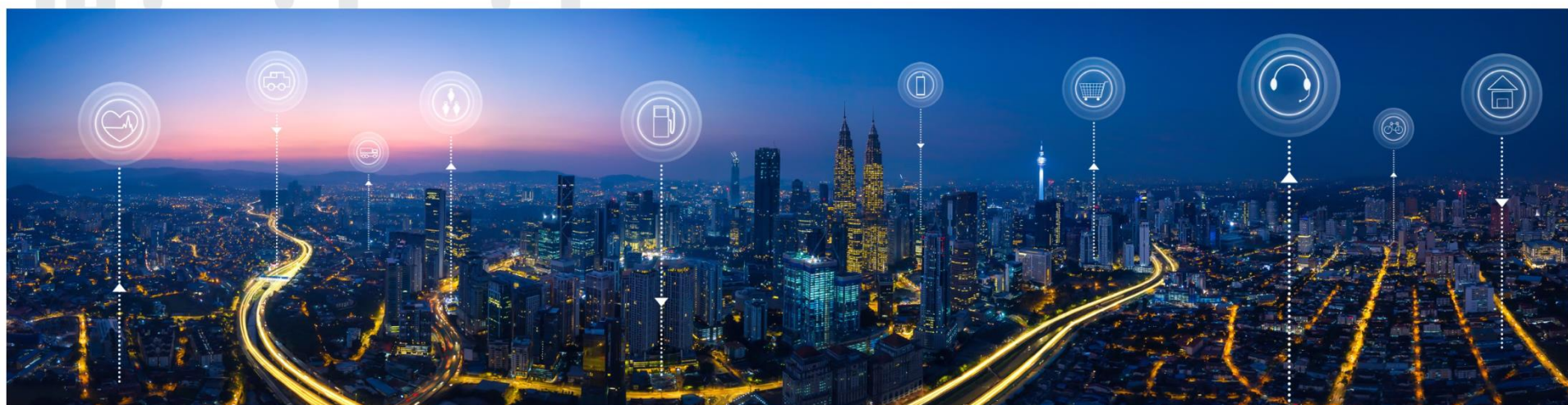# Korea Smart City

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Contents

Korea Smart City Activities

1

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)

2nd Industrial Revolution (Power, Factory, Capital)

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

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

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

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

Industrial City
Paradigm of Urban Planning

4

Solution

Through a data-driven Smart City
Resolve urban problems

Sustain-ability

With protecting environment, energy and the underpreviledged
Pursue Sustainable Growth

Digital

Through the spread of Smart City
Promote Digital Economic Development

History of Korea Smart Cities

1960s-1970s

SEEKING

- 5 YEAR ECONOMIC DEVELOPMENT PLAN

FAST RECOVERY FROM KOREAN WAR

1980s

INITIALIZING

- EXPANSION OF SEOUL
- RAPID DEVELOPMENT OF INDUSTRIAL CITIES

RAPID ECONOMIC GROWTH

1990s

STABILIZING

- METROPOLITAN NEW TOWN CONSTRUCTIONS

* ONLY 5 YEARS TO COMPLETE BUNDANG NEW TOWN, FROM PLANNING TO CONSTRUCTION

PARADIGM SHIFT FROM DEVELOPMENT TO MANAGEMENT

2000s

MATURING

- URBAN REGENERATIONS:
  - CONTESTED SITES
  - DECLINING URBAN CENTERS
  - INDUSTRIAL HERITAGE
- COMMUNITY PLANNING
- SUSTAINABLE / SMART CITY

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

U-City (Ubiquitous)

U-eco City (Ubiquitous+Ecological)

K-Smart City

· 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

Korea Smart Cities Activities

Seoul•Incheon•Kyungkido(21)

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

Chungbuk(5)

- 영동군, 진천군, 청주시
- 진천군
- 제천시

Daejeon•Sejong•Chungnam(8)

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

Jeonbuk(3)

- 고창군, 완주군, 전주시

Kwangju•Jeonnam(7)

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

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

Legend

- Thematic Town
- Smart City Challenge
- Smart Urban Regeneration
- Smart City Platform(Metro)
- Smart City Platform(Medium)
- National Demonstrative City
- National Strategic Smart City R&D

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

Technology

Service

Citizen Engagement
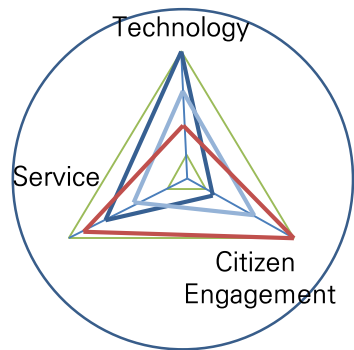
Type of Application

	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

Source : McKinsey Global Institute

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.

5-1 District

Sejong City
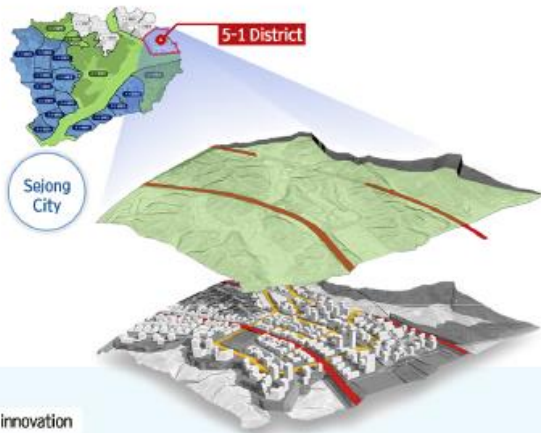
>> 7 areas up for innovation

Mobility
Shared mobility(car sharing, ride hailing)
Automated driving(self-driving shuttles, C-ITS)

Governance
Digital Twin, M-Voting(block chain based)
Living lab(citizen-led initiative)

Health Care
Telemedicine, AI medical examination,
Smart emergency call, Drone rescue

Culture
Personalized cultural recommendations
Community currency payment, Unmanned delivery

Education
Edu-tech, On-line education,
Personalized education, Making Space

Job
Creation of start-up incubators
Global cross-experiment program

Energy
CEMS, Neighborhood Electricity Trading
Zero-energy building

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

Sidewalk | Bicycle | PM | Sharing car | Autonomous shuttle | Sharing car

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

Prevention
- Compile patients' health records
- AI analysis to predict illness

Emergency response
- Calculate short routes for dispatchers
- Real-time transfer of patient data
- Personalized treatment upon arrival at hospitals

Management
- Platform for hospital data sharing (e.g. doctors on-duty, waiting time)
- Personalized hospital recommendation

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** — Digital assistant, Delivery robot, Rehab robot, Robot industry cluster
- **LWP** — Hub place that mixes 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, Real-time personal health monitoring
- **Mobility** — Total mobility solution provision by living at mobility services
- **Safety** — Intelligent disaster prediction system, Intelligent CCTV for citizen safety
- **Park** — Smart park for experiencing innovations in technologies and design

Nakdong river
Mouth of Nakdong river ▶
Old city center
Maekdo river
Pyeonggang lake
Mouth of Seonakdong river ▶
New Busan Port ▶
◀ Gimhae International Airport
Seonakdong river

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**
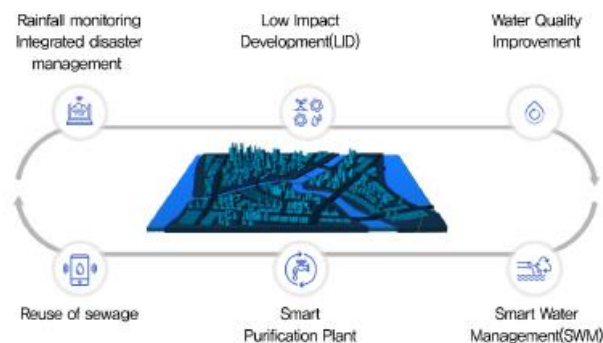
60MW Fuel Cell Plant
Produce electricity and energy from fuel cell plants

Hydrothermal Energy (10% of total energy need)
Obtain energy for heating and cooling by extracting heat from surface water

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

Care robot
Self-check out counter
Medical robot
Delivery robot
Parking robot

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

- Rainfall monitoring Integrated disaster management
- Low Impact Development(LID)
- Water Quality Improvement
- Reuse of sewage
- Smart Purification Plant
- Smart Water Management(SWM)

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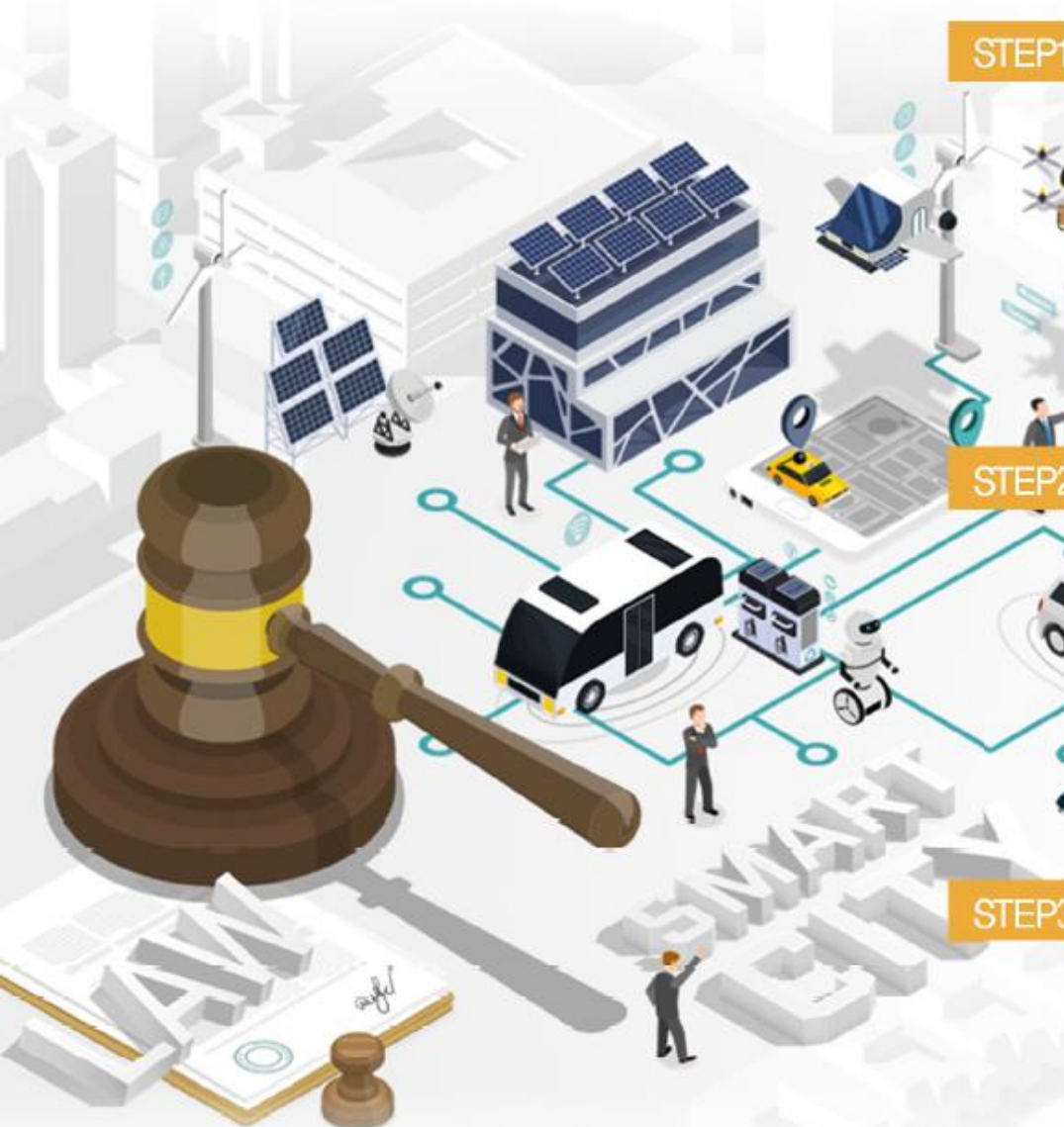
* Regular consultations with businesses/local governments to identify regulations needing revision

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
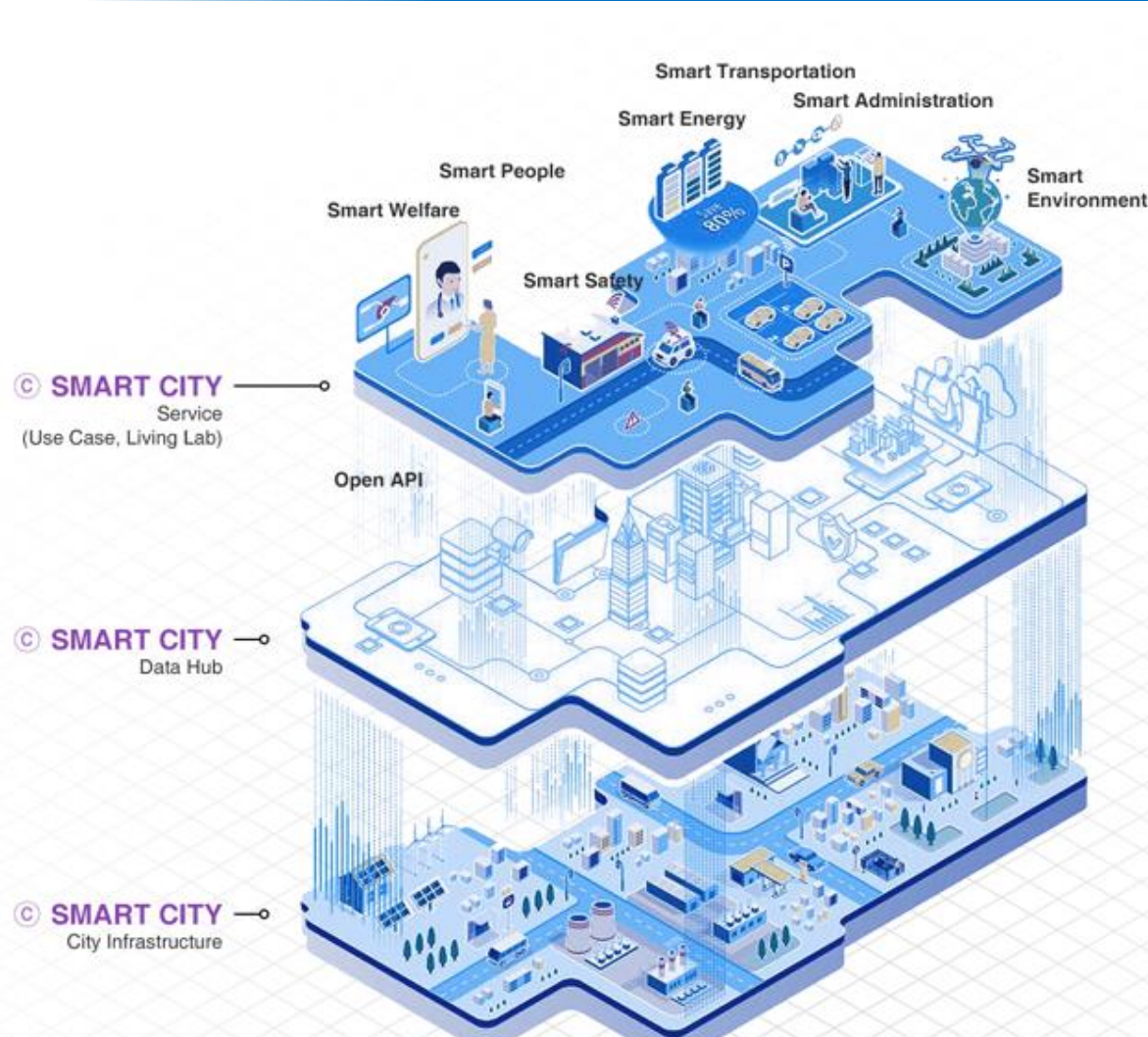
Korea Smart City

National Smart City R&D Program

With COVID-19

2

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**
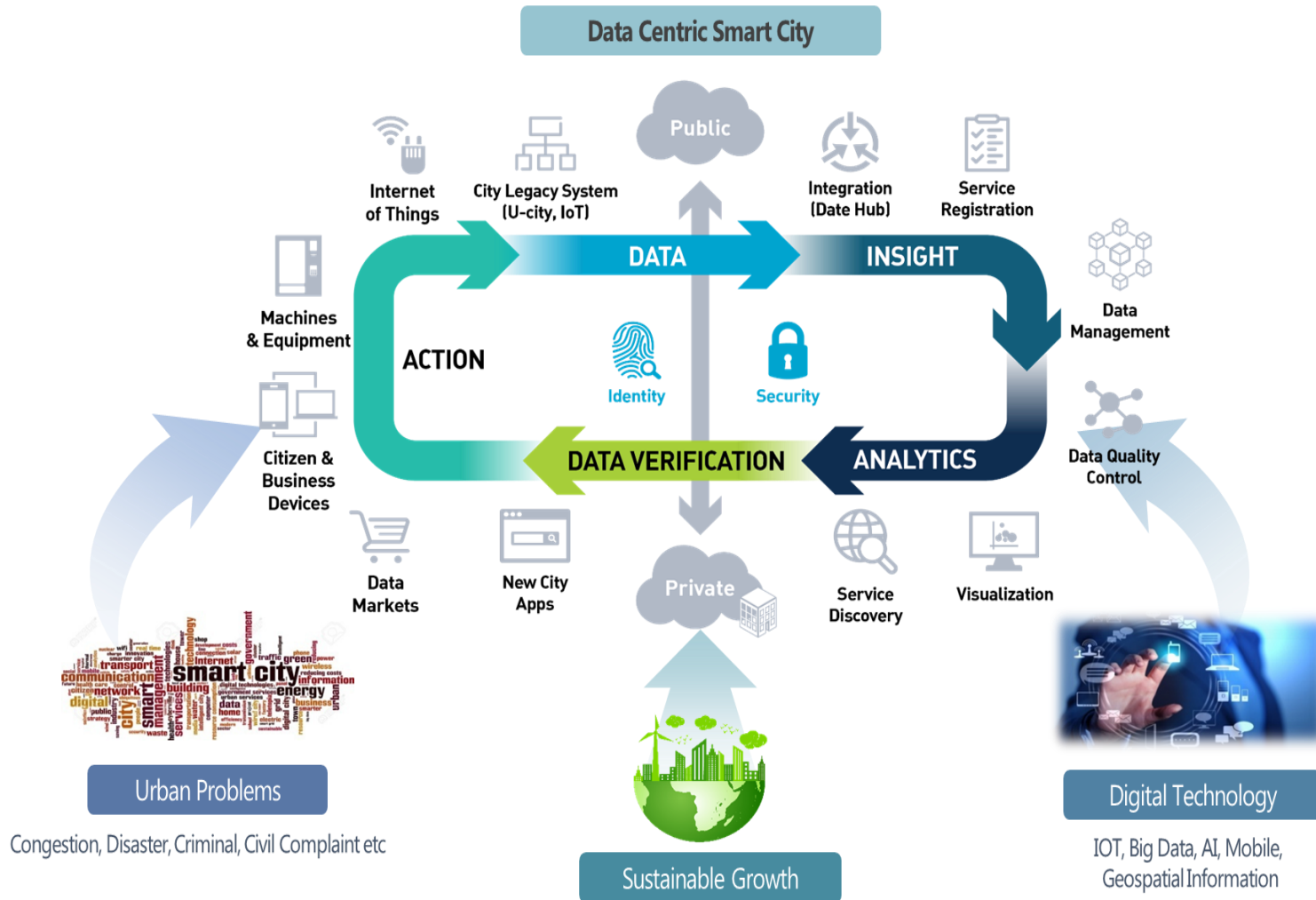
* companies, universities, research institutes

☑ **Participants : more than 1,300**

* professors, researchers, engineers, etc.

2 Data-Centric Smart City

Data-centric smart city aims to resolve urban problems and ensure sustainable growth, eventually accomplishing a robust digital economy through its spread-out.

Data Centric Smart City

Public

Internet of Things
City Legacy System (U-city, IoT)
Integration (Date Hub)
Service Registration

DATA   **INSIGHT**

Machines & Equipment

Data Management

ACTION

Identity   Security

Citizen & Business Devices

DATA VERIFICATION   **ANALYTICS**

Data Quality Control

Data Markets
New City Apps
Private
Service Discovery
Visualization

Urban Problems
Congestion, Disaster, Criminal, Civil Complaint etc

Sustainable Growth

Digital Technology
IOT, Big Data, AI, Mobile, Geospatial Information

Project Alliances within NSSC

Technology development for data & AI–driven smart cities and Demonstration to existing cities (Daegu & Siheung)
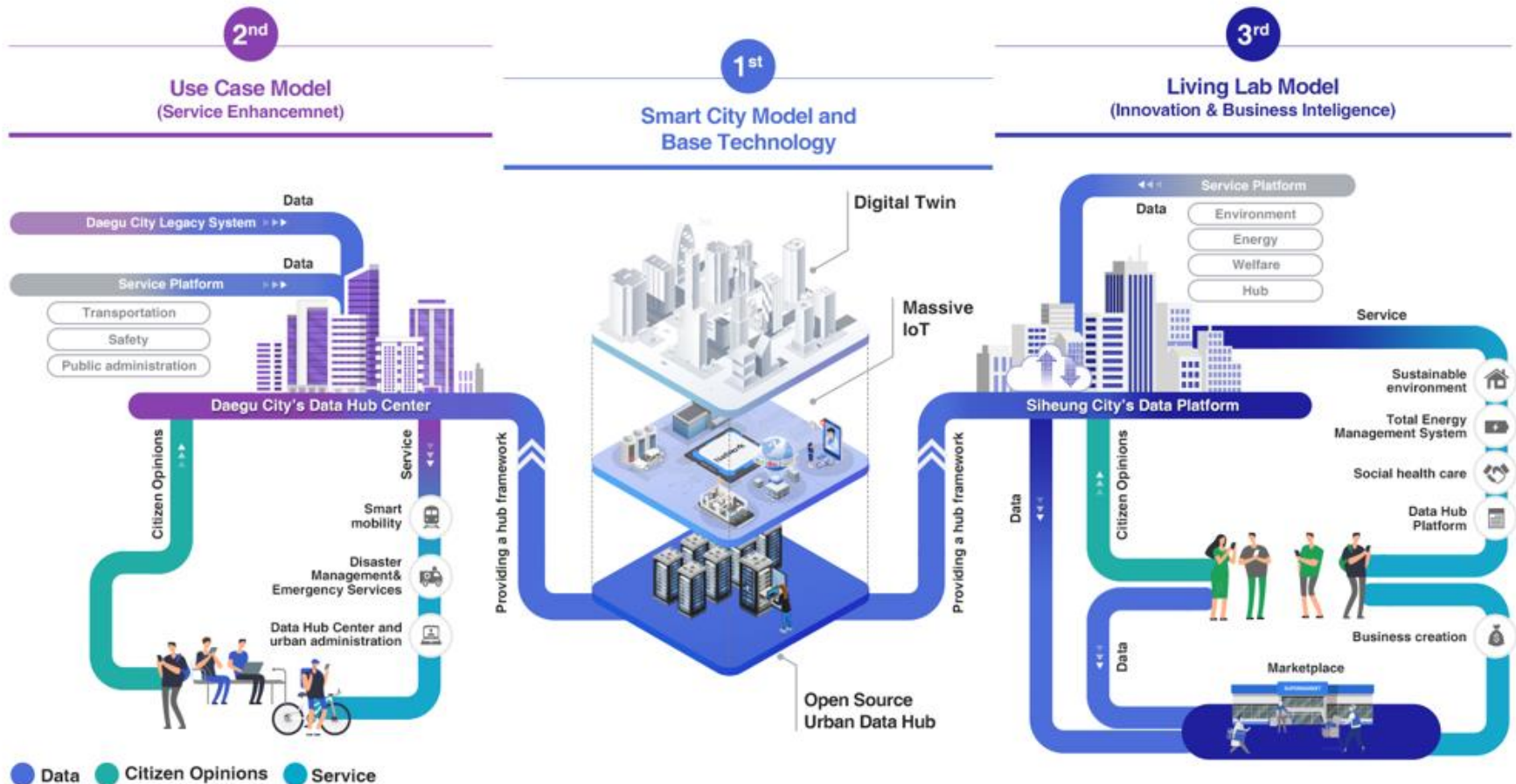
2 National Smart City R&D Program
Smart City Data Hub Model

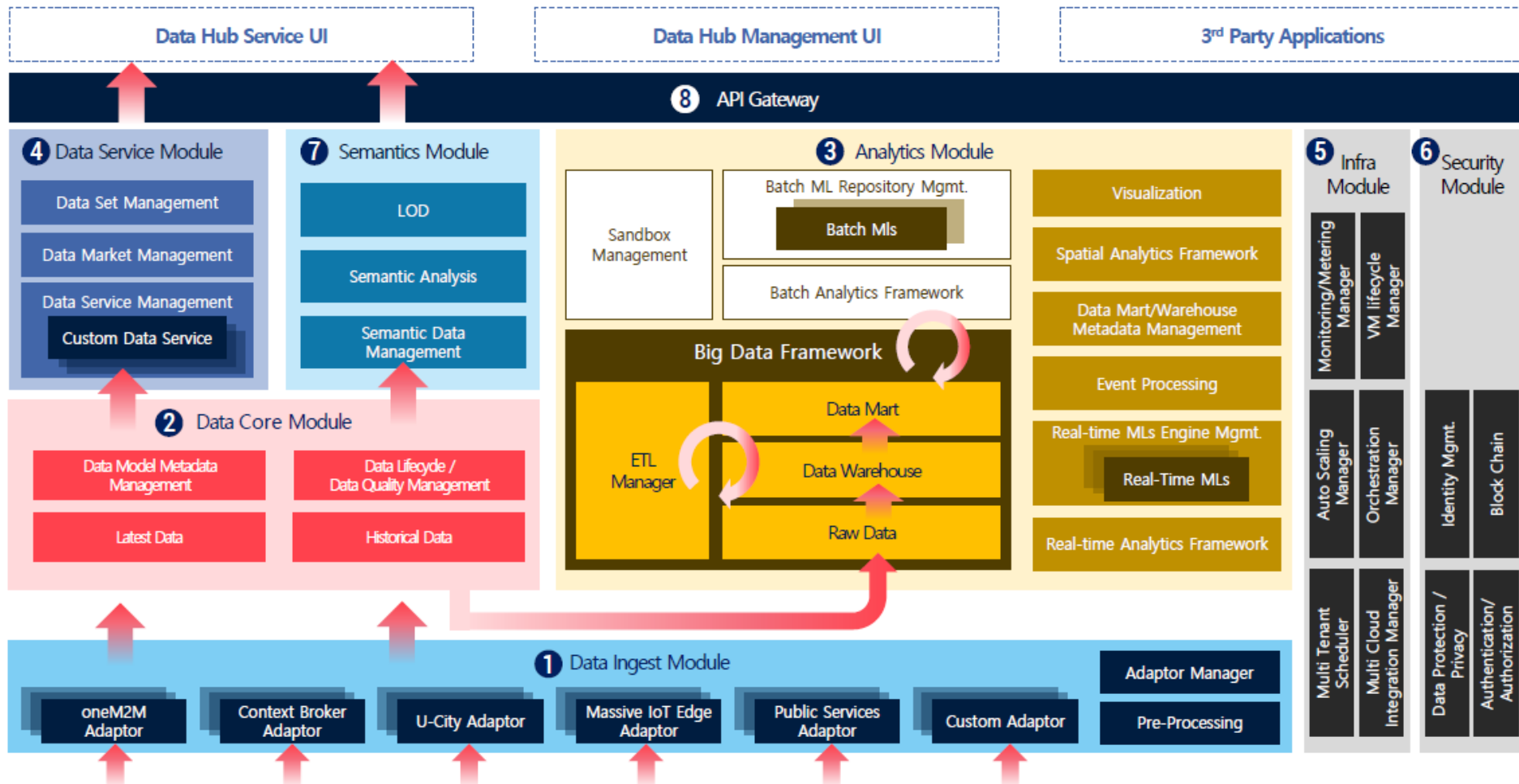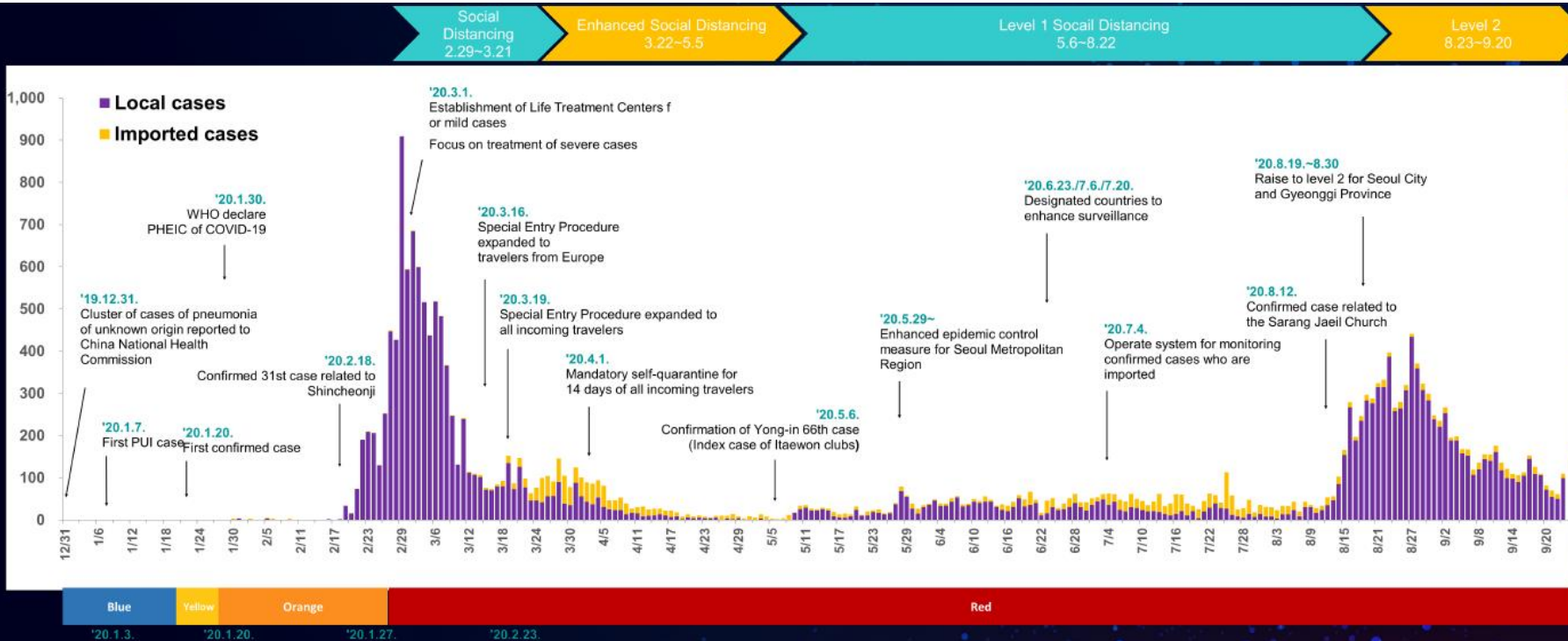Urban infrastructure data collection (Ingest) module, core module that stores standardized data, analytics module that provides real-time batch analysis and sandbox analysis environment for converged data, service infrastructure and security

| Data Hub Service UI | Data Hub Management UI | 3rd Party Applications |

⑧ API Gateway

④ Data Service Module
- Data Set Management
- Data Market Management
- Data Service Management
  - Custom Data Service

⑦ Semantics Module
- LOD
- Semantic Analysis
- Semantic Data Management

② Data Core Module
- Data Model Metadata Management
- Latest Data
- Data Lifecyde / Data Quality Management
- Historical Data

③ Analytics Module

Sandbox Management

Batch ML Repository Mgmt.
- Batch Mls

Batch Analytics Framework

Big Data Framework
- ETL Manager
- Data Mart
- Data Warehouse
- Raw Data

- Visualization
- Spatial Analytics Framework
- Data Mart/Warehouse Metadata Management
- Event Processing
- Real-time MLs Engine Mgmt.
  - Real-Time MLs
- Real-time Analytics Framework

⑤ Infra Module
- Monitoring/Metering Manager
- VM lifecycle Manager
- Auto Scaling Manager
- Orchestration Manager
- Multi Tenant Scheduler
- Multi Cloud Integration Manager

⑥ Security Module
- Identity Mgmt.
- Block Chain
- Data Protection / Privacy
- Authentication/ Authorization

① Data Ingest Module
- oneM2M Adaptor
- Context Broker Adaptor
- U-City Adaptor
- Massive IoT Edge Adaptor
- Public Services Adaptor
- Custom Adaptor
- Adaptor Manager
- Pre-Processing

Key Factors of Covid-19 Response

Governance
- Whole of Government Approach
- Private Sector Cooperation

Engagement
- Citizen Engagement
- Dedication of Healthcare Professionals

Communication
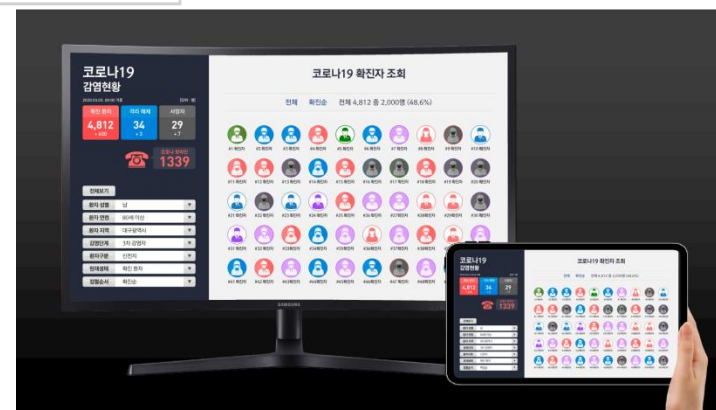- Regular Briefing
- Timely, transparent Information

Innovation
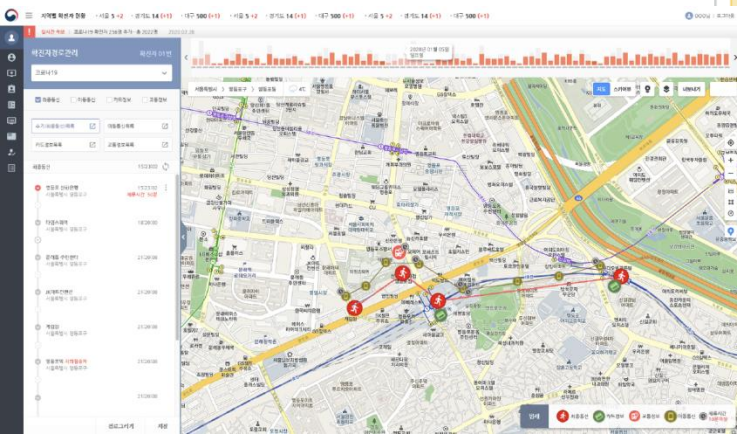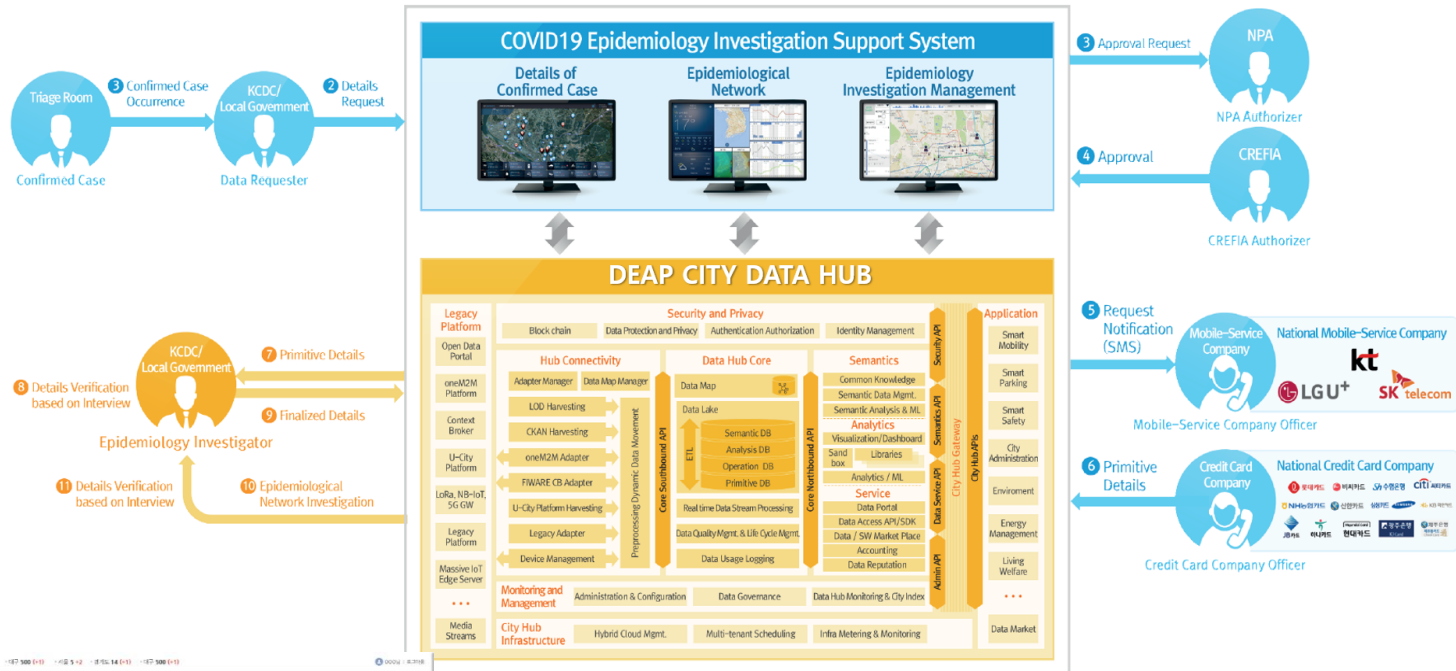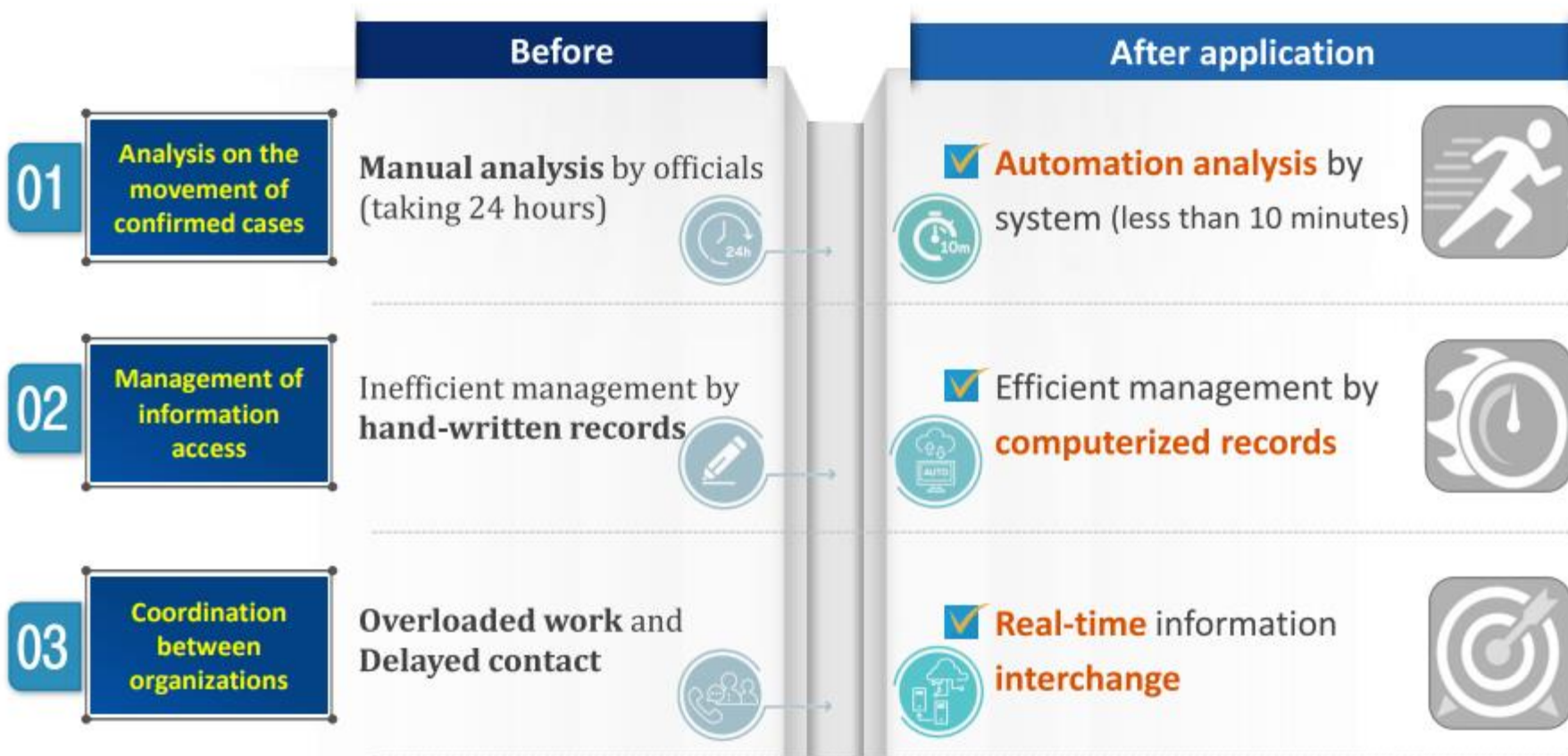- Innovative Approach
- Use of ICT

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.

2 Effects of EISS

	Before	After application
01 Analysis on the movement of confirmed cases	**Manual analysis** by officials (taking 24 hours)	☑ **Automation analysis** by system (less than 10 minutes)
02 Management of information access	Inefficient management by **hand-written records**	☑ Efficient management by **computerized records**
03 Coordination between organizations	**Overloaded work** and **Delayed contact**	☑ **Real-time** information **interchange**

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

"With" Covid-19 era

Forecast
- ❖ Forecasting & modeling via data, AI
- ❖ Technology for speedy epidemiological investigation, contact tracing

Day-to-day prevention & control Innovation
- ❖ Innovative Technology for HVAC system
- ❖ Safe environment for public facility (e.g., restaurant, café, stores, religious. gathering, house)
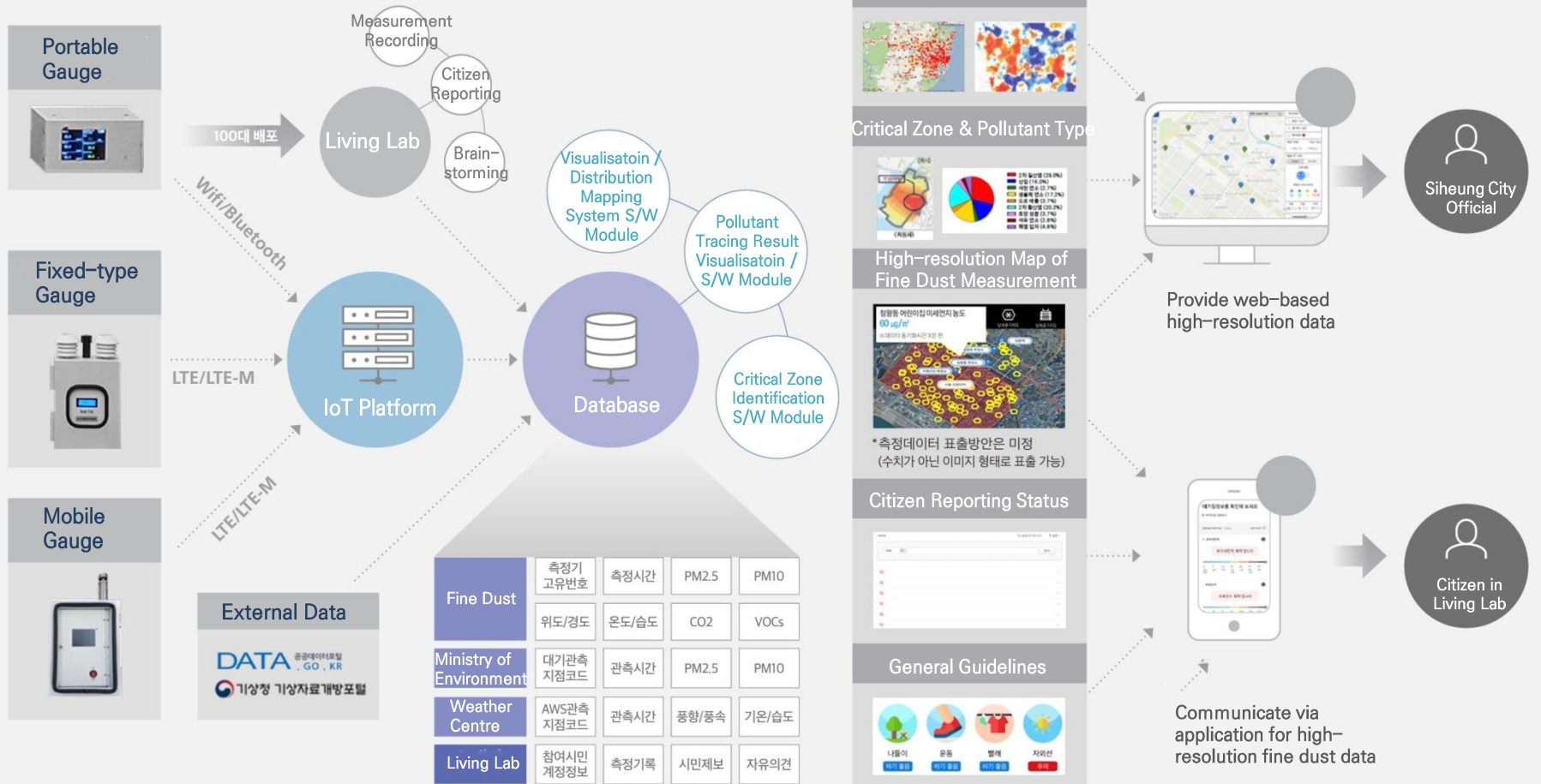- ❖ Safe & easy-to-use masks   (Illustrative example)

R&D
- ❖ Rapid & accurate diagnosis technology,
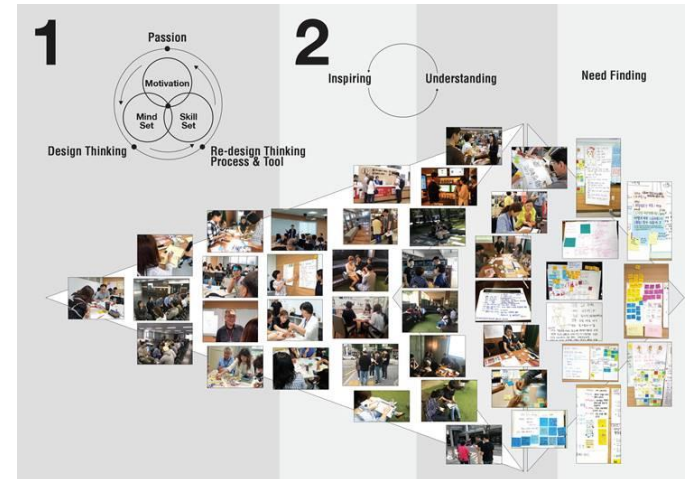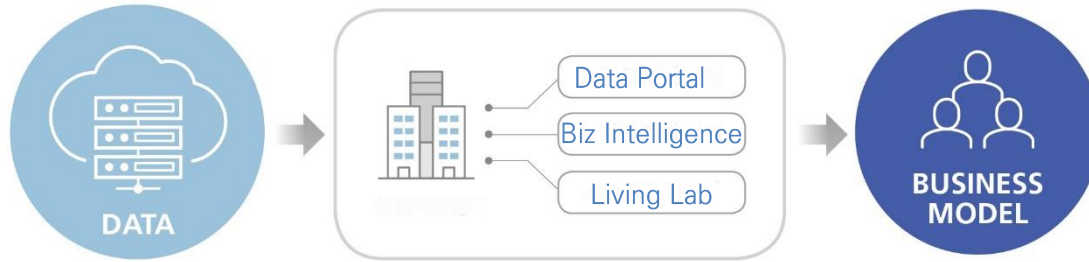- ❖ Accelerate treatment & vaccine development

Measure Fine Dust & Transmit → Operate Citizen-engagement Living Lab → Collect Data → Digitalize Data → Provide Information & Communicate → Users

Portable Gauge

100대 배포

Wifi/Bluetooth

LTE/LTE-M

LTE/LTE-M

Fixed-type Gauge

Mobile Gauge

External Data

DATA .GO.KR 공공데이터포털
기상청 기상자료개방포털

Measurement Recording

Citizen Reporting

Brain-storming

Living Lab

IoT Platform

Visualisatoin / Distribution Mapping System S/W Module

Pollutant Tracing Result Visualisatoin / S/W Module

Critical Zone Identification S/W Module

Database

Fine Dust	측정기 고유번호	측정시간	PM2.5	PM10
	위도/경도	온도/습도	CO2	VOCs
Ministry of Environment	대기관측 지점코드	관측시간	PM2.5	PM10
Weather Centre	AWS관측 지점코드	관측시간	풍향/풍속	기온/습도
Living Lab	참여시민 계정정보	측정기록	시민제보	자유의견

Pollution Mapping Result

Critical Zone & Pollutant Type

High-resolution Map of Fine Dust Measurement

청광동 어린이집 미세먼지 농도
60 ug/m²
*측정데이터 표출방안은 미정
(수치가 아닌 이미지 형태로 표출 가능)

Citizen Reporting Status

General Guidelines

나들이 운동 빨래 자외선

Provide web-based high-resolution data

Communicate via application for high-resolution fine dust data

Siheung City Official

Citizen in Living Lab

Citizen Participation

We hope to collaborate with CALD

THANK YOU

doholcho@kaia.re.kr