

Paradigm shift for Infrastructure and Transportation R&D toward the Fourth Industrial Revolution

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1. The emergence of the 4th Industrial Revolution and Action Strategies

The Fourth Industrial Revolution

1. The emergence of the 4th Industrial Revolution and Action Strategies

- Davos Forum, The Future of Job, 2016
 - ➔ The era of technological convergence in which the boundaries of physical, digital, biological spaces based on the digital revolution(the Third) are diluted

Low growth rate of global economy



Global declining productivity

Needs for New growth engine



Intensifying the countries competition of the Fourth Industrial Revolution for initiative



“Evolution into a more connected and intelligent society”



“Big Data is the base material for intelligence”

The Fourth Industrial Revolution

1. The emergence of the 4th Industrial Revolution and Action Strategies

- **Meaning** : A technological revolution in which the boundaries of digital, biology, physics, etc. are eliminated and merged based on the 3rd Industrial Revolution
- **Characteristics** : Differentiated from the 3rd Revolution in terms of speed, scope and influence

[Development phase of industrial revolution]

[World Economic Forum]



[Characteristics of the Fourth Industrial Revolution]

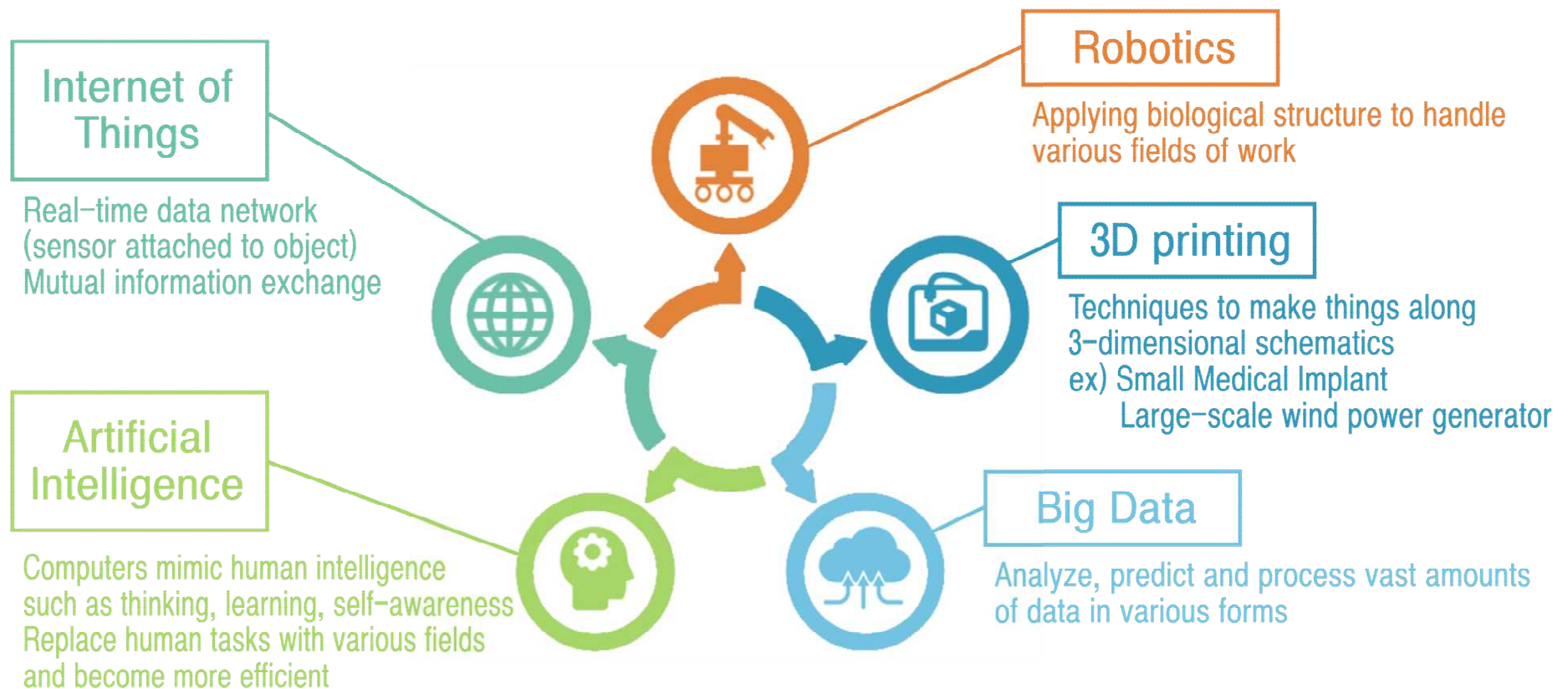
[World Economic Forum]

	Velocity	» Breakthrough technological progress at a rapid pace that humankind has never experienced
	Scope	» Major reorganization of Disruptive Technology in all industries in each country
	System impact	» Expect a big change in the system as a whole, including production, management, governance

Major technology of 4th Industrial Revolution

1. The emergence of the 4th Industrial Revolution and Action Strategies

- In the 4th Industrial Revolution, the emergence of 3D printing, Internet of things, biotechnology and creation of new technology through convergence of related technologies



4th Industrial Revolution Index by Country

1. The emergence of the 4th Industrial Revolution and Action Strategies

- Major factors for the successful promotion of the 4th Industrial Revolution and evaluation of applicability by country

Rank	Country	Labor market flexibility	Skill level	Education system	SOC level	Legal protection	Total
1	Swiss	1	4	1	4.0	6.75	3.4
5	USA	4	6	4	14.0	23.00	10.2
12	Japan	21	21	5	12.0	18.00	15.4
13	Germany	28	17	6	9.5	18.75	15.9
25	Korea	83	23	19	20.0	62.25	41.5
28	China	37	68	31	56.5	64.25	55.6

[UBS, (Extreme Automation and Connectivity : The global, regional and Investment implications of the Fourth Industrial Revolution, Jan, 2016)]

Structural change in 4th Industrial Revolution

1. The emergence of the 4th Industrial Revolution and Action Strategies

1 Industry growth potential

The growth of the industry related to the 4th Industrial Revolution increased relative to other industries

2 Corporate performance

The 4th Industrial Revolution-related company performance increased (USA, Germany, China, Japan)

3 Corporate ecosystem

The entry and exit of new technologies, services and ideas related to the 4th Industrial Revolution are dynamic

4 Industrial structure

Rapid growth of industry related to 4th Industrial Revolution

Strategies in 4th Industrial Revolution

1. The emergence of the 4th Industrial Revolution and Action Strategies



USA

Leading the 4th Industry Revolution with private leadership with advanced technology and funding capabilities



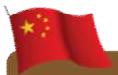
Germany

Striving to improve the competitiveness of manufacturing power by leading the industry 4.0



Japan

Leading change through the nation's overall response to the 4th Industrial Revolution



China

Focus on enhancing manufacturing innovation capability through promotion of Chinese 4.0



2. Future social prospect and science & technology policy

Future social prospects and issues

2. Future social prospect and science
& technology policy



Society/
Culture

Low fertility, aging population and broadening social polarization



Science/
Technology

Development of creative technology and advanced science technology



Economy/
Industry

Rapid growth of emerging countries, Intensifying competition between countries and enterprises due to the elimination of trade barriers due to globalization and openness



Ecology/
Environment

Increasing demand for renewable and alternative energy due to increased environmental issues such as energy and climate change



Politics/
Institution

New security issues arise due to population growth, technological development, and climate change
Increasing social chaos due to unspecified terrorism

Science & Technology Policy Trends

2. Future social prospect and science
& technology policy



USA

Science & Technology Policy plays a role as a part of bureaucratic economic growth and innovation plan



Japan

Concentration of national energy and safety management after the East Japan earthquake in 2011



China

Recently, R&D investment has expanded rapidly both by the government and the private sector, maintaining the world's second largest investment in 2014



EU

Horizon 2020 supports employment, growth, climate change, and industrial competitiveness



India

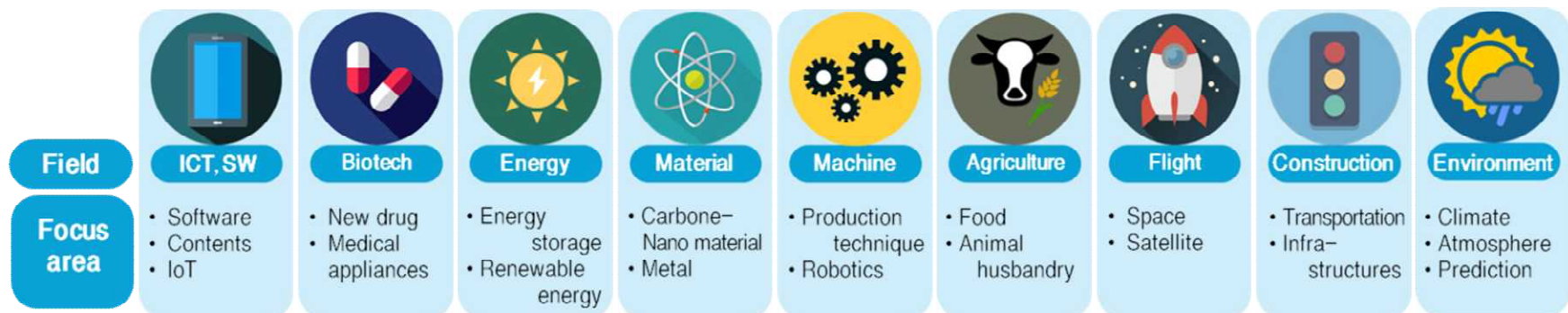
Expansion of budgets for ICT-based innovation and technology-based Start-Up support, and intensive investment of 67%
In 2016, budget for space, nuclear power and smart city

Major Science & Technology Policy in Korea

2. Future social prospect and science & technology policy

» 1st government R&D mid and long term investment strategy

- Identify key areas suitable for investment environment and technology capacity and enhance efficiency of R&D

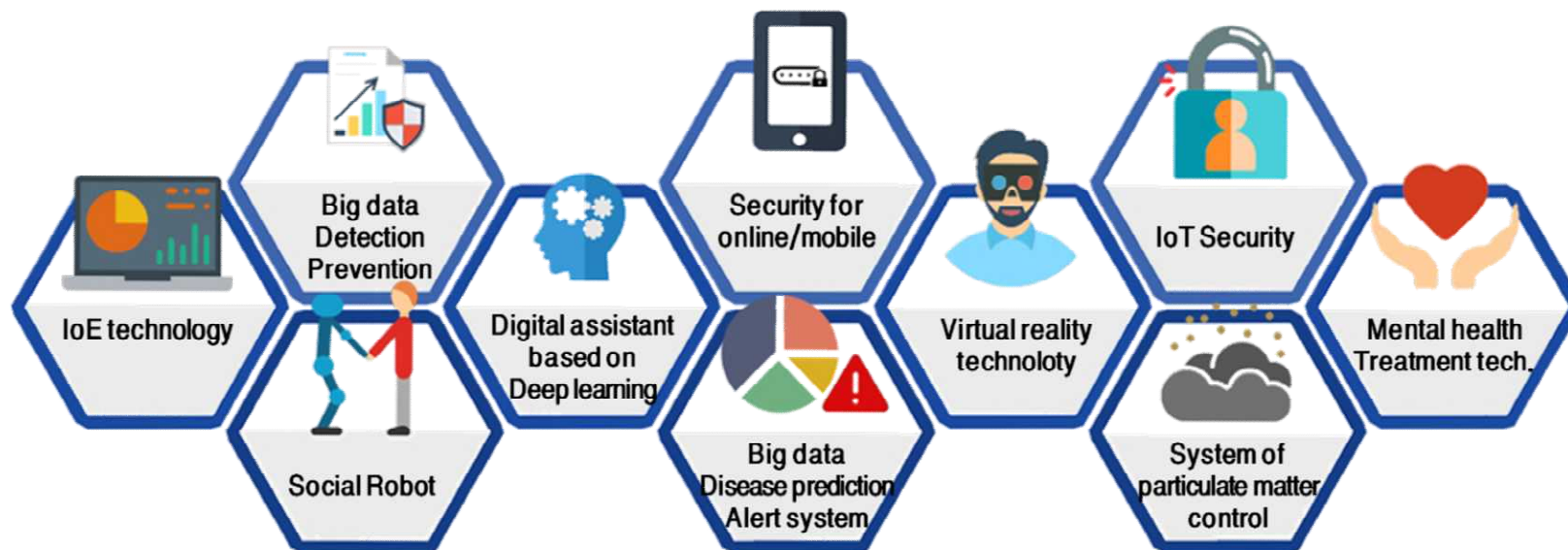


» Supporting expansion of budget investment to promote 19 future engine

- Establishing a direction for promoting customized investment strategies, stimulating private investment, and promoting national interest to create future growth engines for early performance

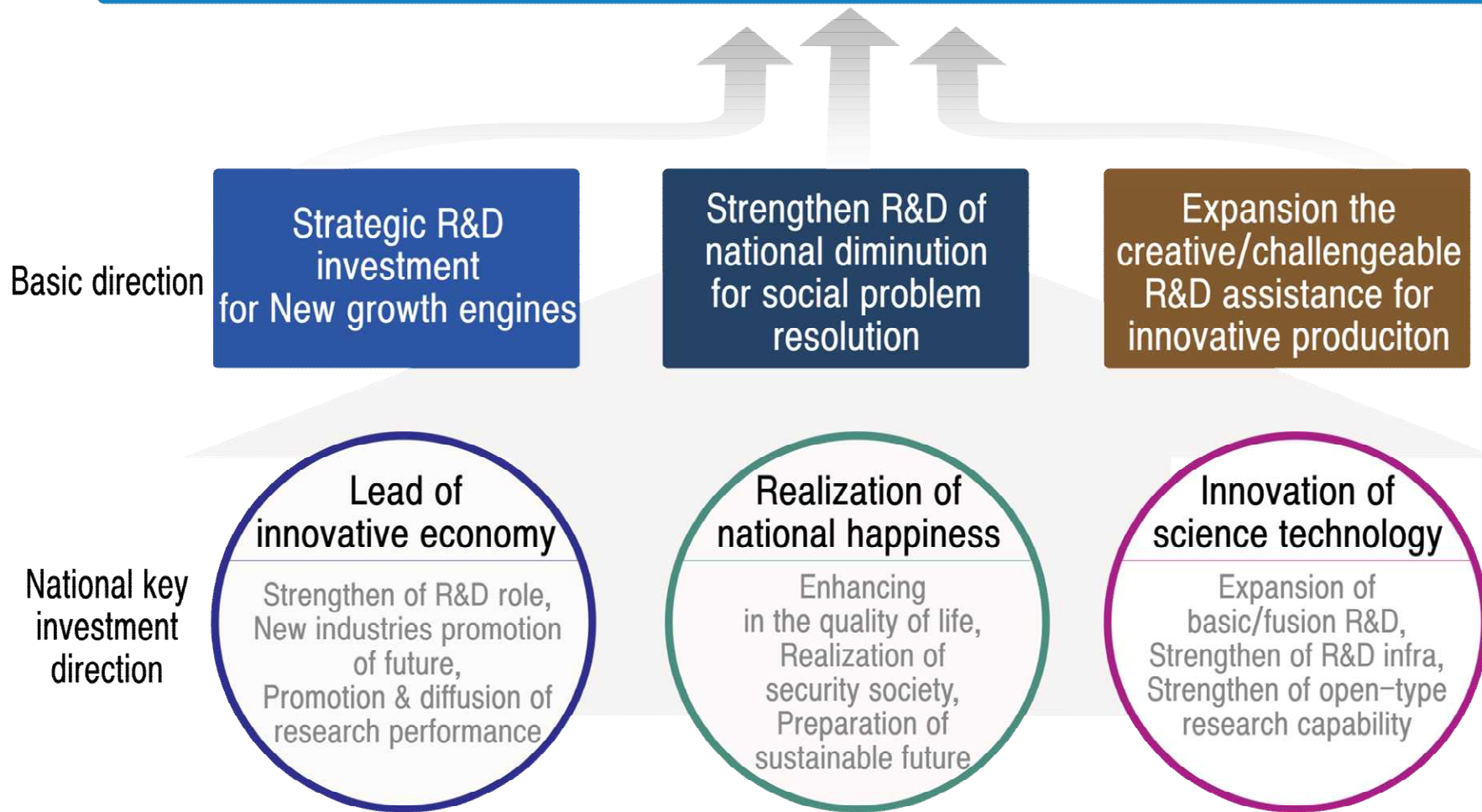
» The TOP 10 future promising technology [KISTEP]

- Selected 10 emerging technologies compared to the 4th Industrial Revolution
- Establishing science and technology strategy to lead quality of life, economic and social development



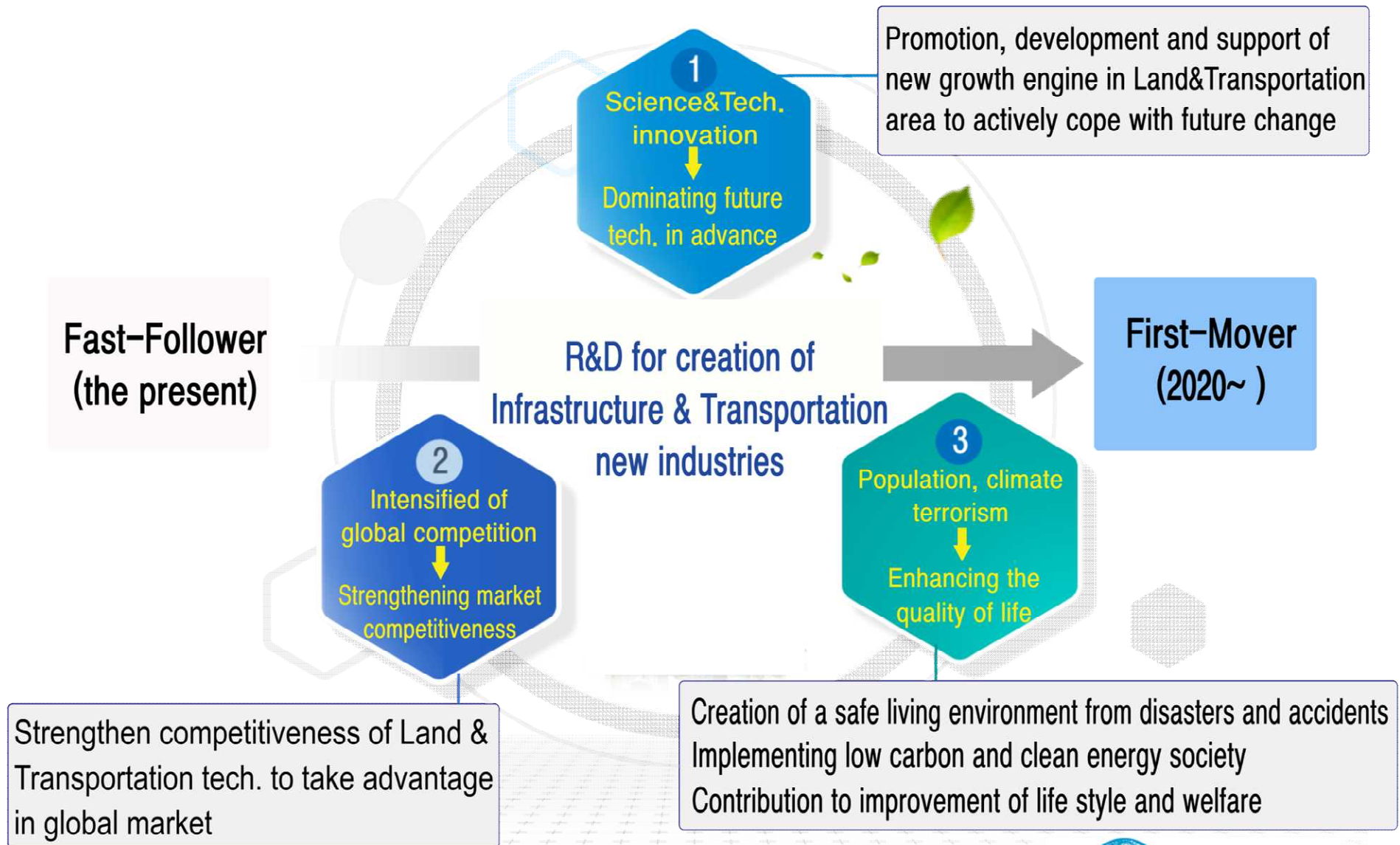
3. Direction of Infrastructure and Transportation area

Global R&D leader Creating the Future Value of Infrastructure & Transportation



R&D strategy for future society response

3. Direction of Infrastructure and Transportation area



Response strategy (1)

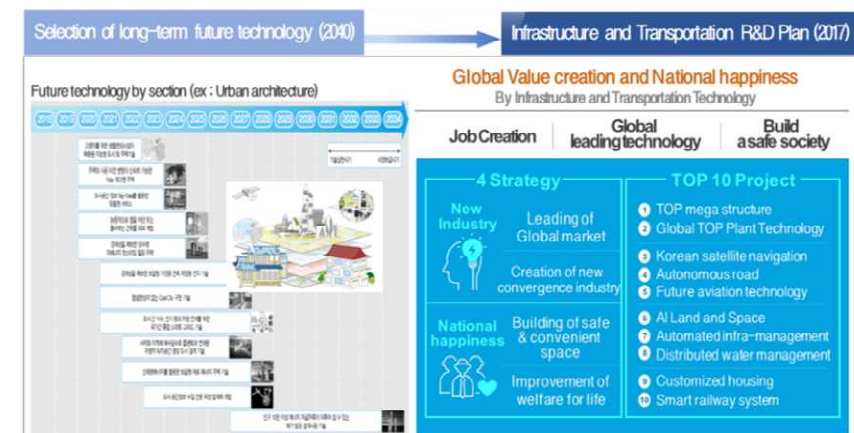
3. Direction of Infrastructure and Transportation area

» Domination of the future technology in advance

- In the global economic recession, the existing Infrastructure & Transportation technology is merging with advanced technology and expanding into new industries
 - » Creation of high value added by utilizing ICT advanced technology

» Agenda

- Securing future growth engine through technological convergence and innovation
 - » ICT convergence construction, Growth of high value added future construction market
 - » Construct real-time active land spatial information
 - » Autonomous vehicle, Construct Infrastructure for intelligent transport systems



Response strategy (2)

3. Direction of Infrastructure and Transportation area

Strengthen market competitiveness

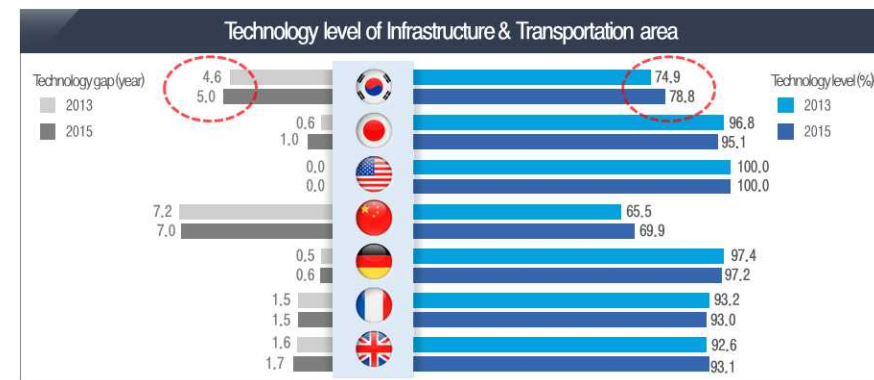
- Decrease in overseas construction orders and increase technology gap with top technology countries, despite of land & transportation market increasing

- Overseas construction orders decrease from \$66 billion in 2014 to \$46.1 billion in 2015
- Technology level of Korea is 78.7% of U.S. level

Agenda

- Creating high value added technology and localization of core technology by strengthening market competitiveness and expansion into overseas markets

- Secure high value added technology for Seawater Desalination Plants



» Improvement the quality of life

- Increased demand for quality of life from Environmental pollution and intensifying competition
 - » Increase risk of social disaster and maintaining the people anxiety for disaster due to climate change

» Agenda

- Resolve inconveniences and risks in living space,
Provide technology to increase the convenience of people life
- Prediction and prevention of damage caused by disasters,
Protecting life and property through systematic response
 - » Urban problem solving through smart city building technology
 - » IoT-based intelligent infrastructure maintenance technology



Strategy of R&D for Global Mega-trend

	Fundamental review	Main issue of R&D	Confrontational strategy
Science/ Technology	Manufacture revolution by technology development (AI, 3D-printing, etc)	Convergence & Develop innovative technology	Domination of the future technology in advance
Economy/ Industry	Importance expansion of competitiveness and productivity & Globalization	Securement of technology competitiveness	Strengthen market competitiveness
Society/ Culture	Welfare cost increasing due to infra-life gap	Mega-city and diversification of space usage for quality in life style	
Environment/ Ecology	Increasing the life-desire due to environment pollution	Increasing demand of eco-friend & high efficiency technology	Improvement the quality of life
Policy/ System	Conflicting the class / National security issue of disaster	Preemptive safety management of the issue	

Need a response strategy for future society

MOLIT

Selection of **7 New Business** for leading business promotion

KAIA

Promotion the key project based on selection and concentration in preparation for future society

» Selection the 7 new business of Land & Transportation for the promotion of leading industry

Autonomous vehicle

- Establishing test operation standards,
- Experimental city composition, Safety evaluation R&D
- C-ITS Pilot service, GPS Improved accuracy

Smart City

- Expansion of U-City center information cooperation
- Civic Experience Service

REITs

- Improvement of criteria for listing requirements, tax system and fund support promotion
- Increase in size and support overseas expansion

Spatial Information

- Developed 3D map of unmanned mobile
- Construction of portal for integration of national space information

Drone

- 5 range sphere(Busan, Daegu, etc.), 15 business operators
- Long-term operation permission of business establishment of safety confirmation
- One stop treatment of flight approval work

Zero energy building

- Promotion of housing complex model project
- Preparation of trading model of Greenhouse gas emission right

Seawater desalination

- ImHea Industrial Complex Leading Business
- UAE Collaborative Research / Demonstration Project



» Promotion the key project in preparation for future society /new industry

Autonomous vehicle

- Support for the commercialization of autonomous vehicles, road-related environmental awareness, positioning, situation judgment, vehicle control technology

Smart City

- Smart City to diversify overseas construction market
- Diversify overseas construction market

Smart construction

- ICT, and IoT, the development of technology for strengthening the efficiency of the construction industry, Robot / Big data related technology required

Seawater desalination

- International joint research and pilot project with UAE
- Low energy reverse osmosis system

Autonomous aircraft

- Urgent development of communication, control, certification and surveillance related technologies for integrated safety navigation

Smart home

- Development of artificial intelligent smart home technology that integrates energy / residential environment / water management service required in house

Spatial Information

- Establishment and development of high-precision spatial information for new industries

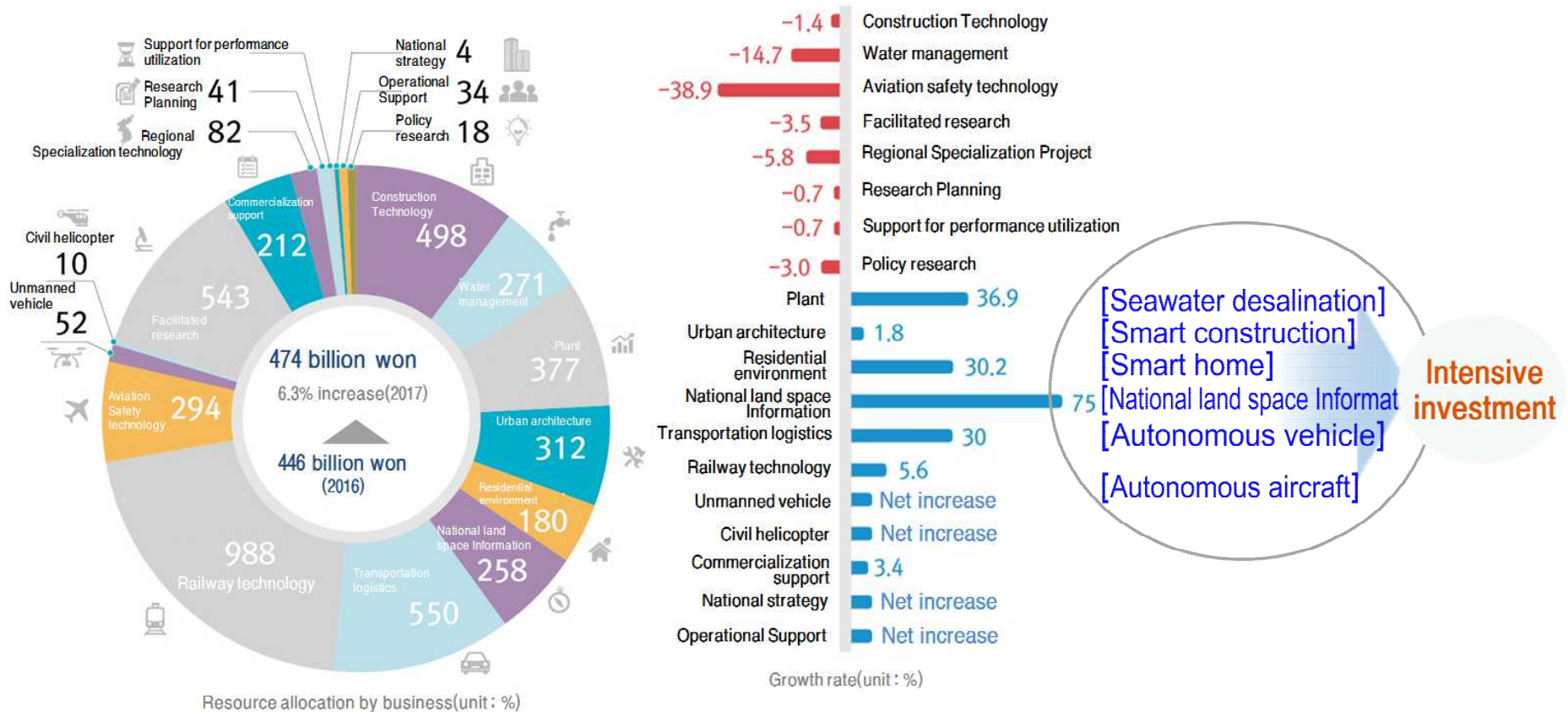


Investment by sector of R&D in 2017 (Korea)

3. Direction of Infrastructure and Transportation area

» Land & infrastructure 1.63 billion \$ (40%), Transportation 1.65 billion \$ (40%), Infrastructure 0.8 billion \$ (20%)

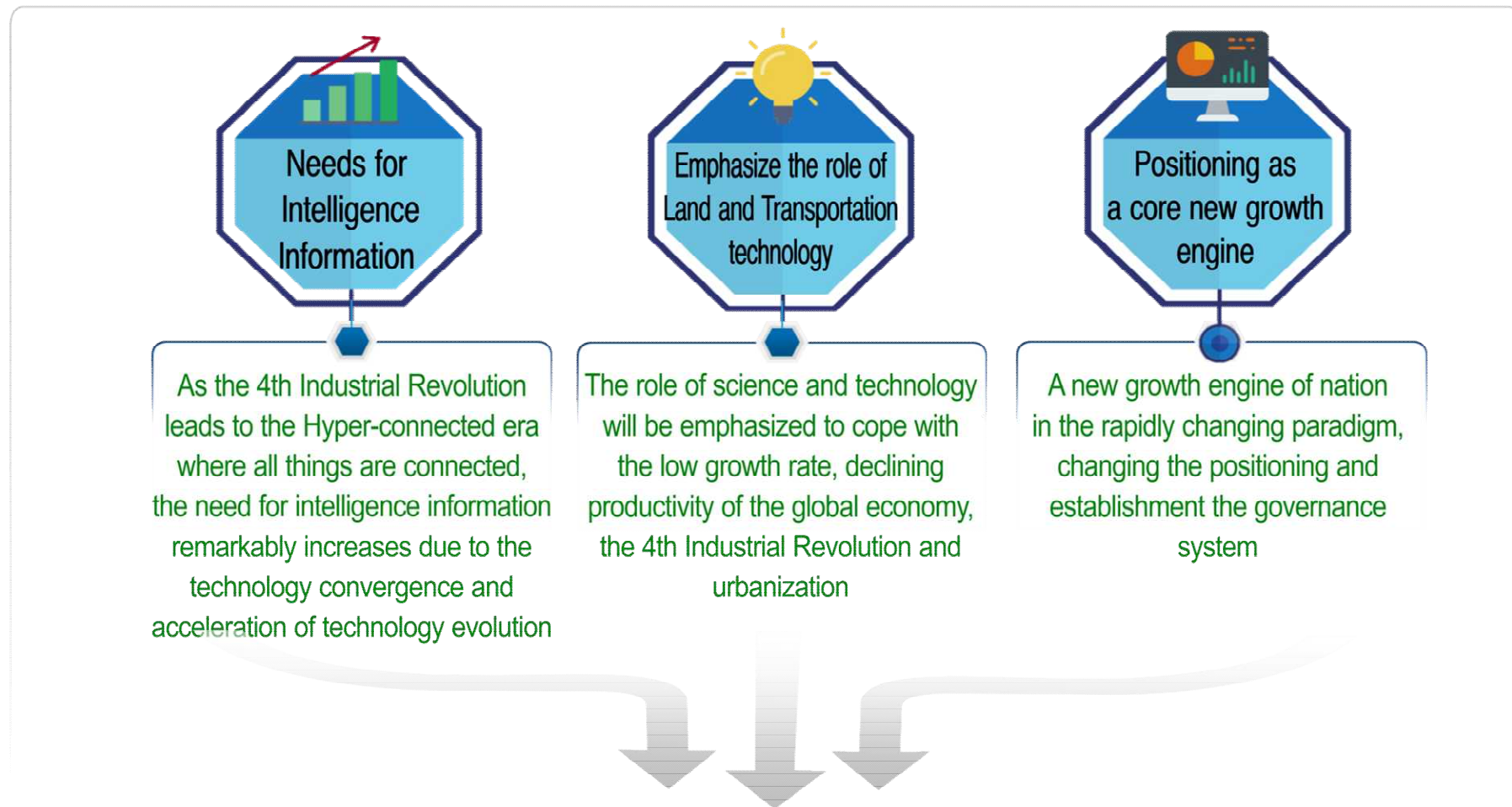
Budget Status



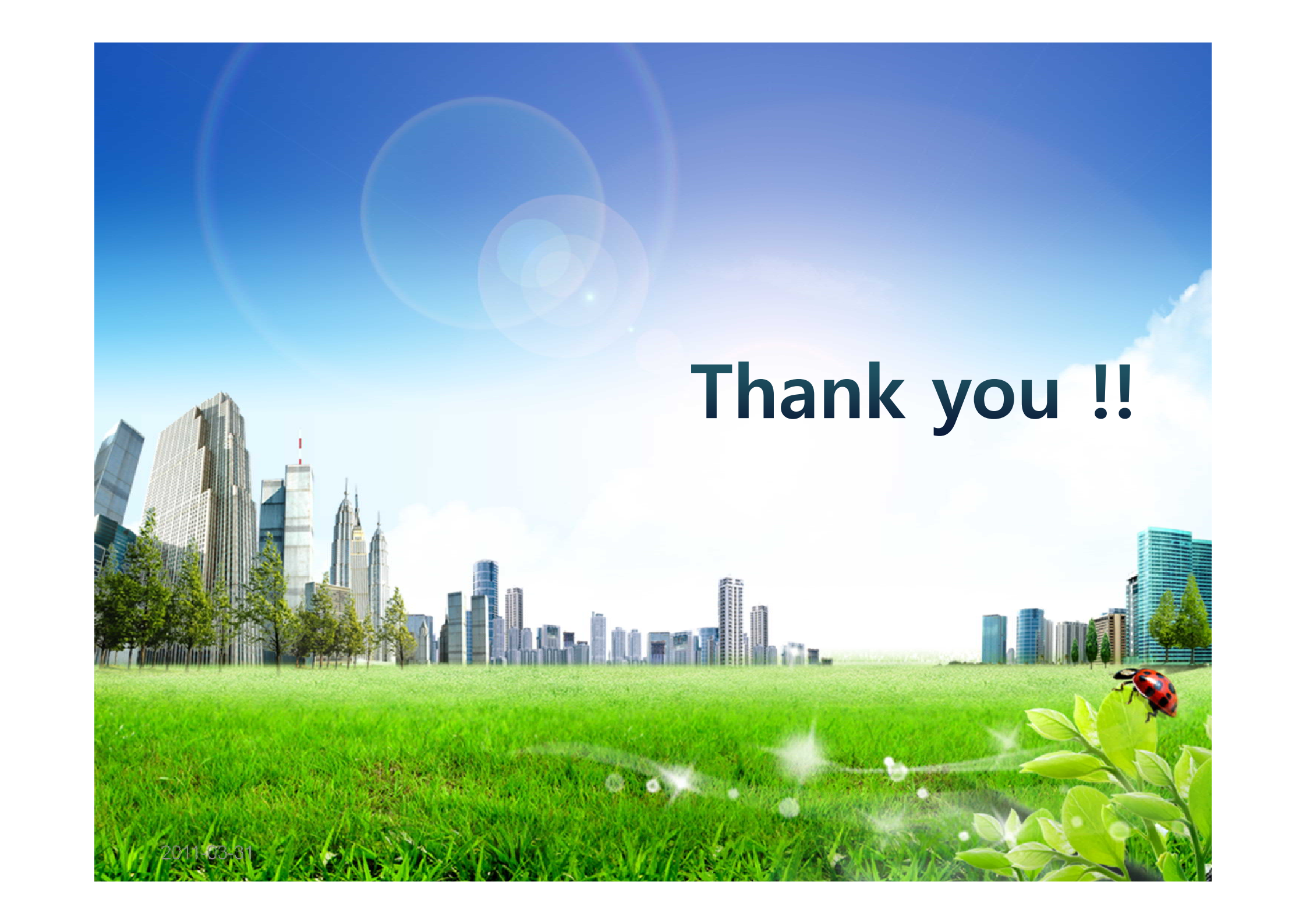
4. Conclusion

Infrastructure & Transportation R&D to create future growth engine

4. Conclusion



The **Infrastructure and Transportation R&D** secures infrastructure technology to **enhance the quality of life of the people** by convergence of related technologies through the **4th Industrial Revolution**

The image is a composite background. The top half is a clear blue sky with several large, overlapping, semi-transparent circular lens flare effects. The middle section shows a city skyline with various skyscrapers, including the Willis Tower. The bottom half is a lush green field of grass. In the bottom right corner, there is a small, detailed illustration of a red ladybug with black spots on a green leaf. A horizontal line of small, white, sparkling particles or dust is visible in the lower right area of the field.

Thank you !!