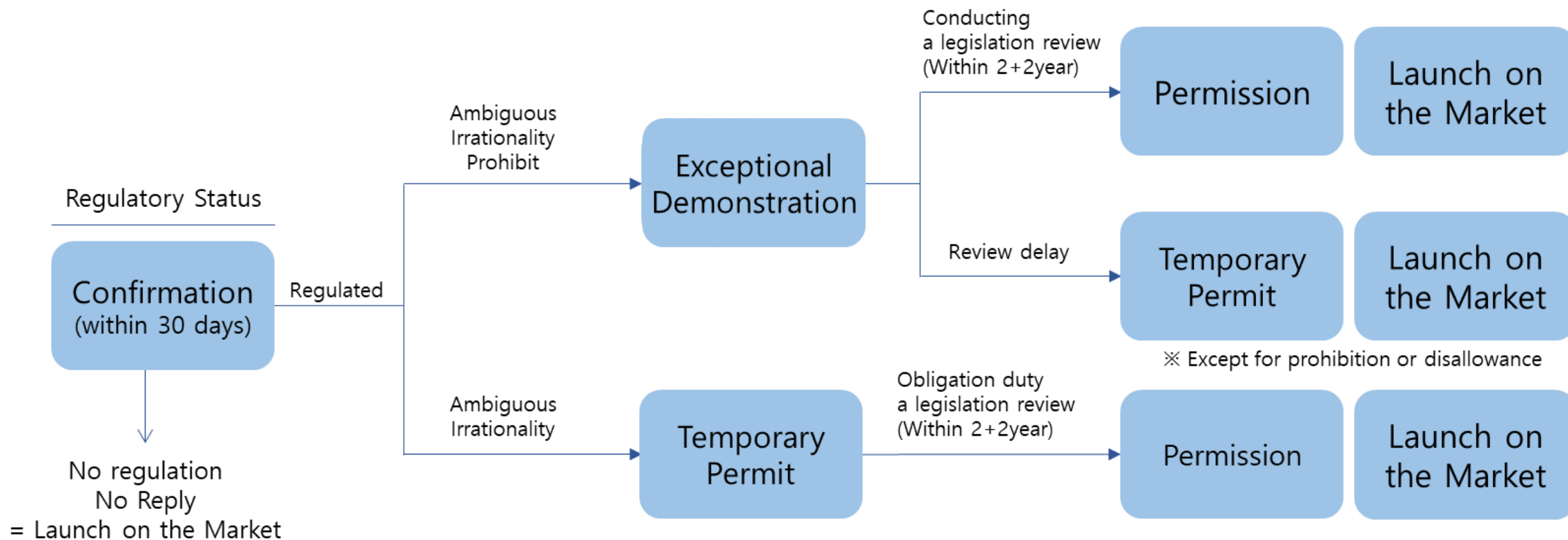# 3. Regulatory Sandbox

The status of Korean Legislation

Regulatory Innovation 5 laws

1	Framework Act on Administrative regulation
2	ICT convergence Act
3	Industrial Convergence Promotion Act
4	Financial Innovation Act
5	Local Special Zone Law

The status of Korean Legislation

Regulatory Status
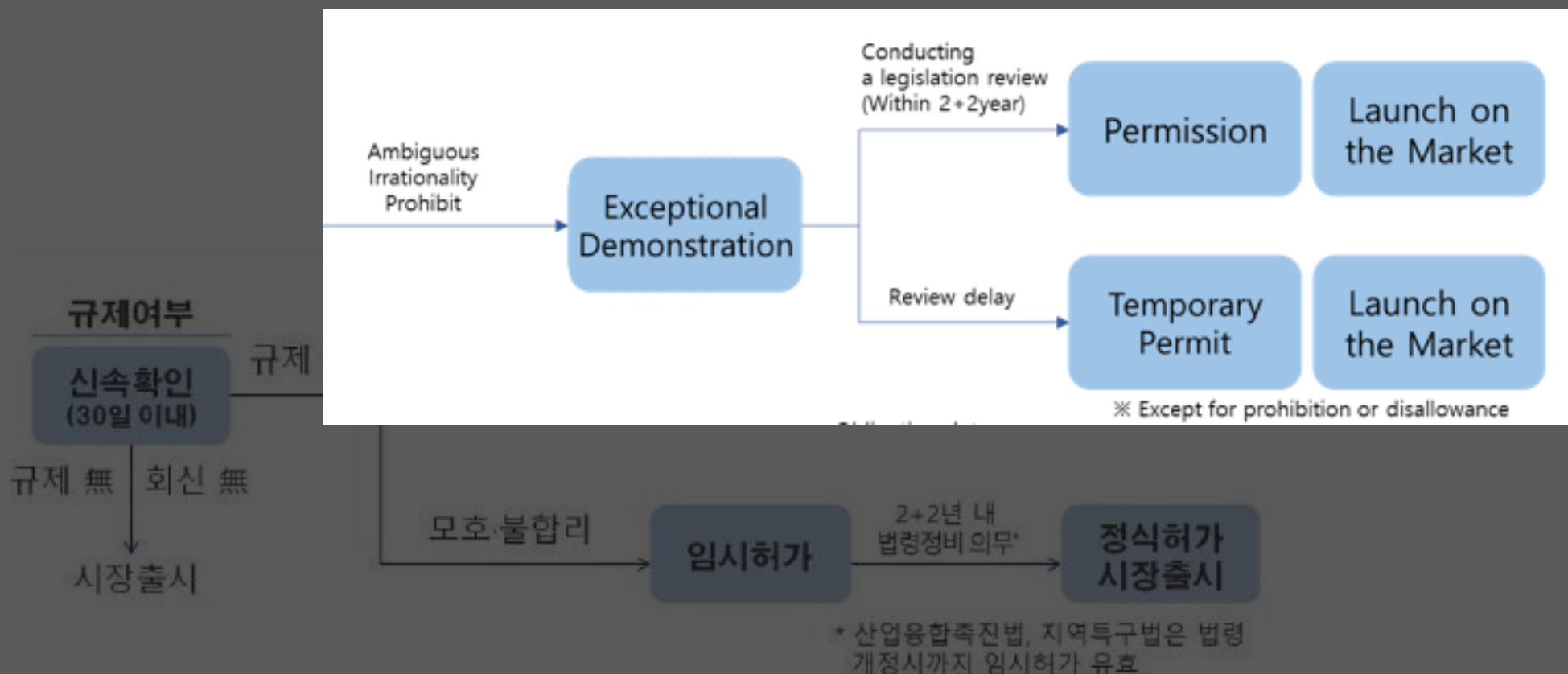
Confirmation
(within 30 days)

Regulated → Ambiguous Irrationality Prohibit → Exceptional Demonstration

No regulation
No Reply
= Launch on the Market

Conducting a legislation review (Within 2+2year) → Permission → Launch on the Market

Review delay → Temporary Permit → Launch on the Market

※ Except for prohibition or disallowance

Ambiguous Irrationality → Temporary Permit

Obligation duty a legislation review (Within 2+2year) → Permission → Launch on the Market

The status of Korean Legislation

Regulatory Status

Confirmation
(within 30 days)

Regulated

No regulation
No Reply
= Launch on the Market

모호·불합리·금지 → 실증특례

2+2년 내
법령정비 추진 → 정식허가
시장출시

법령정비
지연 → 임시허가
시장출시

※ 금지·불허는 제외

모호·불합리 → 임시허가

2+2년 내
법령정비 의무* → 정식허가
시장출시

* 산업융합촉진법, 지역특구법은 법령
개정시까지 임시허가 유효

4. Regulations related to the 4th Industrial revolution

Big Data

1. Public – Private joint control tower establishment(`20.)

2. Subsequent revision of the enforcement ordinance and establishment of guidelines to meet the purpose of the revision of the laws * related the data

   *The laws related the data : 「Personal Information Protection Act」, 「Information and Communication Network Act」, 「Credit Information Law」

3. Regulatory Sandbox : Application of technology regulation special cases using Big Data

4. Establishment of Power Data Sharing Center

5. Promotion of the use of My Data

1. Data opening and distribution activation

   ➢ Promotion of full open public data

   ➢ Big data platform full open of data

   ➢ Expansion of AI development infrastructure

   ➢ Completion of building national data map

2. Data Utilization Support

   ➢ Creation of AI voucher system

3. Improving regulations to vitalize the AI field

   ➢ Application of special regulations on technology using AI through Regulatory Sandbox

5G

1. Communication Data fee and system maintenance

2. Expansion of radio resources and support for regulation

3. Build a safe user environment

4. 5G convergence service regulatory innovation

5. Decrease the digital gap and protect users

IoT

1. Introduction of a system for the use of IoT

   ➢ Establishment of government IoT introduction guidelines

2. Improving regulation to vitalize the Internet of Things(IoT) filed

   ➢ Application of special regulations on IoT utilization technology through Regulatory Sandbox

Smart Mobility

1. **Introduction of systems and infrastructure for fully autonomous driving**
   - ➢ Safety standards development for autonomous vehicle
   - ➢ Revision of laws and preparation of related regulations, such as definition for autonomous vehicle operation, responsibility for accidents, and permission to operate image display devices for drivers
   - ➢ Establish a performance verification system such as verification of autonomous vehicle driving capability
   - ➢ Promote plans to match the shape of traffic lights and safety signs across the country

2. **Improving regulations to activate the smart mobility field (Regulatory Sandbox)**

Smart Robot
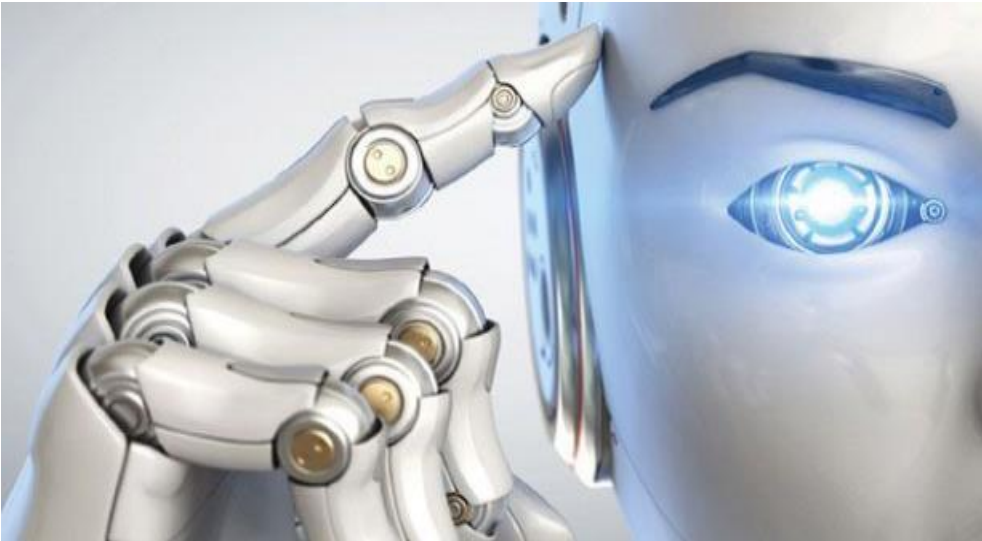
1. Introduction a system to expand the use of robots

2. Pre-development of standard models of manufacturing robots centered on the three manufacturing industries(roots, fibers, food and beverage)

3. Focus on fostering the four service robot fields(logistics, medical care, care, wearables)

4. Improvement of regulations for the spread of service robots

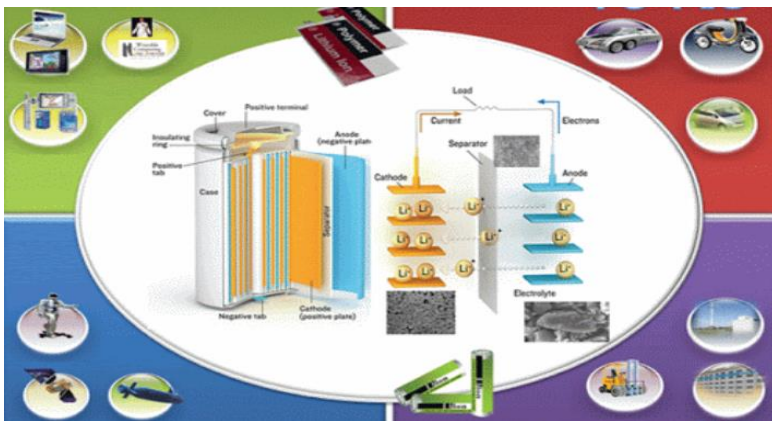# 4. Regulations related to the 4th Industrial revolution

AR/VR and 3D Printing

1. **(AR/VR) Improving regulations to activate the AR/VR field**

   ➢ Application of special regulations on autonomous robot technology through Regulatory Sandbox
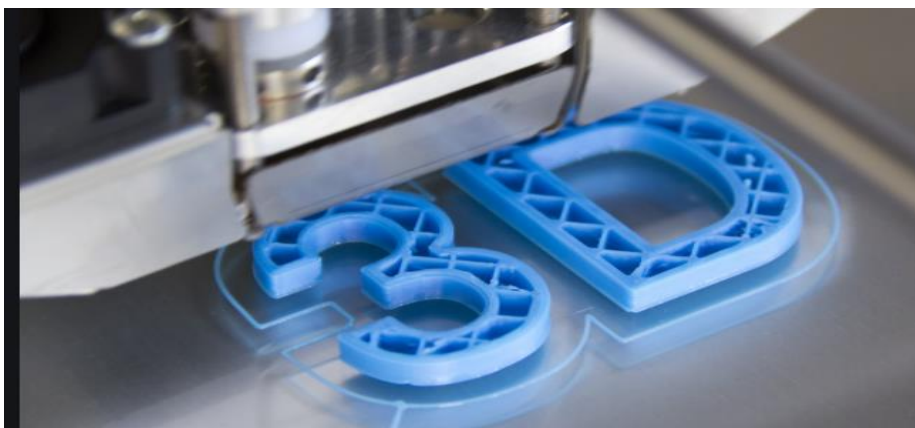
2. **(3D printing) Improving regulations to vitalize the 3D printing field**

   ➢ Application of special regulations on 3D printing technology through Regulatory Sandbox

Battery & ESS

1. **Lithium ion battery explosion**

   ➢ Note 7 failure(2016)

   ➢ According to Product Safety Basic Law(Article 15, 2), Government designated KTL as a 'Investigation Center' for Note 7 failure Investigation
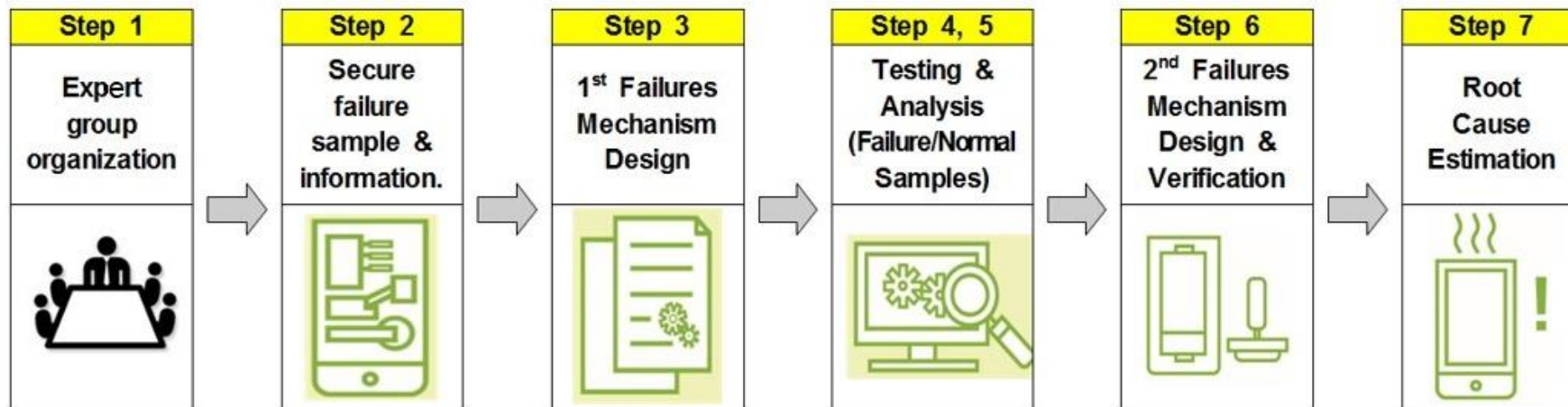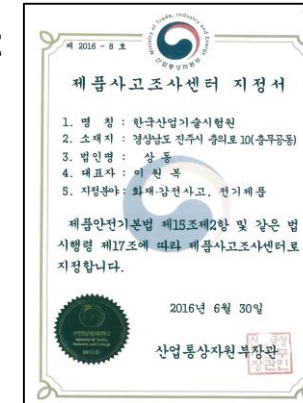
2. **Korean Safety Regulation Revised**

   ➢ Strengthen the level of safety management

   ➢ Strengthen the safety standards with additional test items

✓ **According to Product Safety Basic Law(Article 15, 2), Government designated KTL as a 'Investigation Center' for Note 7 failure Investigation.**

✓ Investigation task was a seven-step process from organizational structure to root cause estimation.

✓ KTL made a presentation regarding 'the lesson on Note 7 failure issue' **at UL Korea Battery Summit 2017**.

Step 1	Step 2	Step 3	Step 4, 5	Step 6	Step 7
Expert group organization	Secure failure sample & information.	1st Failures Mechanism Design	Testing & Analysis (Failure/Normal Samples)	2nd Failures Mechanism Design & Verification	Root Cause Estimation

4. Regulations related to the 4th Industrial revolution

Battery & ESS
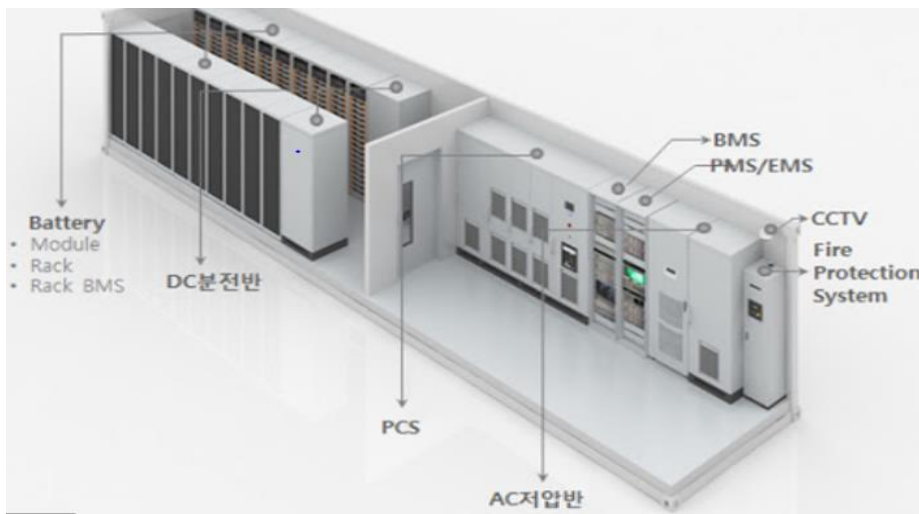
1. Thanks to the policy to support ESS supply, it expanded rapidly from 2017

	~'13	'14	'15	'16	'17	'18	Total
ESS sites	30	47	124	74	268	947	1,490
Battery(MWh)	30	36	145	207	723	3,632	4,773

➢ Due to the many reasons, ESS Fire accidents (28 cases) in Korea for the last three years

2. Korean Safety Regulation Revised

➢ Strengthen the level of ESS safety management

➢ Development of KS(Korean Standard) about ESS safety

Battery & ESS

Task Force Team
(Ministry of TIE)

→

ESS fire accident
investigation committee
(Special ESS Expert)

←

As a center for
Investigation
(KTL)

✓ There were 28 ESS fires accident in Korea. The ESS fire accident investigation committee was formed.

✓ KTL was designated by Government(Electric Utility Law, Article 96, 3) as an Investigation center and conducting the Investigation.

✓ Based on the ESS accident investigation, KTL suggested new proposal for International Standard(IEC) in 2019.