

Korea Smart City Development

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Chief Director
National Strategic Smart Program
KAIA



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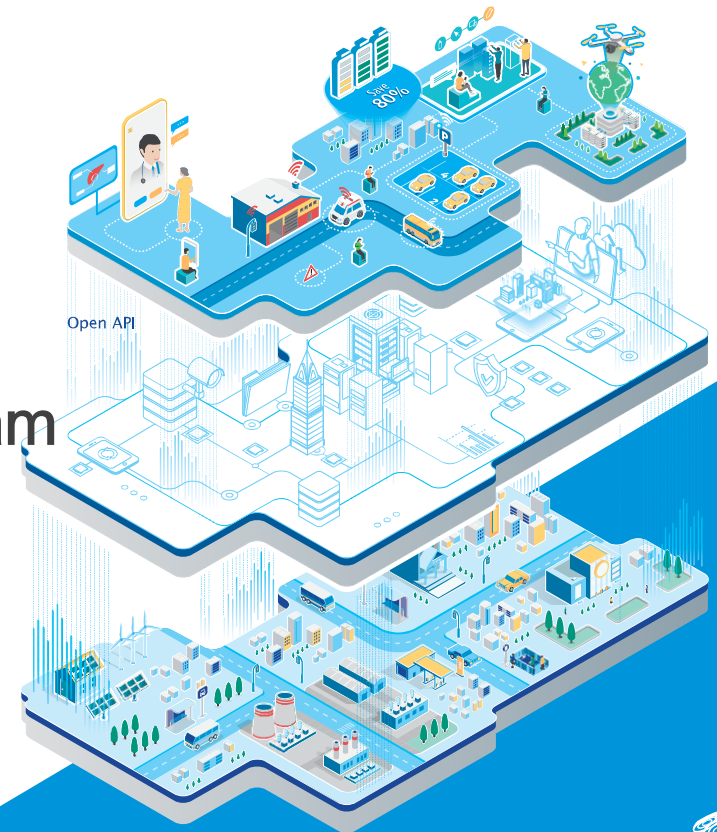
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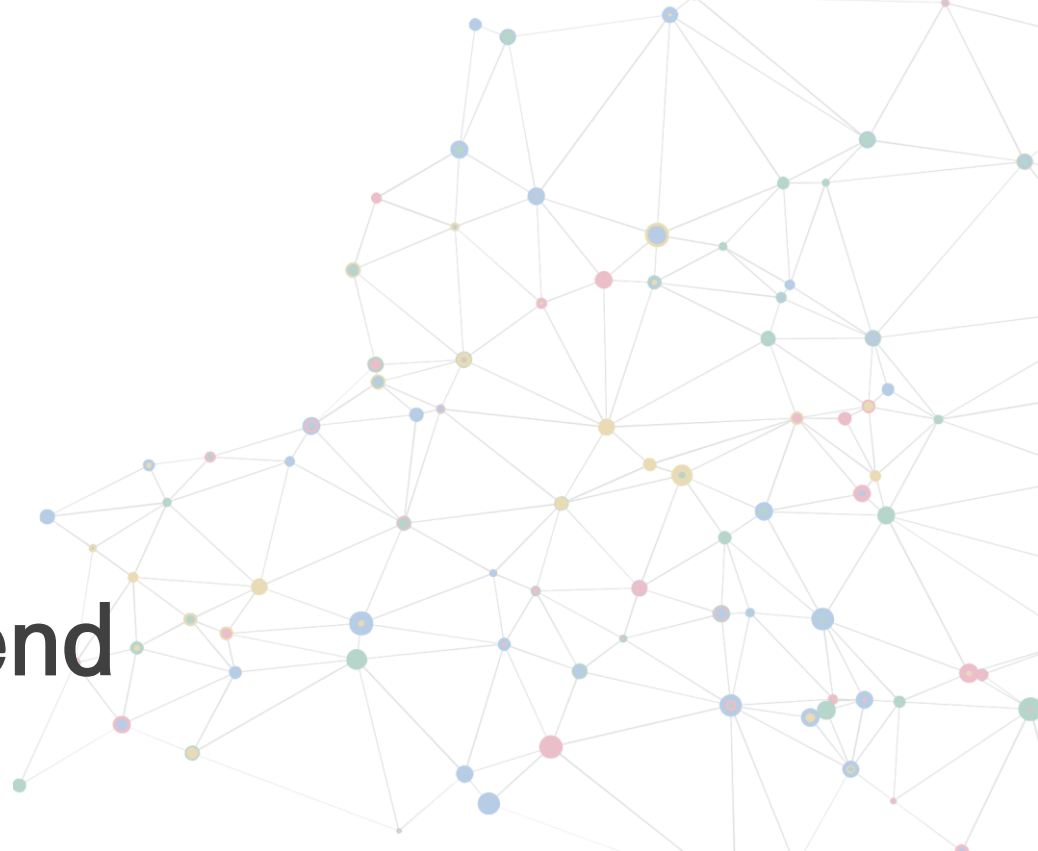
DEAP CITY

스마트시티 혁신성장동력 프로젝트 사업단



Korea Smart City Development

Smart Cities Trend



1 Smart City Trend Evolution of a City

Urban Transformation

Urbanization has been rapidly expanded since the industrial revolution.

Cities have been evolved in various formats in line with the social changes



BENEFITS OF SMART CITY

- Efficiency in urban management
- Improved quality of life
- Sustainable Growth

Urban Problem

4th Industrial Revolution (Super-intelligence, Virtualised, Hyper-connected)



3rd Industrial Revolution (IT, Information, Data)



Sustainable City



Social Cooperation
 Planning in 80's
 New Urbanism in 90's

Smart City



u-city/Digital city in 2000's
 Smart City in the 21st century

1st Industrial Revolution (Steam Engine, Machine, Resource)



Industrial City



Paradigm of Urban Planning

2nd Industrial Revolution (Power, Factory, Capital)



Modern City



Development booming in 60's
 Reasonable Urban Planning in 70's

1 Smart City Trend Purpose of Smart City



Through a data-driven Smart City
Resolve urban problems



With protecting environment, energy and
the underprivileged
Pursue Sustainable Growth



Through the spread of Smart City
Promote Digital Economic Development

1 Smart City Trend

Global Smart Cities



토론토
Google Sidewalk Labs



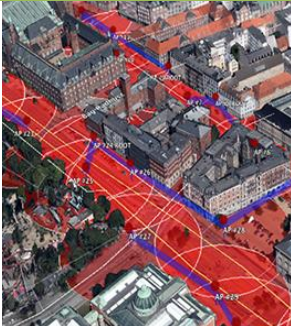
암스테르담
Smart City Living Lab & Digital Ecosystem



콜럼부스
Connected Transport System (DoT Grant)



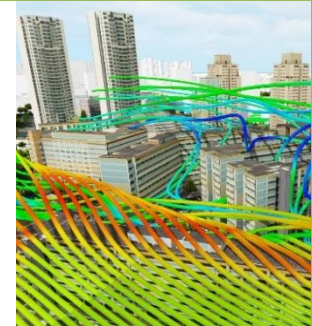
코펜하겐
Connecting Project & Smart Energy Solution



바르셀로나
Smart City 3.0
City OS - Open Data Platform



싱가포르
Virtual Singapore
Digital Twin



뉴욕
One NYC
- The Plan for a Strong and Just City



두바이
3D-printed Building, AI & Blockchain



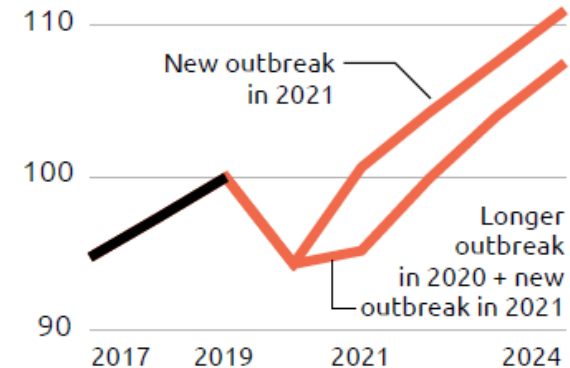
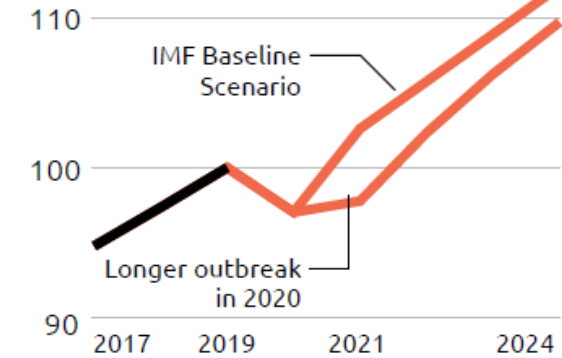
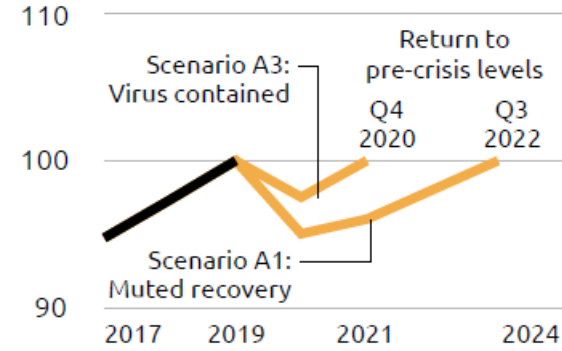
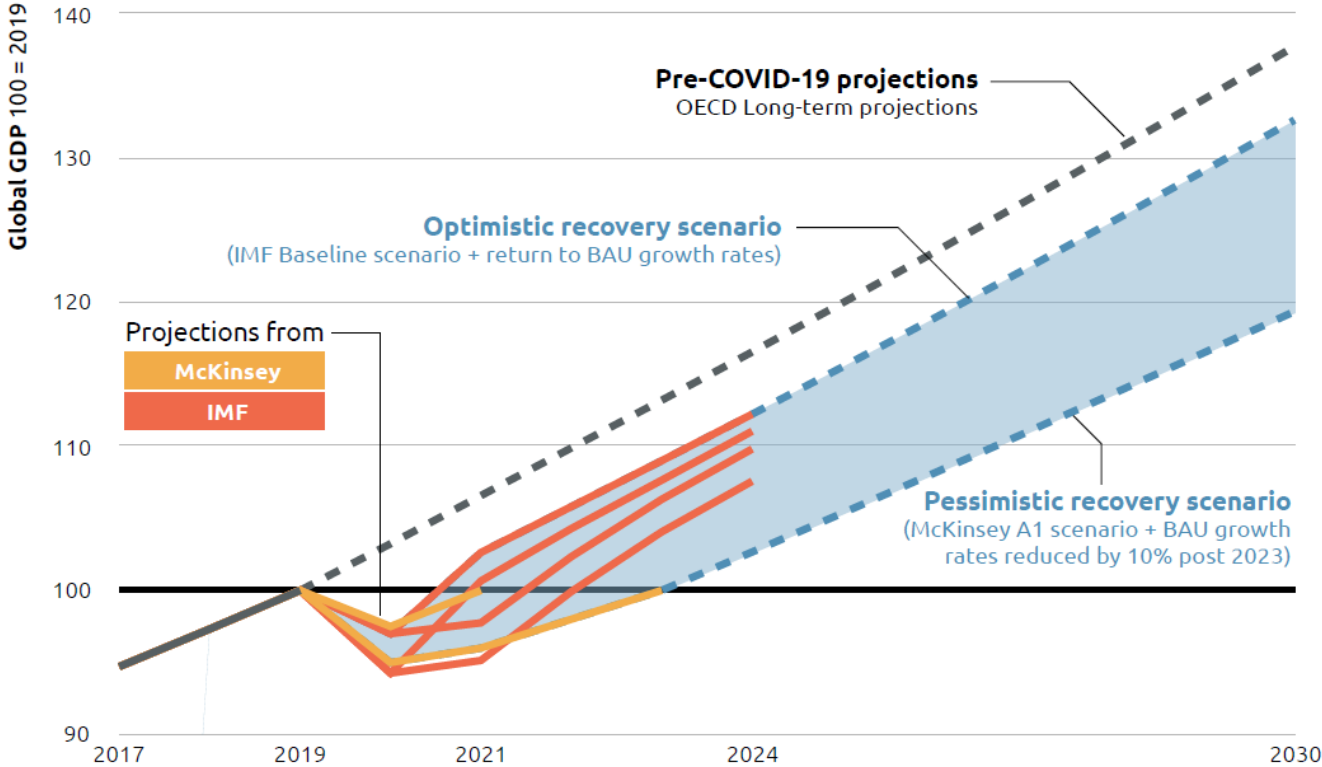
리오데자네이로
Integrated Operation Centre



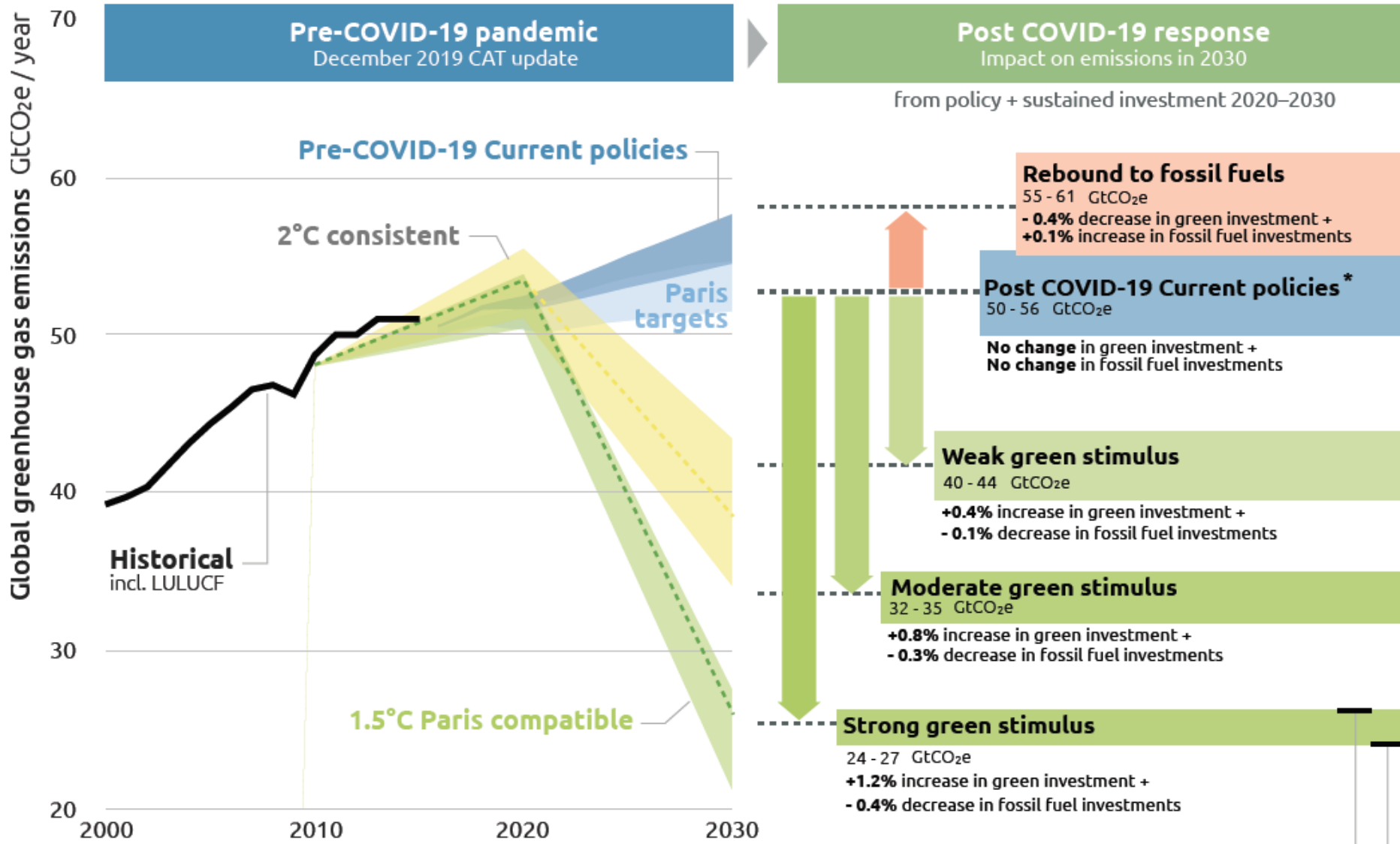
1 Smart City Trend

Prospects of Global Economy After COVID 19

Long-term global GDP optimistic and pessimistic projections



1 Smart City Trend CO2 Emmission after COVID 19



* Indicative results for post COVID-19 current polices has been calculated on a different basis compared to normal pre-COVID-19 method and excludes any announcement of economic recovery measures to date.

Explaining the ranges on estimates
Based on the **optimistic scenario** of future GDP growth
Based on the **pessimistic scenario** of future GDP growth

1 Smart City Trend

UNSDG 11 Sustainable Smart Cities



GOAL 11 TARGETS

- 11.1 Adequate, safe and affordable housing
- 11.2 Accessible and sustainable transport systems for all
- 11.3 Inclusive and sustainable urbanization
- 11.4 Safeguard the world's cultural and natural heritage
- 11.5 Reduce the number of people affected by disasters
- 11.6 Reduce the environmental impact of cities
- 11.7 Provide universal access to safe public spaces
- 11.a Support links between urban, peri-urban and rural areas
- 11.b Increase integrated policies and plans towards mitigation and adaptation to climate change
- 11.c Building sustainable and resilient buildings utilizing local materials

CPI SUB-DIMENSIONS

1. Local Economic Development
2. Employment
3. Municipal Finance
4. Adequate Housing
5. Energy and ICT
6. Urban Mobility
7. Urban Form
8. Urban Land
9. Public Space
10. Social Development
11. Economic Inclusion
12. Gender and Youth Inclusion
13. Safety and Security
14. Resilience
15. Environmental Sustainability
16. Climate Change
17. Urban Rules and Regulations
18. Urban Governance

CPI DIMENSIONS

- Productivity**
- Infrastructure**
- Quality of Life**
- Equity and Social Inclusion**
- Environmental Sustainability**
- Governance and Legislation**

SDG WITH URBAN BASED TARGETS

- 8.1.1 City product per capita
- 8.2.1 Growth rate per employment
- 8.3.1 Informal employment
- 8.5.2 Unemployment rate
- 9.2.1 Manufacturing employment
- 3.6.1 Traffic fatalities
- 6.1.1 Access to improved water
- 6.2.1 Access to electricity
- 9.c.1 Mobile network coverage
- 17.8.1 Internet Access
- 15.1.2 Forest (green areas) as a percentage of total land area
- 16.1.1 Homicide rate
- 16.1.3 Population subjected to violence
- 1.1.1 Poverty rate
- 5.5.1 Women in local government
- 8.5.1 Gender wage gap
- 8.6.1 Youth unemployment
- 10.1.1 Growth rate 40%
- 3.9.1 Population exposed to outdoor air pollution
- 6.3.1 Waste water treatment
- 7.2.1 Share of renewable energy
- 12.5.1 Solid waste recycling share
- 9.a.1 Investment capacity
- 16.6.1 Local expenditure efficiency



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Korea Smart City Development

Korea Smart City Activities



2 Korea Smart City Activities

History of Korea Smart Cities



STAGES OF CITY DEVELOPMENT IN KOREA

CITY DEVELOPMENT IN KOREA PASSES INTO THE MATURITY STAGE

KOREA HAS ACCUMULATED KNOWLEDGE ABOUT SOLUTIONS TO RELEVANT URBAN ISSUES FOR BOTH MATURED CITIES & NEW CITIES



- A city where ubiquitous services are provided through city infrastructure using ubiquitous city technologies
- A city that promises to provide an environment-friendly urban milieu with advanced ubiquitous infrastructures and services for residents and visitors
- A customized city based on the convergence of ICT (Information and Communication Technology) with city development & management

2 Korea Smart City Activities

Korea Smart Cities Activities

Seoul•Incheon•Kyungkido(21)

- 서울 특별시
- 인천광역시, 부천시, 수원시
- 마포구, 은평구
- 남양주시, 부평구, 고양시
- 서초구, 성동구, 고양시
- 부천시, 서울 성동구
- 광명시, 남양주시, 수원시
- 시흥시
- 시흥시, 안산시, 용인시

Chungbuk(5)

- 영동군, 진천군, 청주시
- 진천군
- 제천시

Daejeon•Sejong•Chungnam(8)

- 서산시, 아산시, 천안시
- 대전광역시
- 대전광역시 충남 광주 부여군
- 세종특별자치시
- 세종 조치원읍
- (연동면 5-1 생활권)

Jeonbuk(3)

- 고창군, 완주군, 전주시

Kwangju•Jeonnam(7)

- 광주광역시
- 광주광역시
- 광양시, 나주시, 순천시
- 순천시
- 완도군

Jeju(1)

- 제주도



Kangwon(3)

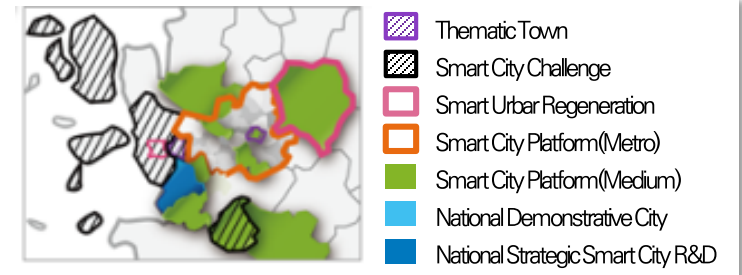
- 강원도
- 원주시, 춘천시

Daegu•Kyungbuk(8)

- 경산시, 구미시, 포항시
- 대구광역시
- 대구 북구, 포항시(2)

Busan•Ulsan•Kyngnam(12)

- 부산 강서구, 김해시, 울산 동구
- 김해시, 부산 사하구
- 양산시, 창원시
- 창원시
- 김해시 통영시, 부산 수영구
- 부산광역시(강서구, 에코델타시티)

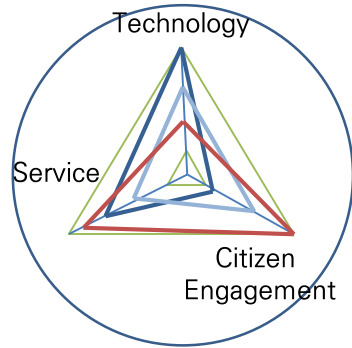


2 Korea Smart City Activities

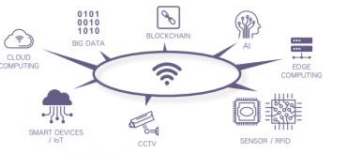
Application in Phases to Scale-Up

Differentiated test-bed application of services, systems and facilities in phases of existing, newly-developed and regenerated cities

Scope of Application



Type of Application

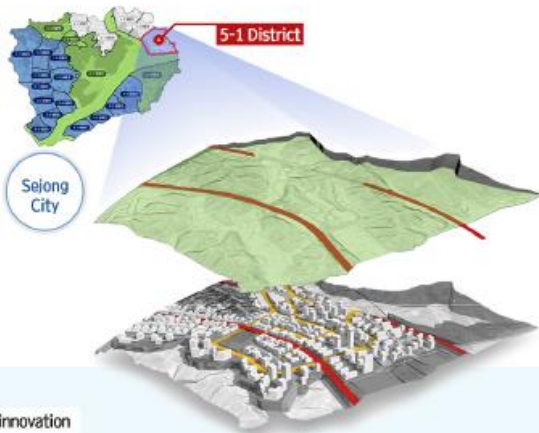


	Green Field	Gray Field	Brown Field
	New Technology & Development	Development-oriented	Service & Data-oriented
Service	R&D → Demo → Spread	R&D → Demo → Spread	R&D → Demo → Spread
System	R&D → Demo → Spread	R&D → Demo → Spread	R&D → Demo → Spread
Facilities	R&D → Demo → Spread	R&D → Demo → Spread	R&D → Demo → Spread
	Busan EDC, Sejong, Songdo	Toronto, QuaySide, Pankyo	Yongsan, Daegu, London

2 Korea Smart City Activities

Sejong 5-1 District

The Sejong Pilot City with the concept of AI-based city, is creating a smart city that changes the daily lives of citizens through 7 innovative factors such as mobility, healthcare, education, energy, and more. For example, smart transportation optimizes traffic by sharing-based transportation and AI analysis of traffic flow data to provide services that reduce commute time and costs, and introduces various future transportation such as shared cars and autonomous vehicles to be experienced in daily life.



>> 7 areas up for innovation

- Mobility**
 Shared mobility(car sharing, ride hailing)
 Automated driving/self-driving shuttles, C-ITS
- Health Care**
 Telemedicine, AI medical examination,
 Smart emergency call, Drone rescue
- Education**
 Edu-tech, On-line education,
 Personalized education, Making Space
- Energy**
 CEMS, Neighborhood Electricity Trading
 Zero-energy building
- Governance**
 Digital Twin, M-Voting(block chain based)
 Living lab(citizen-led initiative)
- Culture**
 Personalized cultural recommendations
 Community currency payment, Unmanned delivery
- Job**
 Creation of start-up incubators
 Global cross-experiment program

MOBILITY

A city that ensures access to transportation by introducing **future mobility services** such as automated driving car & personal mobility

- ✓ Designate 'sharing car only district' and offer smart mobility services* inside the district
 - * Smart mobility : personal mobility, car sharing, ride hailing, self-driving shuttles
- ✓ Promote Mobility as a Service(MaaS) by developing a platform that streamlines transfers between transportations Like bus, taxi, bicycle, taxi and personal mobility
 - * MaaS : Mobility-as-a-Service



Healthcare

A city that develops a platform for **proactive and streamlined health care** service provision for protection of citizens' health and lives

- | Prevention | Emergency response | Management |
|--|--|---|
| <ul style="list-style-type: none"> * Compile patients' health records * AI analysis to predict illness | <ul style="list-style-type: none"> * Calculate short routes for dispatchers * Real-time transfer of patient data * Personalized treatment upon arrival at hospitals | <ul style="list-style-type: none"> * Platform for hospital data sharing (e.g. doctors on-duty, waiting time) * Personalized hospital recommendation |



2 Korea Smart City Activities

Busan Eco-Delta City(EDC)

The Busan pilot city with the concept of data and augmented reality, is creating of cutting-edge waterfront city through 10 innovative factors such as robots, water, and energy. In particular, it is a city specialized in water by applying smart water management technology in the entire urban water cycle (rainwater-river-sewage-reuse) and will also build zero energy system that achieves 100% energy self-sufficiency by utilizing renewable energy source from nature such as hydro and solar energy.

>> 10 areas up for innovation

- Robot**
Elder assistant, delivery robot, smart watch, smart industry cluster
- LWP**
Hub space that saves learning, work and play
- City Admin**
Administration based on AI and augmented reality
- Water**
Water technology exhibition, Low Impact Development(LID) smart purification plant
- Education**
Smart home, smart shopping, smart education
- Health Care**
Healthcare cluster, Near-home personal health monitoring
- Mobility**
Total mobility solution solution by using all mobility services
- Safety**
Intelligent disaster prediction system, Intelligent CCTV for urban safety
- Park**
Smart park for experiencing innovations in technology and design



Robot

A global **robot city** with emerging robotic industry and **robot-friendly infrastructure** that integrates robots to daily life



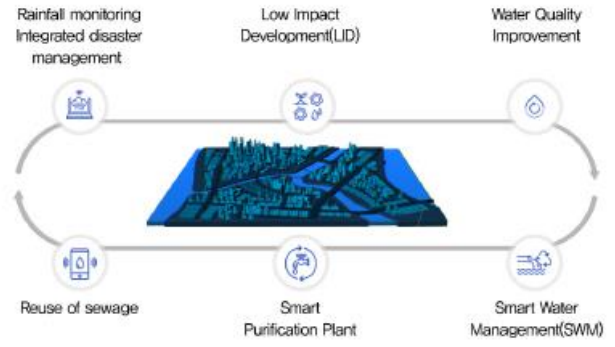
Robot Cluster

- Robot station, Robot rental service, Robot control center(planned)
- Robot Lab/Test bed (planned)

Water

Develop a Korean **Water-Specialized City** by implementing all the cutting-edge technologies related to water throughout the entire water cycle(rainwater-river-sewage-reuse)

100% Water recycling with smart water technologies



Busan Pilot City - Core Innovative Factors

Energy

A city that secures energy self-sufficiency by meeting its energy need from new sources like **fuel cell plant, hydrothermal energy**



60MW Fuel Cell Plant

Produce electricity and energy from fuel cell plants

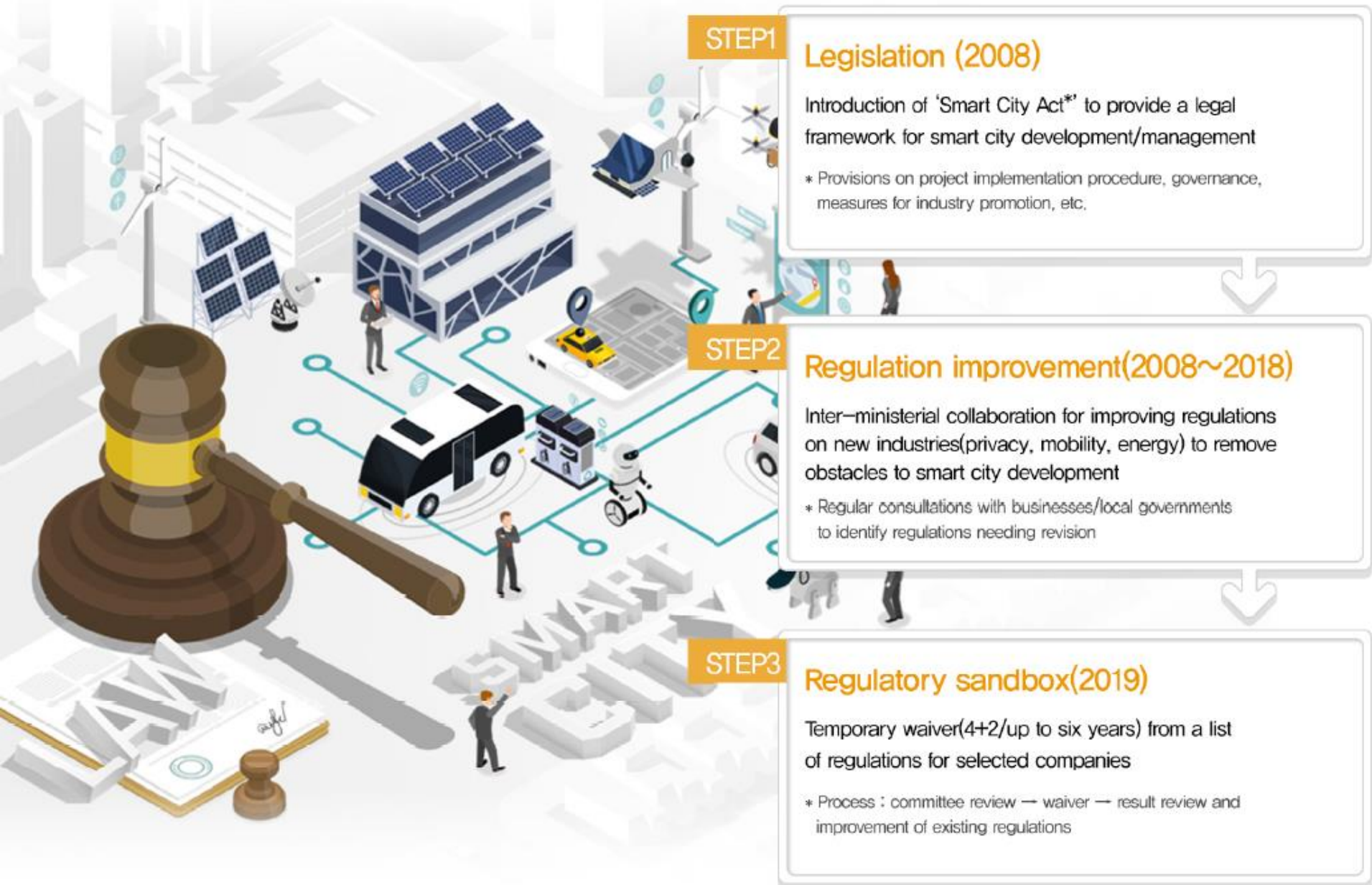


Hydrothermal Energy (10% of total energy need)

Obtain energy for heating and cooling by extracting heat from surface water

2 Korea Smart City Activities

Smart City Regulation



STEP1

Legislation (2008)

Introduction of 'Smart City Act*' to provide a legal framework for smart city development/management

* Provisions on project implementation procedure, governance, measures for industry promotion, etc.

STEP2

Regulation improvement(2008~2018)

Inter-ministerial collaboration for improving regulations on new industries(privacy, mobility, energy) to remove obstacles to smart city development

* Regular consultations with businesses/local governments to identify regulations needing revision

STEP3

Regulatory sandbox(2019)

Temporary waiver(4+2/up to six years) from a list of regulations for selected companies

* Process : committee review — waiver — result review and improvement of existing regulations

2 Korea Smart City Activities

Korea Digital New Deal Policy(2020)

그린 리모델링 SOC 디지털화 디지털 트윈

도시·산단의 공간 디지털 혁신 스마트 물류 체계 구축

with our devices at home, at work, and throughout our cities.

This network of connected devices gathers vast amounts of data about our online activities.

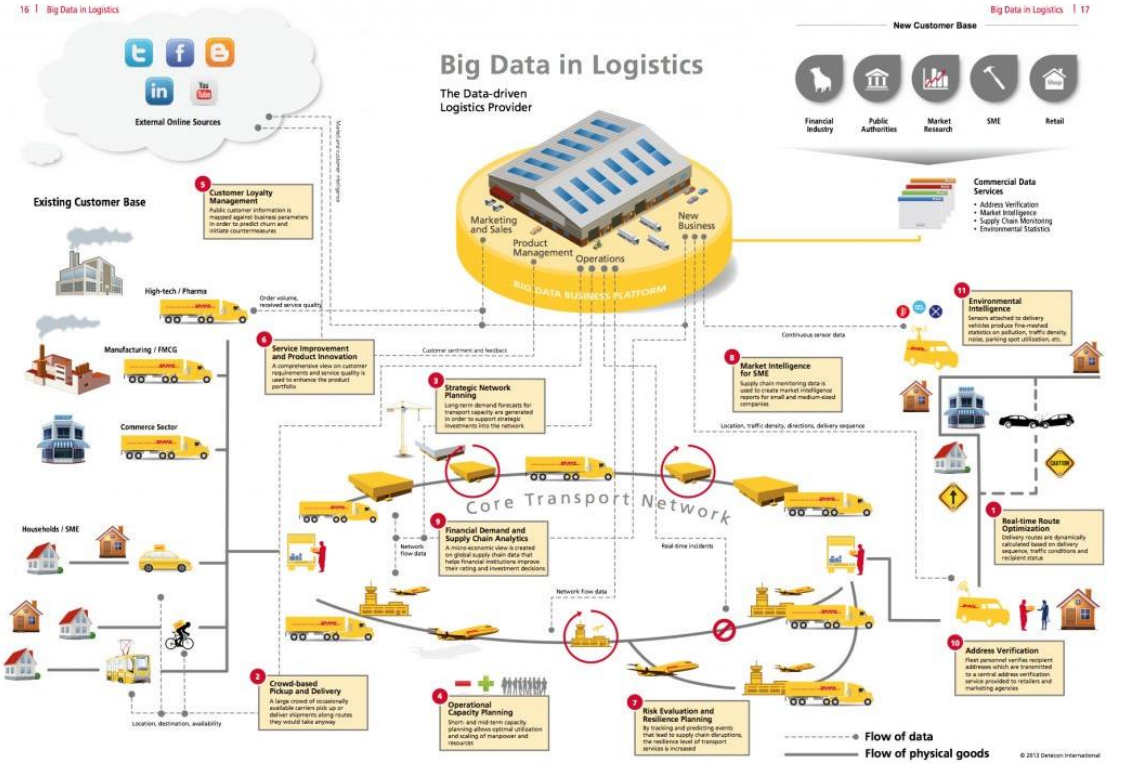
Daily Data Generated from IoT Devices

5 quintillion bytes
(5 BILLION GIGABYTES, OR 5 EXABYTES)

SOURCE: CISCO

IoT is empowered by **three key technologies:**

- Artificial Intelligence (AI)
- 5G Networks
- Big Data



Smart Home

Smart home devices such as thermostats, coffee makers, lights, and smart TVs learn a user's habits to develop automated home "support" for everyday tasks. Applications include energy efficiency, safety, entertainment, access control, and personal comfort.

1

Wearables

Wearable devices continuously monitor and track user preferences and habits. Applications include fitness and health trackers, heart rate monitoring, wireless headphones, and AR/VR devices.

2

Smart watches, AR/VR goggles, Wireless earbuds

Smart Industry

Smart cities that integrate all levels of municipal services are becoming safer, more convenient places to live. Applications include open data for better urban planning, optimized energy consumption, and increased public safety through smart traffic surveillance.

3

Autonomous manufacturing robots, Automated supply chain management, Predictive maintenance sensors

Smart energy grids, Smart streetlights, Smart public transportation

Smart City

Smart cities that integrate all levels of municipal services are becoming safer, more convenient places to live. Applications include open data for better urban planning, optimized energy consumption, and increased public safety through smart traffic surveillance.

4



DEAP CITY

스마트시티 혁신성장동력 프로젝트 사업단



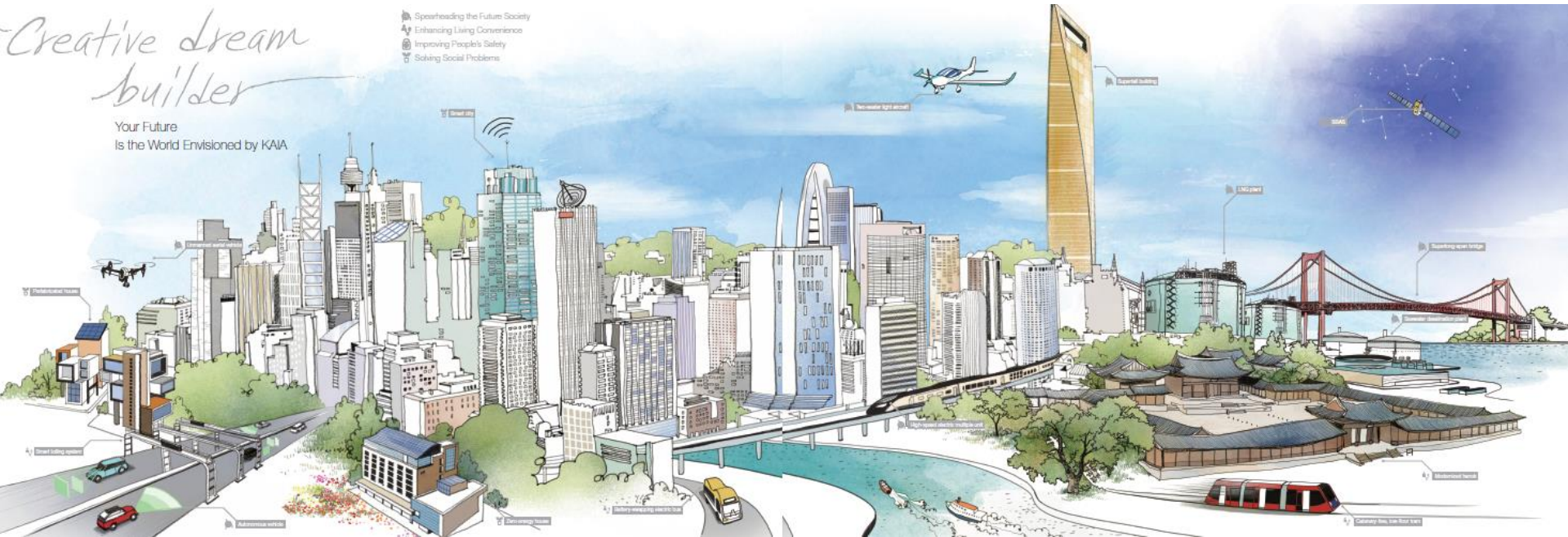
Korea Smart City Development

National Smart City R&D Program



3 National Smart City R&D Program Achievements of KAIA

KAIA is the only National R & D Agency in the field of land, transportation and infrastructure such as housing, bridges, plants, buildings, transport facilities, railways, and aviation, etc.



Urban Transit Maglev Train

High-Speed Electric Multiple Unit

Autonomous Vehicle

Smart Tolling System



- Commercialized the world's second urban transit maglev train
- Maximum speed of 110 km/hr; opened the Incheon International Airport Line (2016)

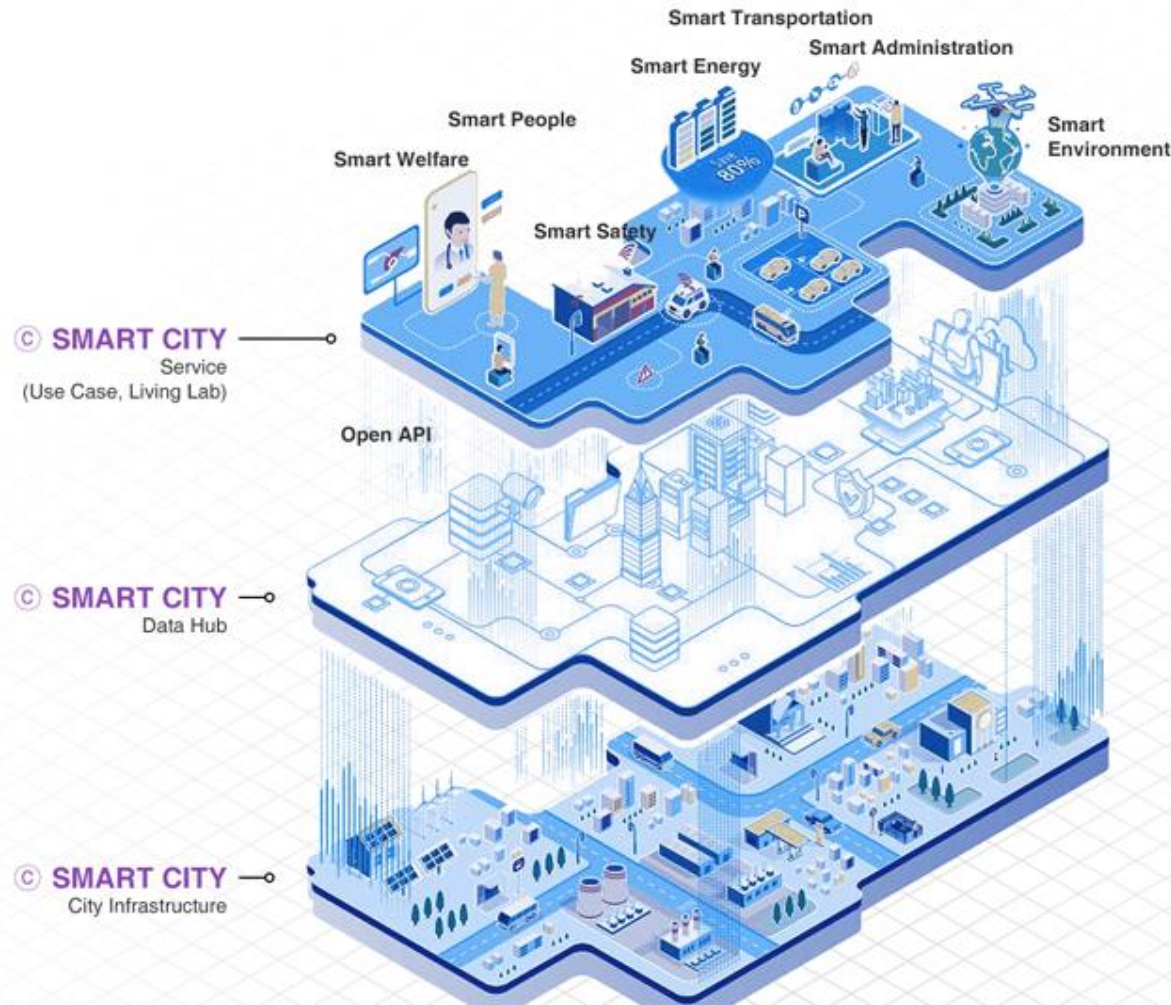
- Developed a commercialized technology for high-speed EMU, with a maximum speed of 421.4 km/hr (the fourth of its kind in the world)
- Received the Prime Minister's Award (the National Grand Prize in Technology) and was contracted to supply 130 models for commercial use

- Began constructing K-city, a virtual city where autonomous vehicles will be tested (2017)

- Commercialized toll payment technology using a wireless communication and image recognition system
- Applied to tollgates in West Busan, South Incheon, West Yeongam, South Suncheon, and North Daegu

3 National Smart City R&D Program Overview

Initiating National Strategic Smart City Program Based on Data and AI for building Open Data Smart City Frameworks



✓ National Strategic Project 130 million dollars investment(18-22)

- * Government (84.3billion)
- + Private sector(23.5billion)
- + Municipal governments (20.9billion)

•• Phase 1

Data hub technology development(18-19)

•• Phase 2

Demonstration to Daegu and Siheung (19-21)

•• Phase 3

Spread and expansion (22-)

✓ Joined Organizations : 90

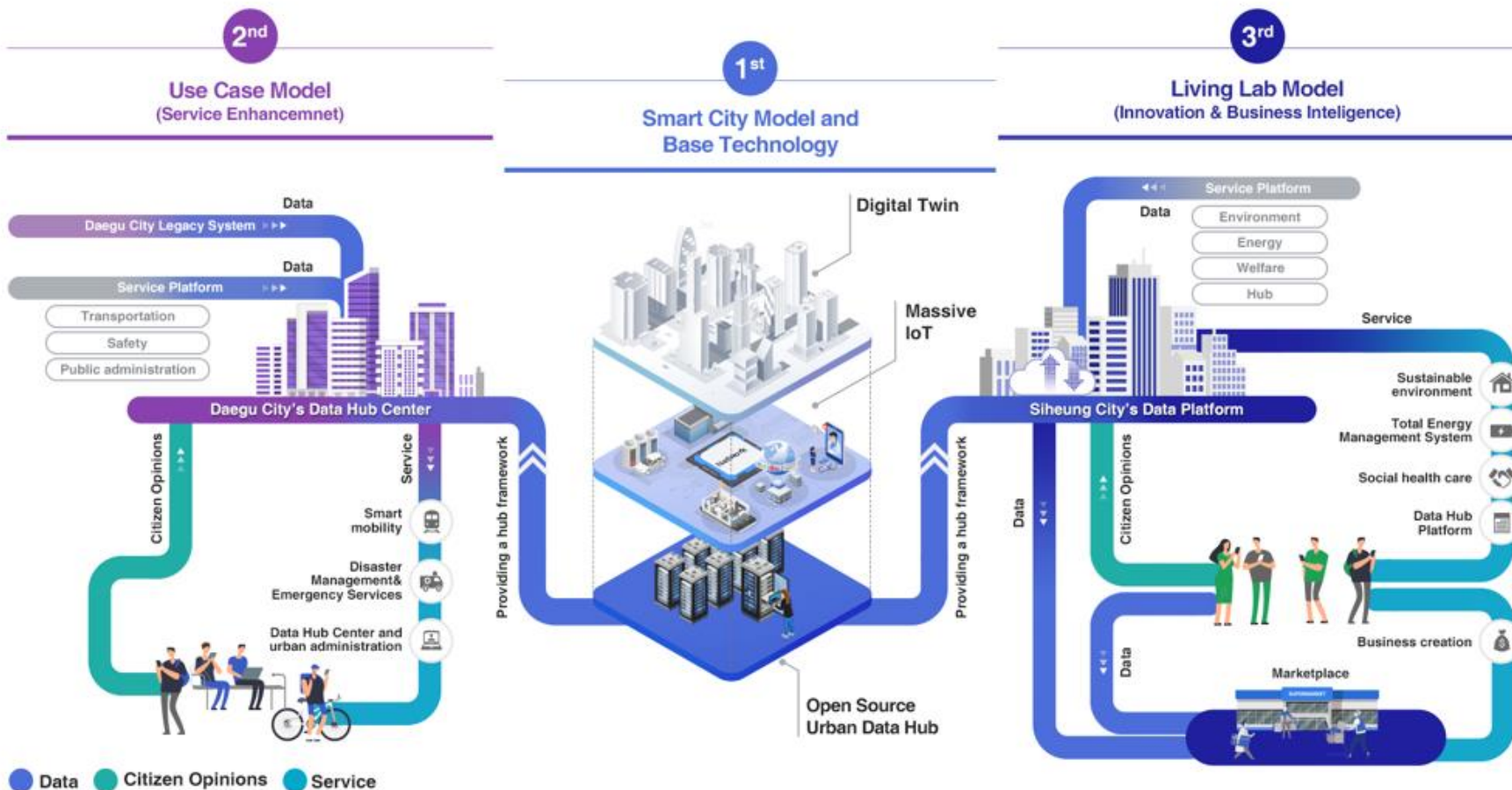
- * companies, universities, research institutes

✓ Participants : more than 1,300

- * professors, researchers, engineers, etc.

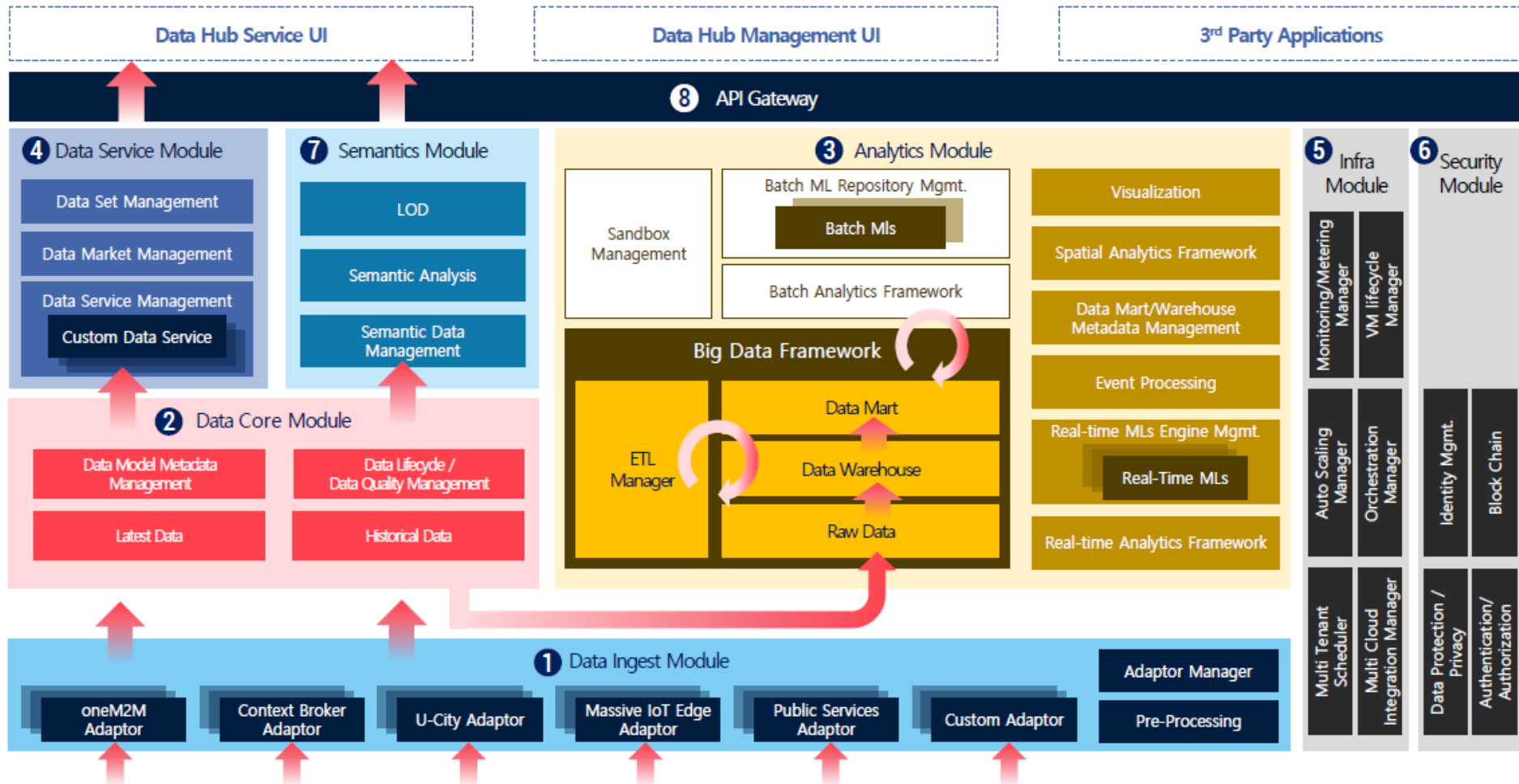
3 National Smart City R&D Program Project Alliances within NSSC

Technology development for data & AI-driven smart cities and Demonstration to existing cities
 (Daegu & Siheung)



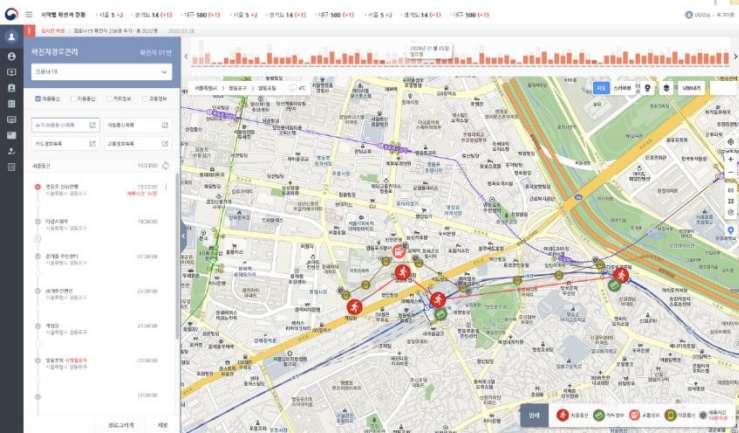
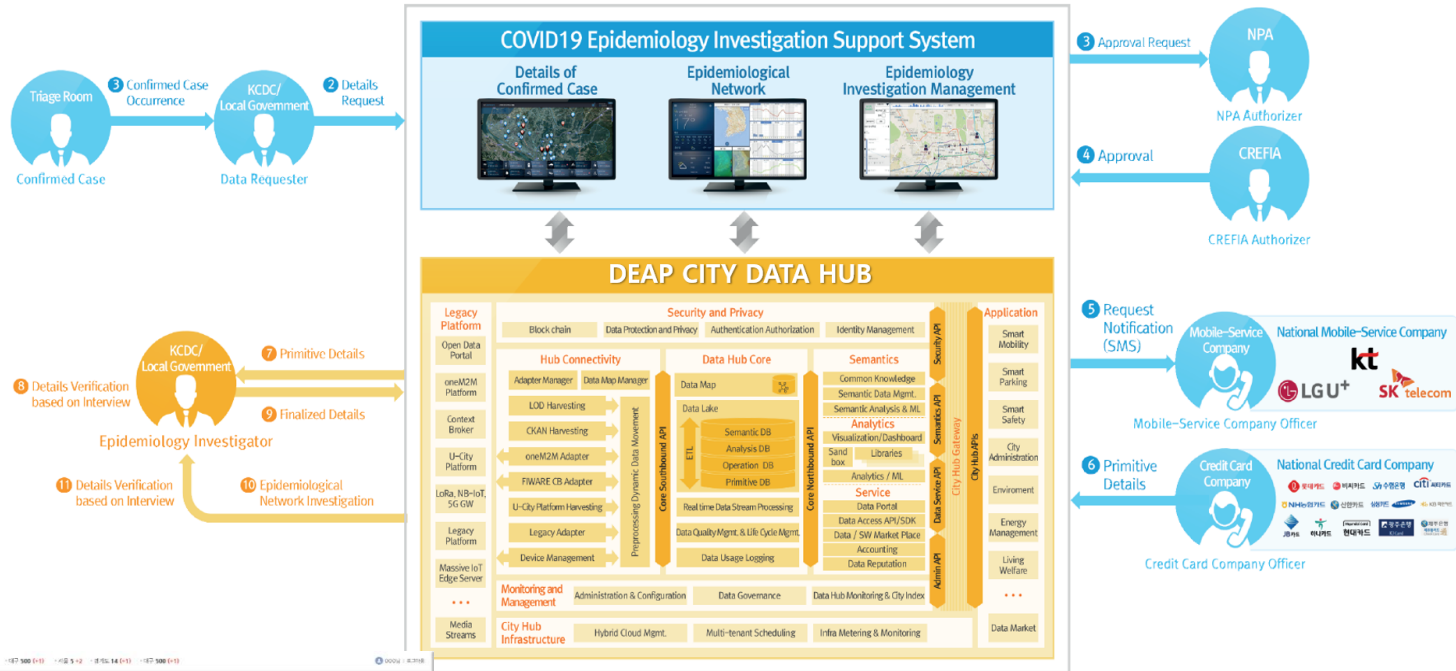
3 National Smart City R&D Program Smart City Data Hub Model

Urban infrastructure data collection (Ingest) module, core module that stores standardized data, analytics module that provides real-time batch analysis and sandbox analysis environment for converged data, service infrastructure and security



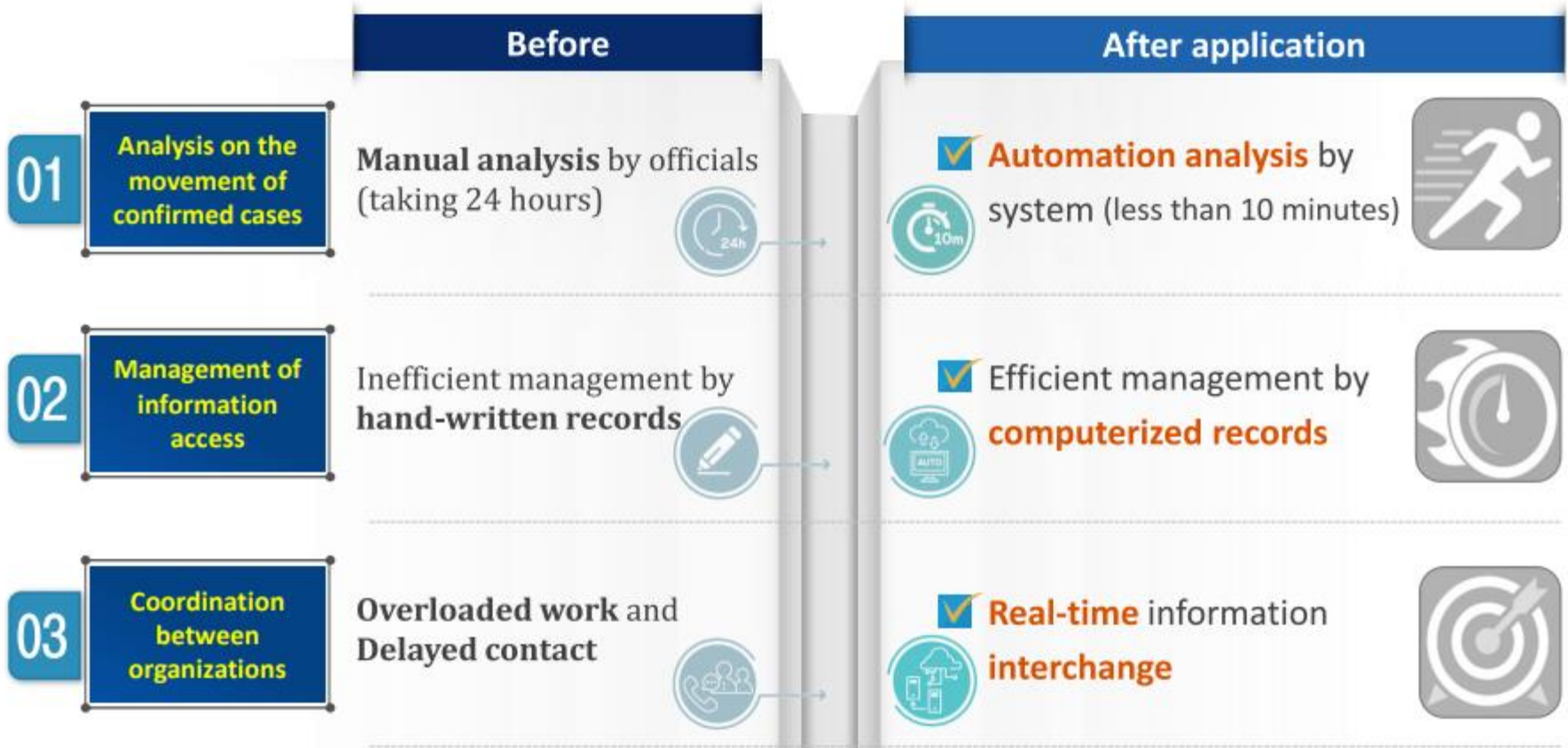
3 National Smart City R&D Program Epidemic Investigation Support System(EISS)

EISS was Developed through the application of Smart City Data Hub to collect, process and analysis to enable the automation of the epidemiological investigation process.



3 National Smart City R&D Program

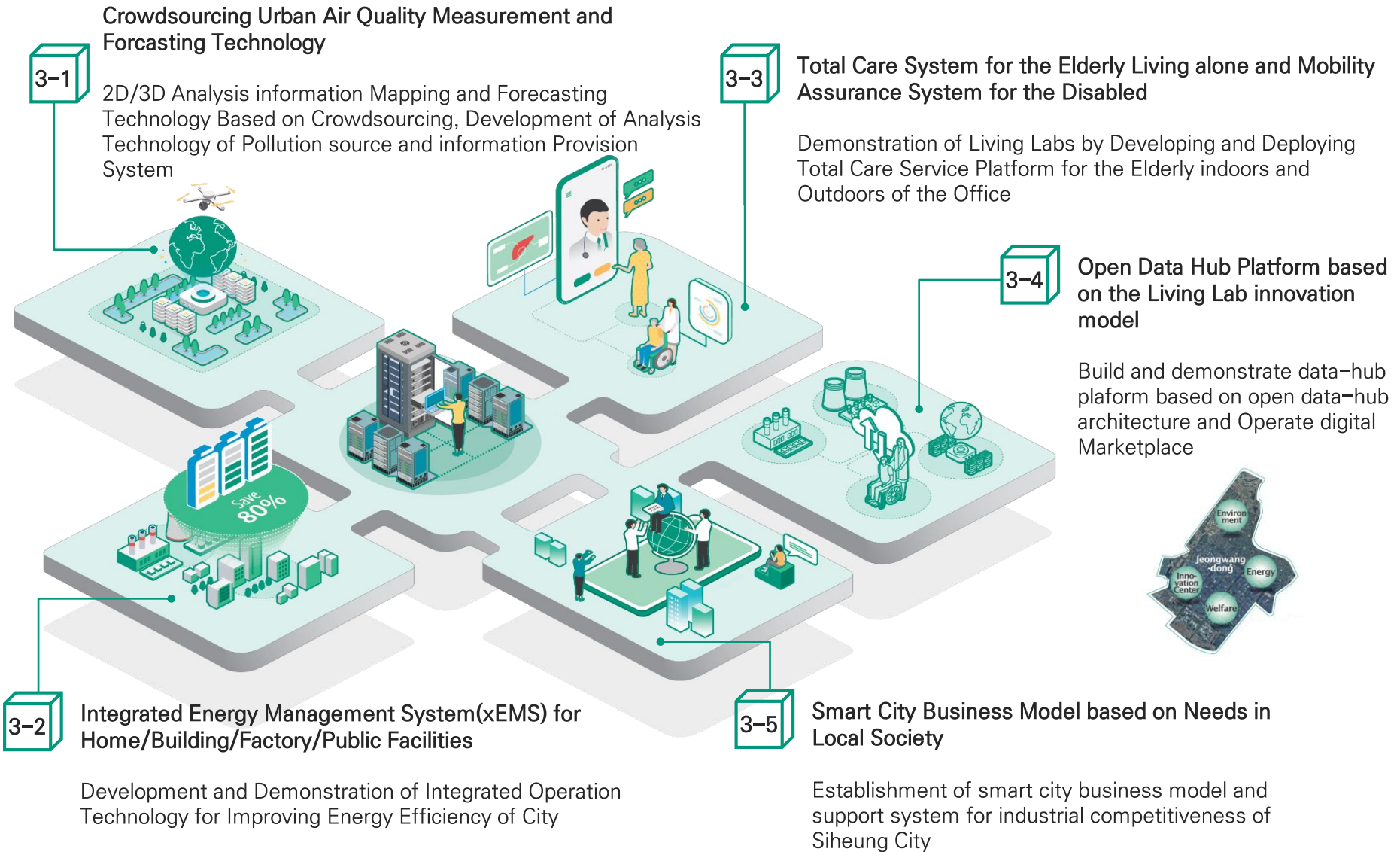
Effects of EISS



※ Paperwork and contacts needed amongst 28 organizations supporting KCDC have been replaced with the automatic system.

3 National Smart City R&D Program

Demonstration R&D Model of Siheung City



3 National Smart City R&D Program Digital Twin Model for Smart City

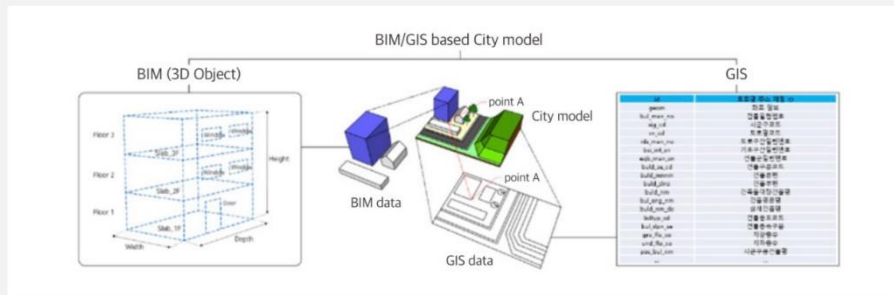
Digital twin
Prototype
Daegu



Landslide Alarm &
Fire Alarm

Digital Twin Platform

BIM-GIS Base 3D Object-Oriented Model



Artificial Intelligence

Analytics (T3Q)

Monitoring Stabilization

(Hanyang Univ.)

Cloud

Service Model (Crosent)

Standard

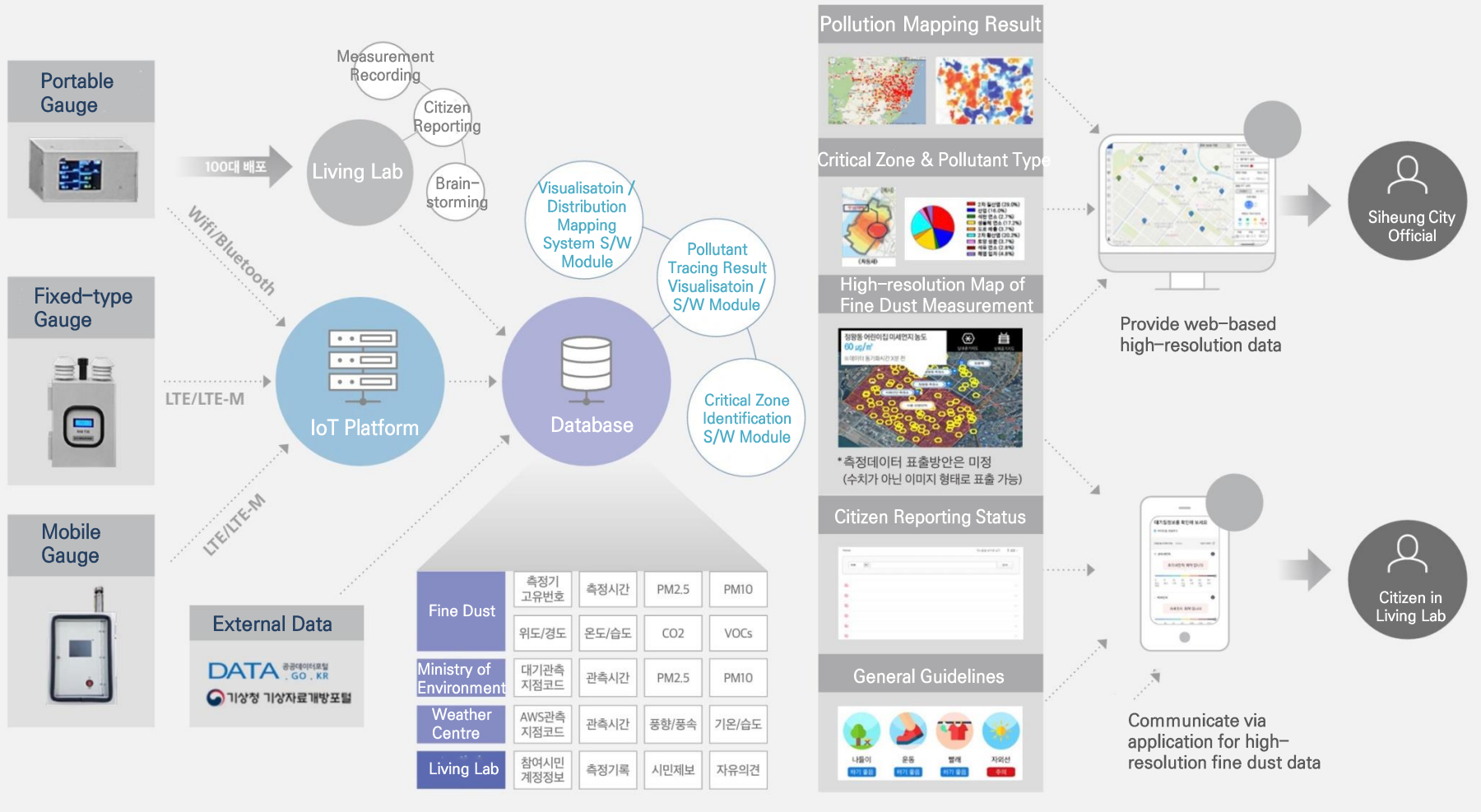
Data Format (KT)

Digital twin
Prototype
Siheung



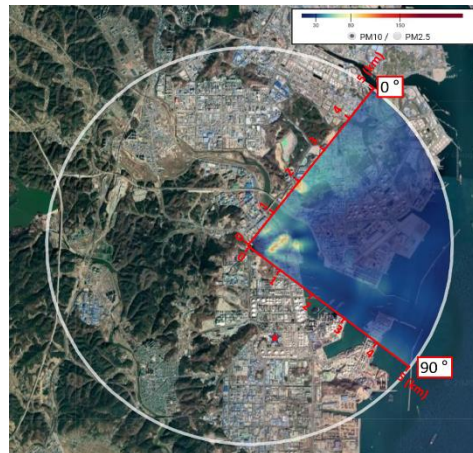
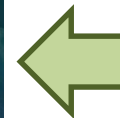
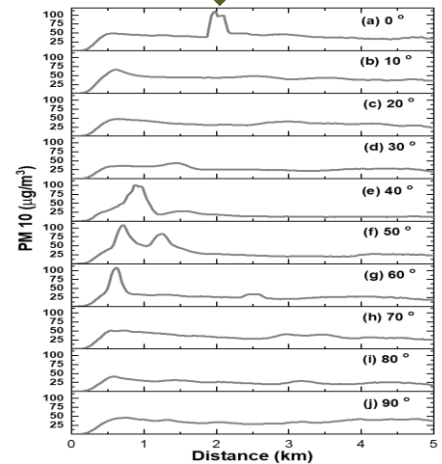
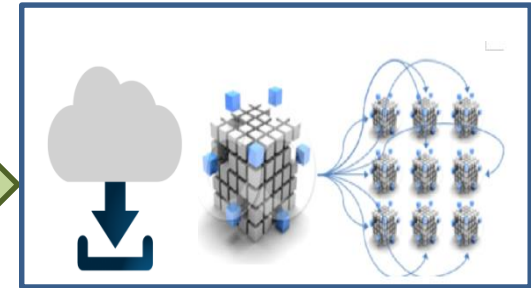
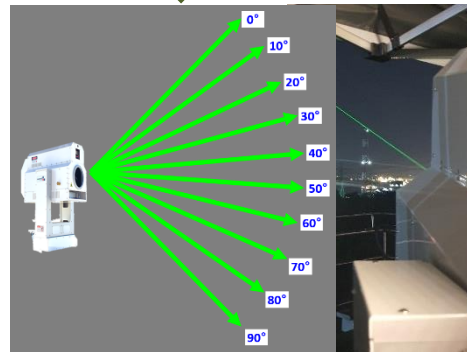
Energy Management System (FEMS/BEMS)

3 National Smart City R&D Program Air Quality Monitoring System

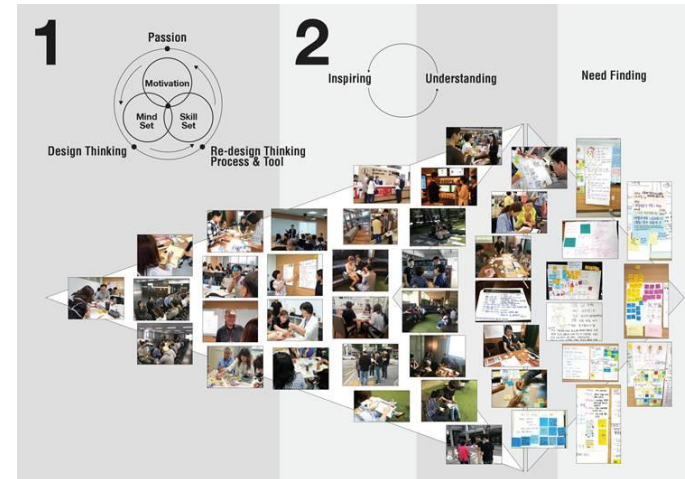
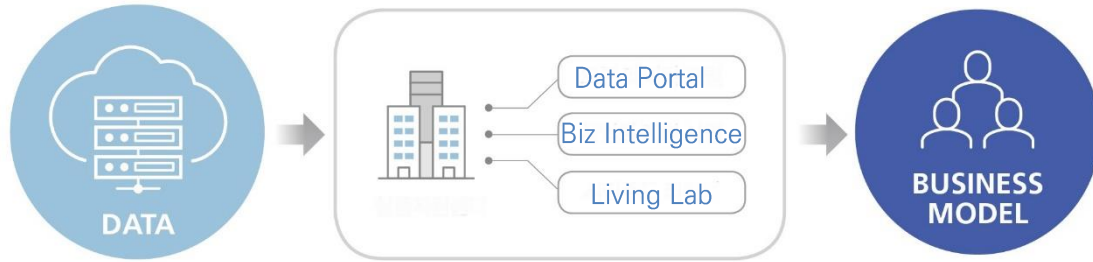


3 National Smart City R&D Program Lidar System for Air Quality Monitoring(World First)

- 1 Panorama**
 - Select the location
 - Escape the obstacles
- 2 Lidar Surveying**
 - Continuous Survey
- 3 Data Transfer**
 - Transfer through Web
- 4 Analysis**
 - Real-time analysis
- 5 Visualization**
 - 30m distance display



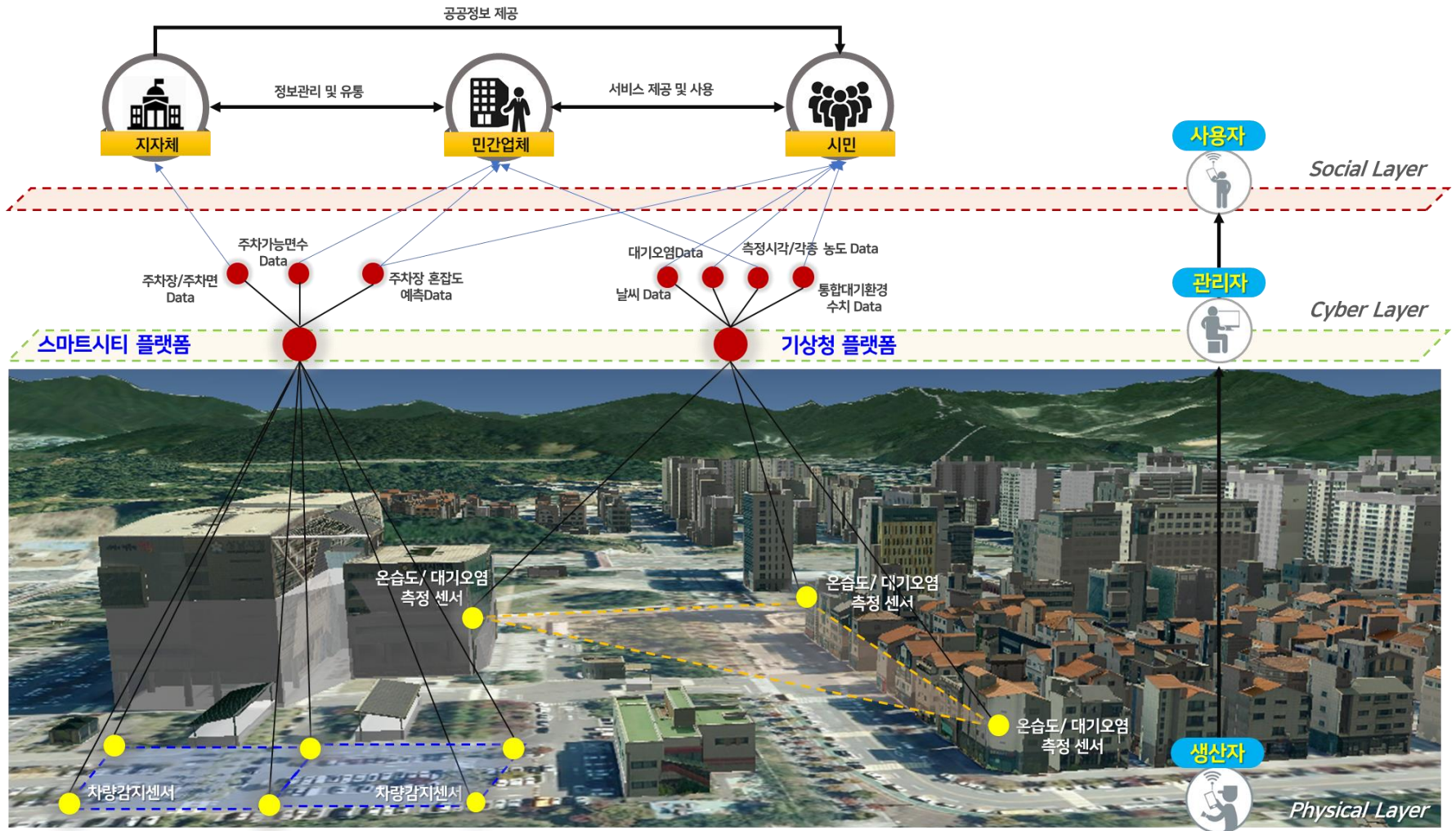
3 National Smart City R&D Program Citizen Participation(Kindergarden)



3 National Smart City R&D Program

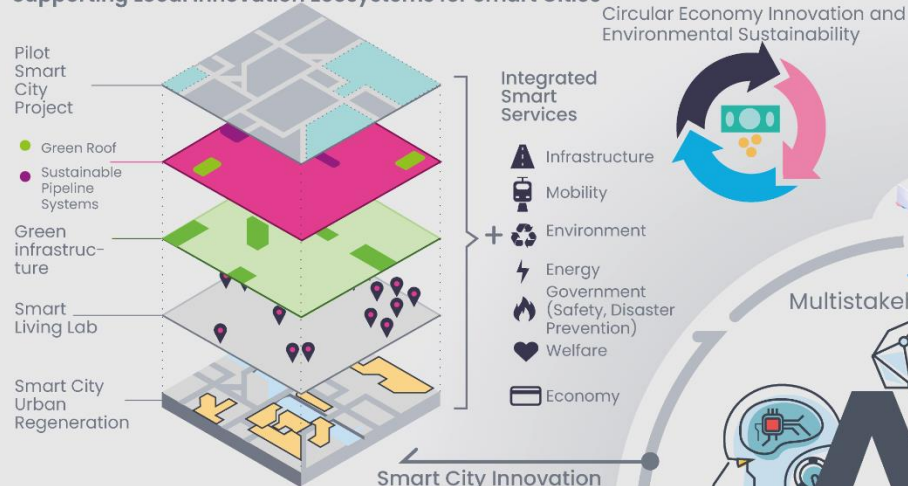
Data Driven Smart City Model

In order to build a data-based city, it is very important to structurize the city, maintain connectivity, and establish a data distribution system with data interoperability and governance system



3 National Smart City R&D Program AI Center for Hyper-Smart City

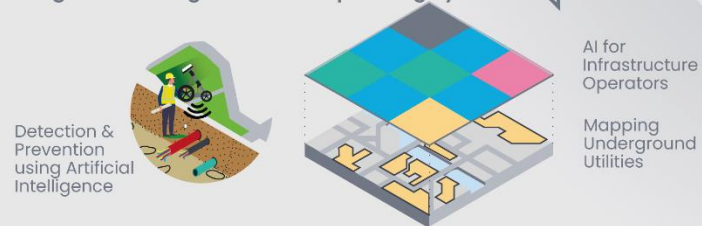
Big Data, Artificial Intelligence and Smart Cities Supporting Local Innovation Ecosystems for Smart Cities



Artificial Intelligence Urban Services Platform Cross Domain AI Analytics



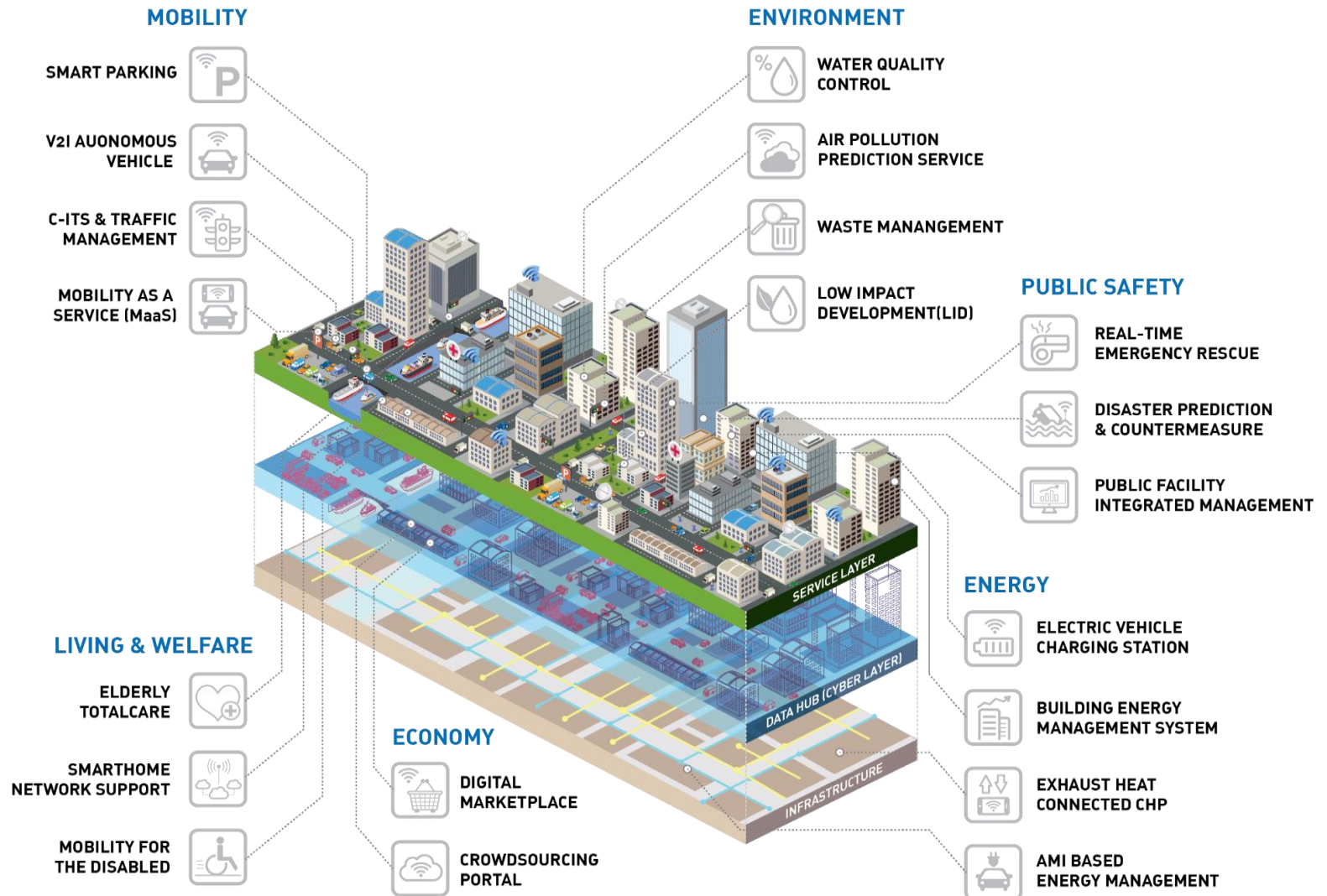
AI Operating Systems (OSes): A City Operating System for National Pilot Smart Cities



Cross-Domain AI & Data Fusion - A Roadmap for Development
Smart Cities and Inclusive Growth - A Model for Planning Smart Cities
Smart City R&D Promotion Plan considering Cross-Ministerial Linkage -
Long-term R&D Strategy, Technology Adoption and Diffusion



3 National Smart City R&D Program Final Model of NSSCP



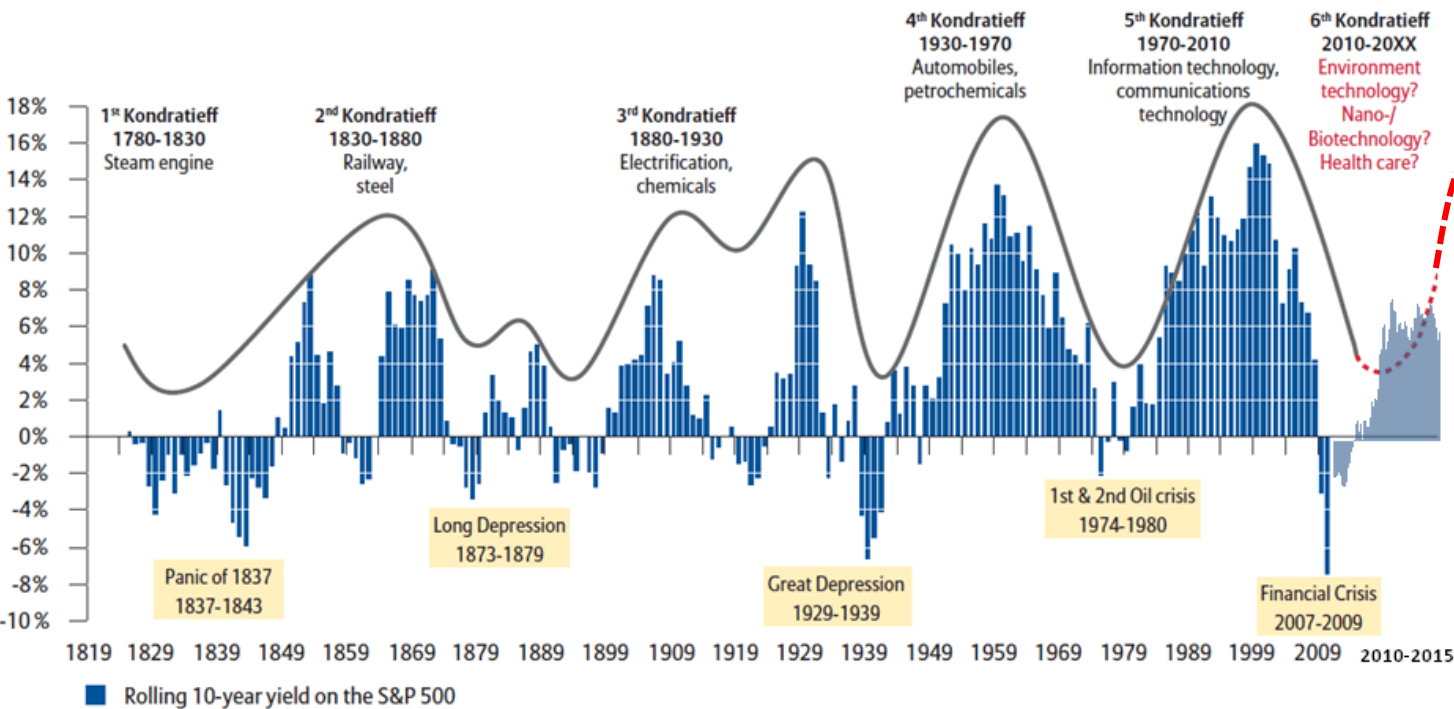
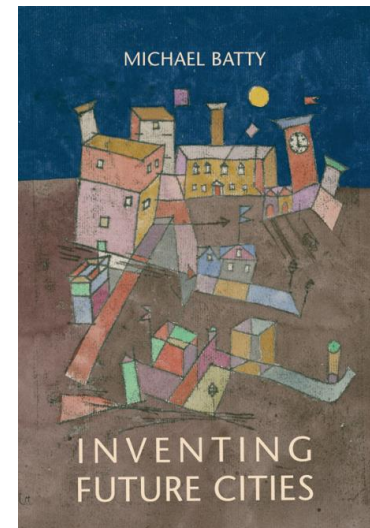
3 National Smart City R&D Program

Future of Smart City

6th Kondratieff Wave invokes endless invention, creative destruction and innovation, which will be mainly concentrated on Smart Cities



The Age of The Smart City



Source: Allianz Global Investors 2010 Report –
“The Sixth Kondratieff, long waves of prosperity”
Updated to Q3 2015 by deconstructingrisk.com

THANK YOU



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