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COVID-19 Smart Management System (SMS) in Korea

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* KAIA (Korea Agency of Infrastructure Technology Advancement) is the sole government agency specialized in R&D management in the fields of land, infrastructure and transport in Korea

Ministry of Land, Infrastructure and Transport

KAIA Korea Agency for Infrastructure Technology Advancement

Contents

1. Introduction

COVID-19 SMS

- Formally named **'Epidemic Investigation Support System(EISS)'**

  * **'Epidemic Investigation'** is basic activities that need to be done to prevent the spread of COVID-19 as per 'the Act on the Prevention of Infectious Diseases'

- A system enabling the **automation** of the epidemiological investigation process

- Developed through **the application of Smart City technologies** to collect, process and analysis a **huge volume of urban data**

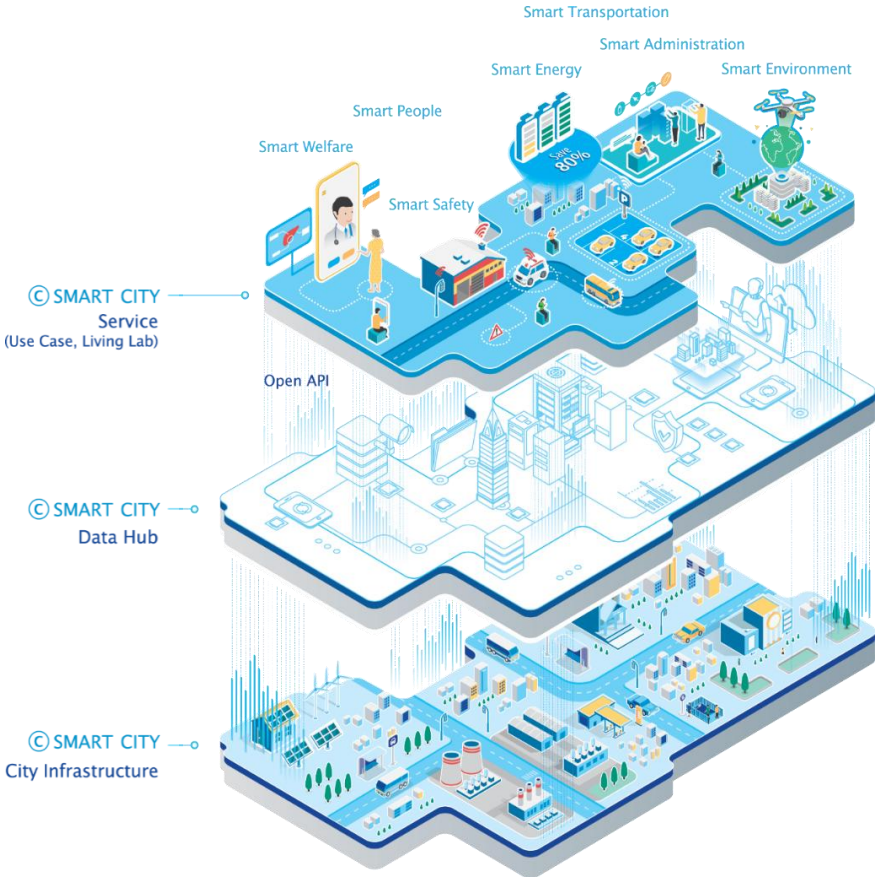
  * **SMS's urban data** was developed from **Smart City Data Hub Platform** of Korea National Strategic Smart City Program, which is **managed by** Smart City Innovation Growth Engine Project Division of **KAIA**.

1. Introduction

National Strategic Smart City Program

Korea National Strategic Smart City Program (NSSC) has launched for the purpose of **developing standardized Open Data Hub Architecture** which will be the common bases to apply transparent and shared administrative services and facilitate digital economy.

- **Duration** : **2018 ~ 2022**
- **Total Amount of Budget** : Approx. **US$ 120 million**
- **Participants** : more than **120 organizations** with approx. **1,200 research members**
- **Competent Ministries** : Managed by **MOLIT** / Supported by **MSIT**



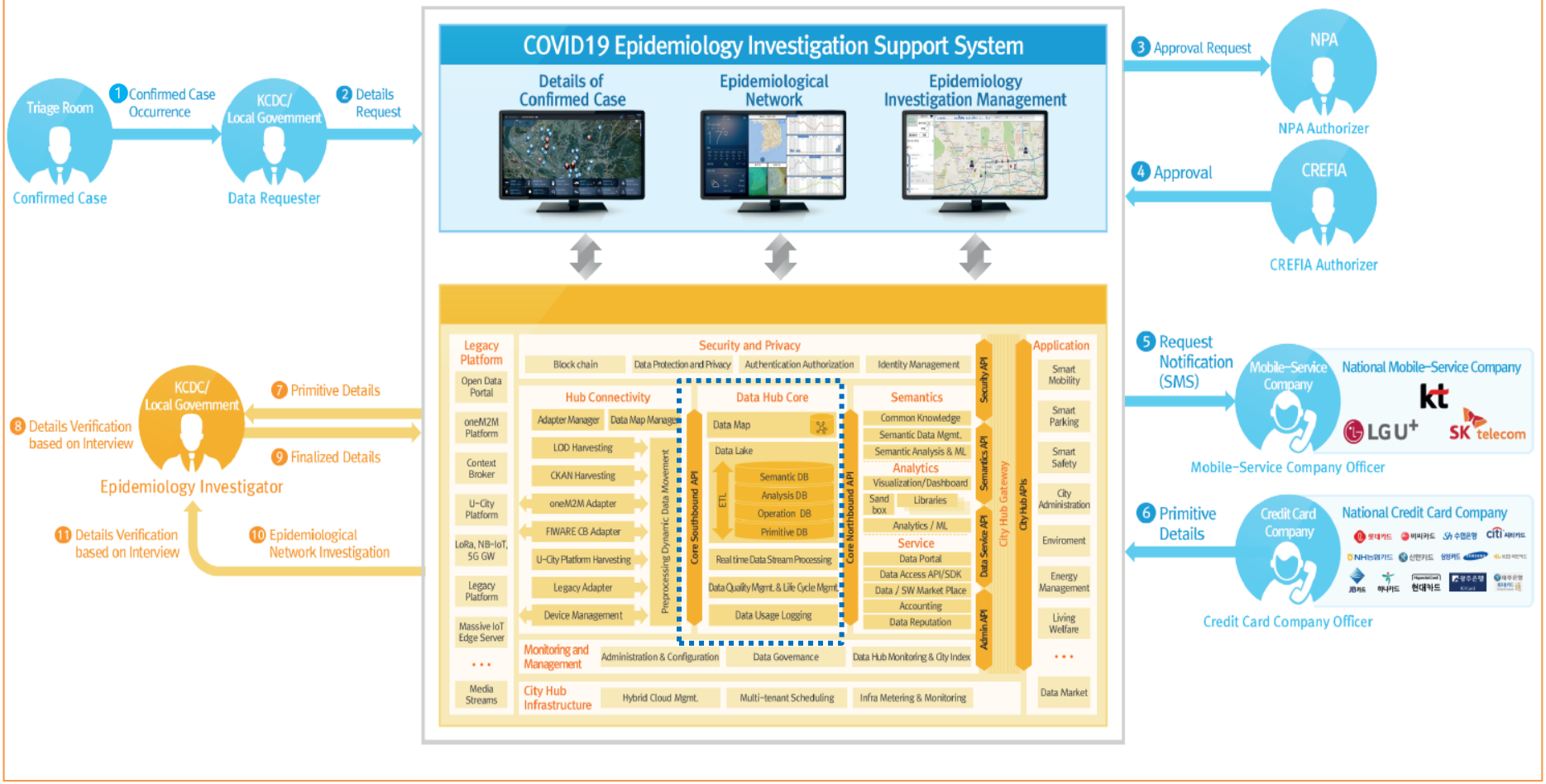
Solving Urban Problems — **Urban Solution Provider** Data-driven Smart City to solve various urban problems

Sustainable Society — **Inclusive Smart City** to pursue sustainable growth

Digital Economy — **Expansion of Smart City** to enhance digital economy

2. Key Functions of SMS

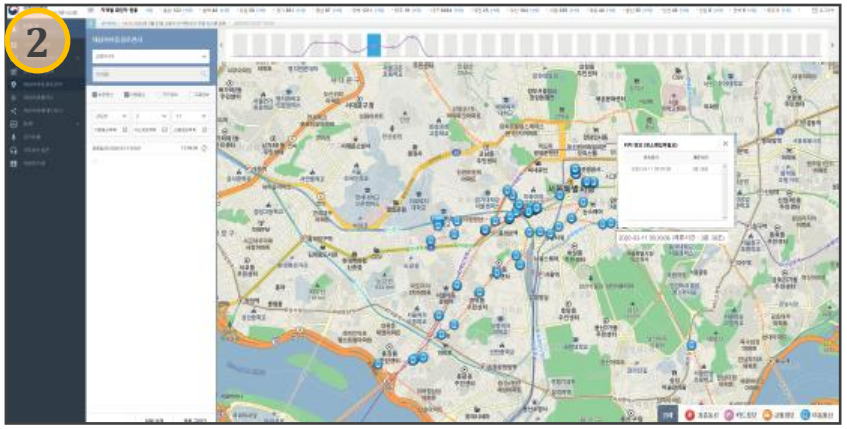
Operating Structure



2. Key Functions of SMS

Analysis Process

Automatic analysis is conducted as to the movement routes and contact tracing of the cases investigated



Movement routes are confirmed after review by epidemiological surveyors

Analysis on the Source of Infection

Analysis on the Transmission Network of Infection

2. Key Functions of SMS

Information Request Process

Location Information

KCDC Director → System / Letter → Approved by NPA → System / Letter → Telecom Company

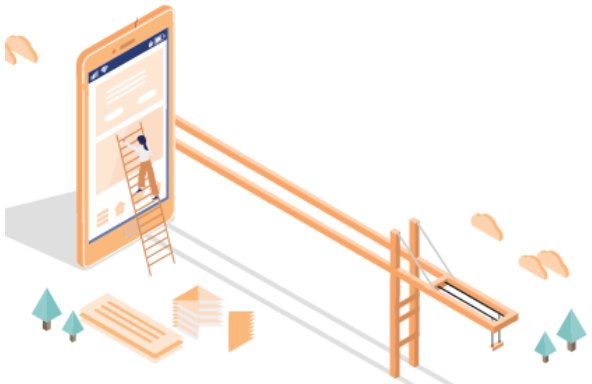
"COVID-19 SMS"

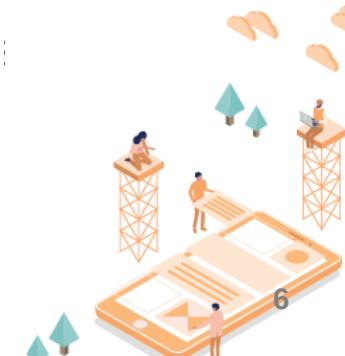
Credit Card History

MoHW Minister (KCDC Director) → System / Letter → via Credit Finance Association → System / Letter → Credit Card Company

"COVID-19 SMS"

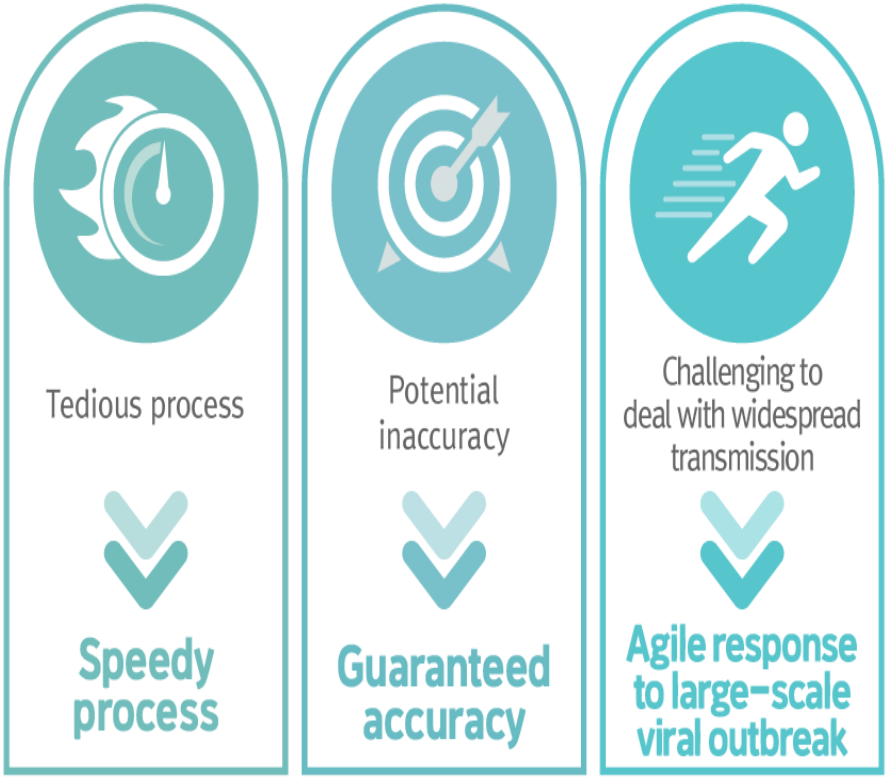
Before | **After**



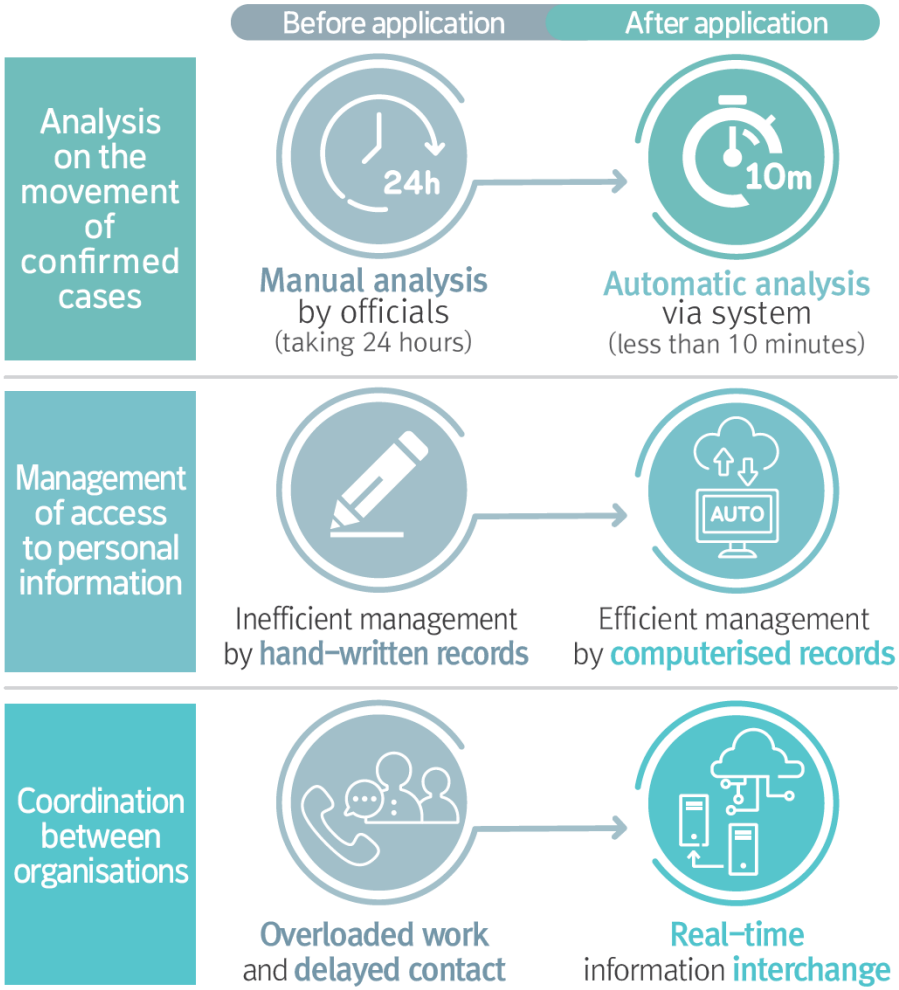


3. Implications _ Advantages of SMS

Large-scale Transmission



Before & After



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

3. Implications _ Key Factors and Suggestion

Digital Technology

- **IT Infrastructure w/ Smart City**
  - Analyzing credit card history data and location information by **Smart City Data Hub**
  - Actively developed other **IT-based applications** like Self-diagnosis App and Self-quarantine Safety APP
- **e-Government System**
  - Support 28 agencies to **work together**

➡ Be prepared **by developing IT infrastructure** to use the data and protect safety of the nationale

Medical System

- **3T (Testing – Tracing – Treatment)**
  - **Testing & Tracing :** Confirmation of diagnosis and classification of mild and severe patient
  - **TREATMENT** by classification : Asymptomatic and mild patient to Living Treatment Center, severe patient to national designated hospital

➡ **Contactless** (aka un-tact) diagnosis such as remote medicare and walk-thru testing **protected medical staff from infection**

Regulatory Foundation

- **Personal Information Use**
  - the Infectious Disease Control and Prevention Act
  - **Strictly cautious** to use personal information
- **Universal Coverage of National Health Insurance**

Social Consensus

- **Lessons learned** from **MERS** in 2015
  - Raised the **public's awareness** of safety and personal information use
  - Gave **experience** to **administrative bureau** and **medical staff**

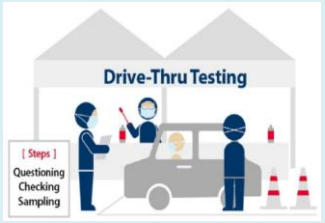
3. Implications _ Other ICT Using Cases

Remote Medicare

- **Temporarily permitted telemedicine** at Living Treatment Center via video calls with patients' smart phones


Walk-thru Testing

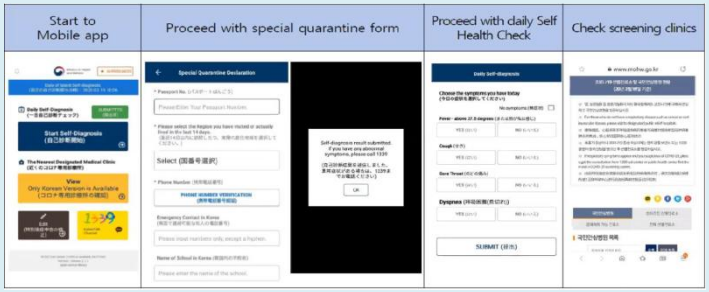
- **Minimize infections** while maximize daily testing capacity



Types	① Negative pressure booth (Booth for patients)	② Positive pressure booth (Booth for medics)
Details	Patients inside, Medics outside 	Patients outside, Medics inside 
Note	Booths need to be sterilized after each use. Medics outside the booth must wear protective gears. Takes 10 mins for each sampling due to cleaning & sterilizing of the booth inside.	Only the gloves used outside the booth need to be cleaned & sterilized. Medics inside do not necessarily have to wear protective gears. Takes 1 min for each sampling.

Self-diagnosis APP

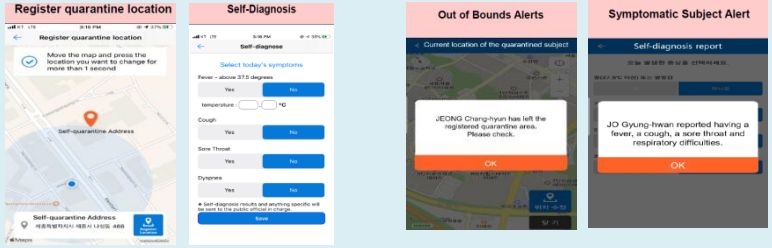
- To monitor **inbound travelers** effectively (Installation **required**)



Self-quarantine Safety APP

- To monitor **confirmed patients'** conditions (Installed **voluntarily**)

< for Self-quarantined Patients > < for Assigned Case Officers >



Source: The Government of the Republic of Korea, How Korea responded to a pandemic using ICT Flattening the curve on COVID-19 (Apr. 15, 2020)

Appendix (1)

COVID-19 SMS FAQs

01 Reason and background for introducing the data platform?

As the number of confirmed cases of a novel coronavirus (COVID 19) increased in Korea, the need to **digitize epidemic investigation activities** (e.g. communications between agencies, exchanges of documents, digitization of handwritten documents, etc.), mandated under the **Infectious Disease Control and Prevention Act** became essential.

The case for building a digital platform for these activities grew even stronger as large outbreaks in several local regions overwhelmed the health officials responsible for contact tracing, leading to, in some cases, delays in their response.

Recognizing this demand, Ministry of Land, Infrastructure and Transport (MOLIT) of Korea proposed repurposing the **City Data Hub System**, an urban data management platform under development as part of the **national smart city R&D program**, to carry out these tasks more efficiently.

After the proposal was made on February 26, a prototype platform was created on March 1, which proved its applicability to epidemic response. The official development of the platform started from March 9, which included setting-up of the coordination network among relevant agencies as well as the government guideline on personal data protection. After a ten-day pilot operation period from March 16 to 25, the data platform was introduced into service from March 26.

02 Benefits of the data platform?

The data platform helped strengthen Korea's response to COVID 19 in three ways.

First is **streamlining of the administrative process** required for personal data request. The conventional way of acquiring personal information for contact tracing involves a health official seeking separate permissions from all the authorities and companies holding the information. By bringing all the relevant parties (KCDC, National Police Agency, Credit Financial Association, 22 telecommunications companies, three credit card companies) to one place, the platform makes this process less bureaucratic and less time-consuming. To reduce the response time further, text message alerts are sent to relevant officials or company personnel as the process moves to each phase. Overall, it results in cutting the time to complete the data analysis process from 24 hours to less than 10 minutes.

Second, the data platform strengthens **personal data protection**. Access to the personal information kept in the platform is strictly limited and the system logs all the access records.

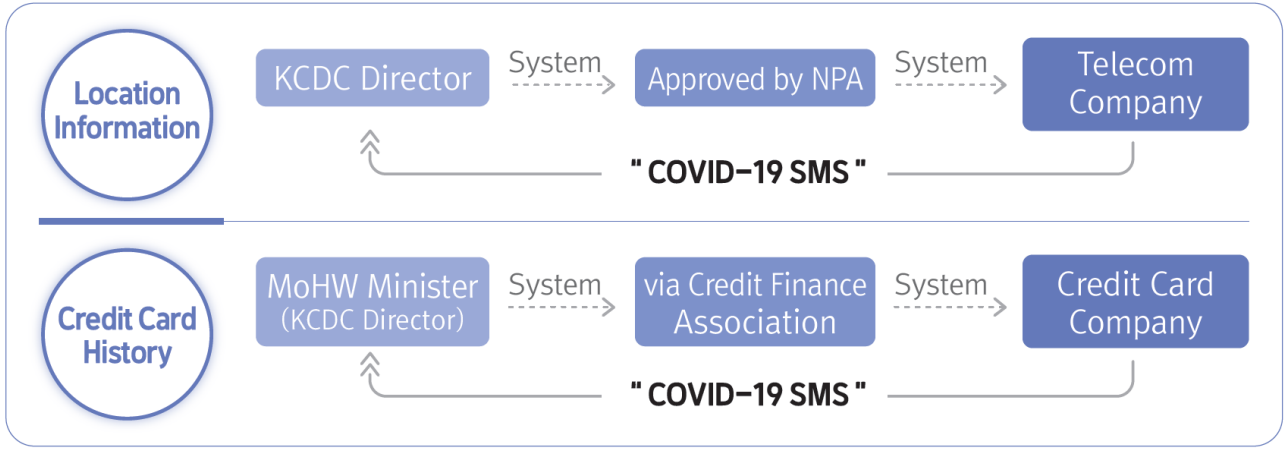
Third, the big data analysis provides inputs for **timely government interventions** and swift response to the disease.

03 Operation procedure of the data platform?

Personal information stored in the platform includes **location information** provided by three telecommunications companies and **credit card transaction records** provided by 22 credit card companies. Any collection of the information is performed in full compliance with the Article 76-2 of the Infectious Disease Control and Prevention Act.

Before data collection, however, a health official in charge of a confirmed/highly suspected case carries out an interview to confirm basic facts about the person and notify and inform about the data collection to be conducted. Also, it is during this stage the official makes a professional judgement on whether additional information should be gathered, which usually involves cases of uncertain infection dates or patients with imperfect memory.

Following a notification is given to the patient, the process for seeking permission to gain access to personal information begins. For location information, KCDC asks for a permission from the National Police Agency, which upon granting the permission, makes a formal request to three telecommunications companies. For card transaction information, permissions are granted by the Credit Financial Association, which extends its request to credit card companies.



04 Improvements made to the data request process?

When it comes to location data provision, the National Police Agency serves as an intermediary between KCDC and telecommunications companies. The data platform streamlines this coordination process by introducing a system where **each data request is processed digitally in the platform** from KCDC asking for a permission from the National Police Agency, the National Police Agency granting the permission and relaying the request to telecommunications companies to the companies' providing relevant information. **This integrated approach cuts phone calls and paper works between the entities dramatically.**

To minimize delays, an alert goes out to a relevant entity in charge of each phase of the process, either via the platform or text messages.

The platform also reduces the risk of unnecessary exposure of personal information by altering the data provision process in a way where the telecommunications companies send the information to the end-user, KCDC, directly, leaving more time for response.

But streamlining does not mean bypassing the due process. Seeking permits from the National Police Agency and due procedures for information request will be administered in accordance with relevant laws and regulations.

05 Legal basis for use of personal information?

- The **Article 76-2 of the Infectious Disease Control and Prevention Act** gives the health authorities the mandate **to use personal information for infectious disease control**.

  The Act was revised **in July 2015 after the outbreak of MERS in the same year**, which **raised the public's awareness** on the necessity of personal information use for containment of infectious disease.

  But the Act presents the list of the disease that allows such a practice.

06 Access to the data platform?

- **Access** to personal information **stored** in the platform is **strictly managed**. Under the current set-up, only the **KCDC officials and local government health officials in charge of contact tracing have access** to the personal information and big data analysis produced by the platform. As for the National Police Agency, telecommunications companies and credit card companies, **their access is limited** to only the information they provided. Access by other government ministries or agencies are denied.

  When MOLIT transferred the data platform to KCDC, it revoked all of its temporary access active during pilot operation.

07 Measures for personal information protection?

- All activities on the platform will be conducted in full compliance with relevant laws, regulations and due process. (Refer to No. 4)

  Data collection under the platform is limited to **confirmed cases or highly suspected cases** and requires notification to the affected people prior to collection. All the **personal information gathered will be anonymized** to avoid the risk of identity exposure.

  Above all, the data platform is a temporary measure put in place to cope with COVID 19.
  The system as well as all the personal information stored will be deleted upon completion of the official response to the disease.

08 Public access to the data platform?

- Access to the data platform is **limited only to the KCDC officials and local government health officials in charge of contact tracing**.

  Officials need the access to personal information (location information, credit card transaction records) **to correlate the data with the interviews** they conducted with the patients and to produce reliable contact tracing results. What the general public can see is the final, anonymized contact tracing results released by their local governments.

  To prevent data breach, the platform runs on a virtual private network.

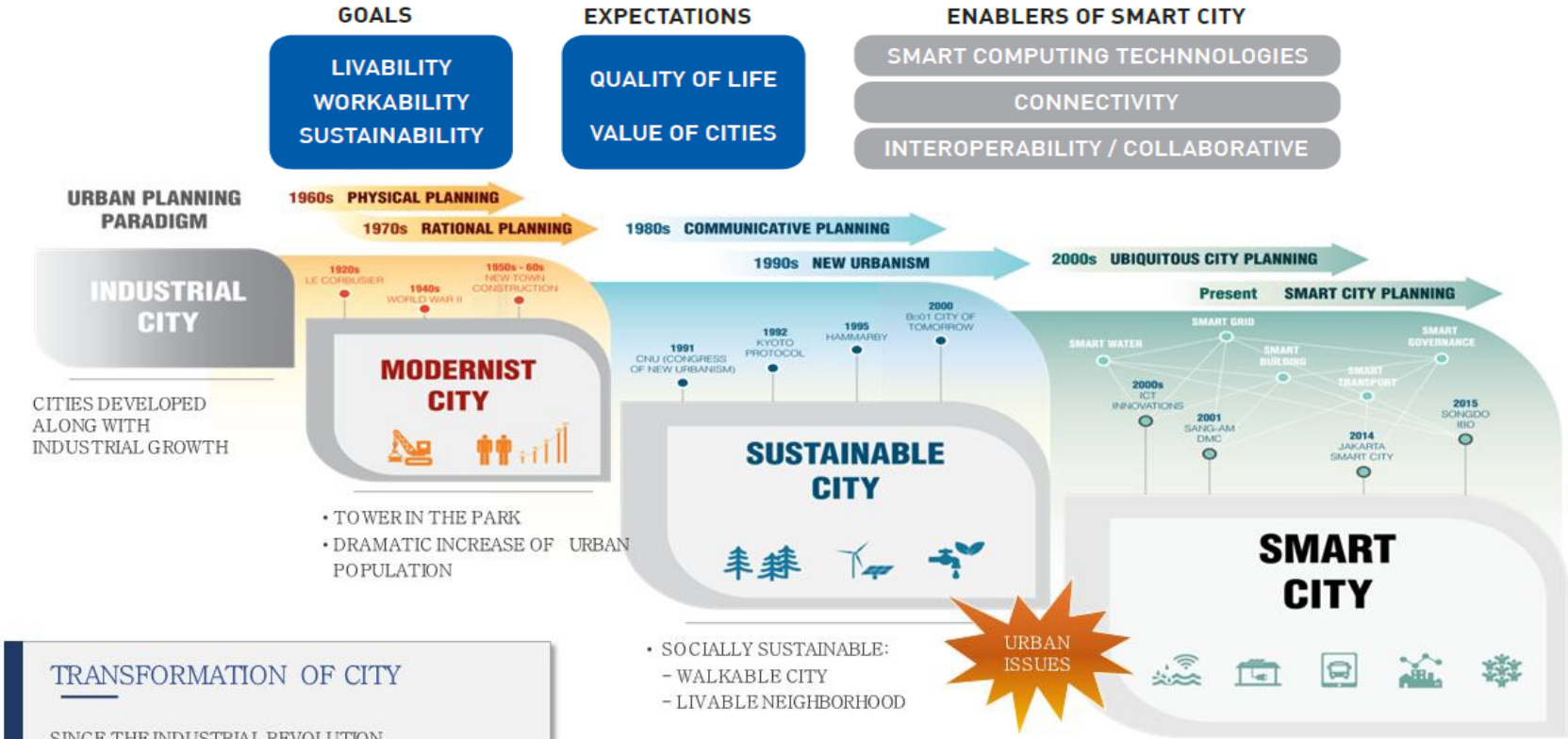
Appendix (2)

Korean National Strategic Smart City Program

1. Overview _ Smart City

Definition of Smart City

Smart city enables its citizens to **enjoy a better quality of life** through **sustainable development** and **improved urban management**. The key to this is a suite **of information and communication technologies** which collect, analyze and manage information from across the city.



1. Overview _ Smart City

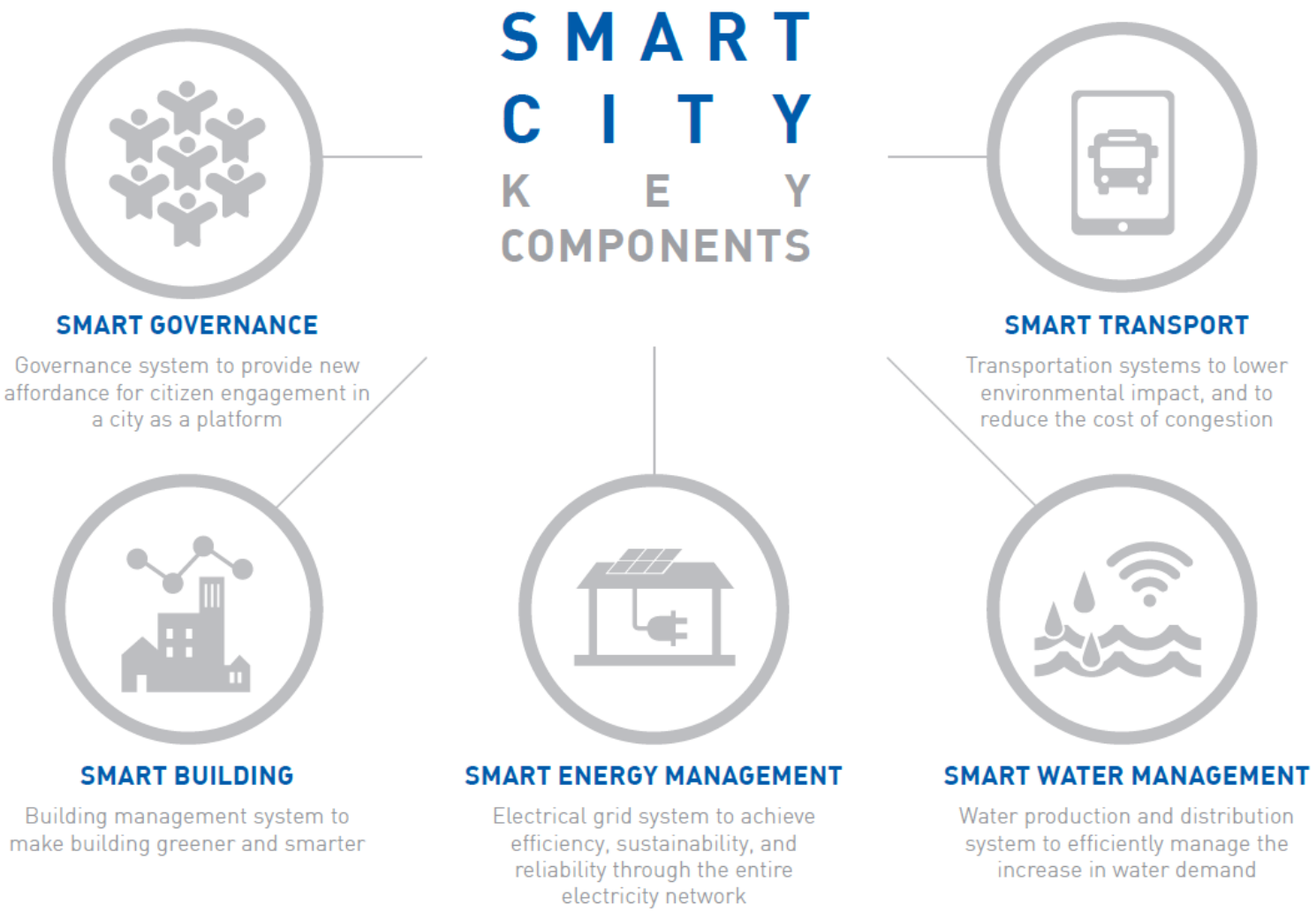
Areas of Smart City

Smart city covers all the facilities composing of **cities and personal & social activities**

1. Overview _ Smart City

Smart City Components

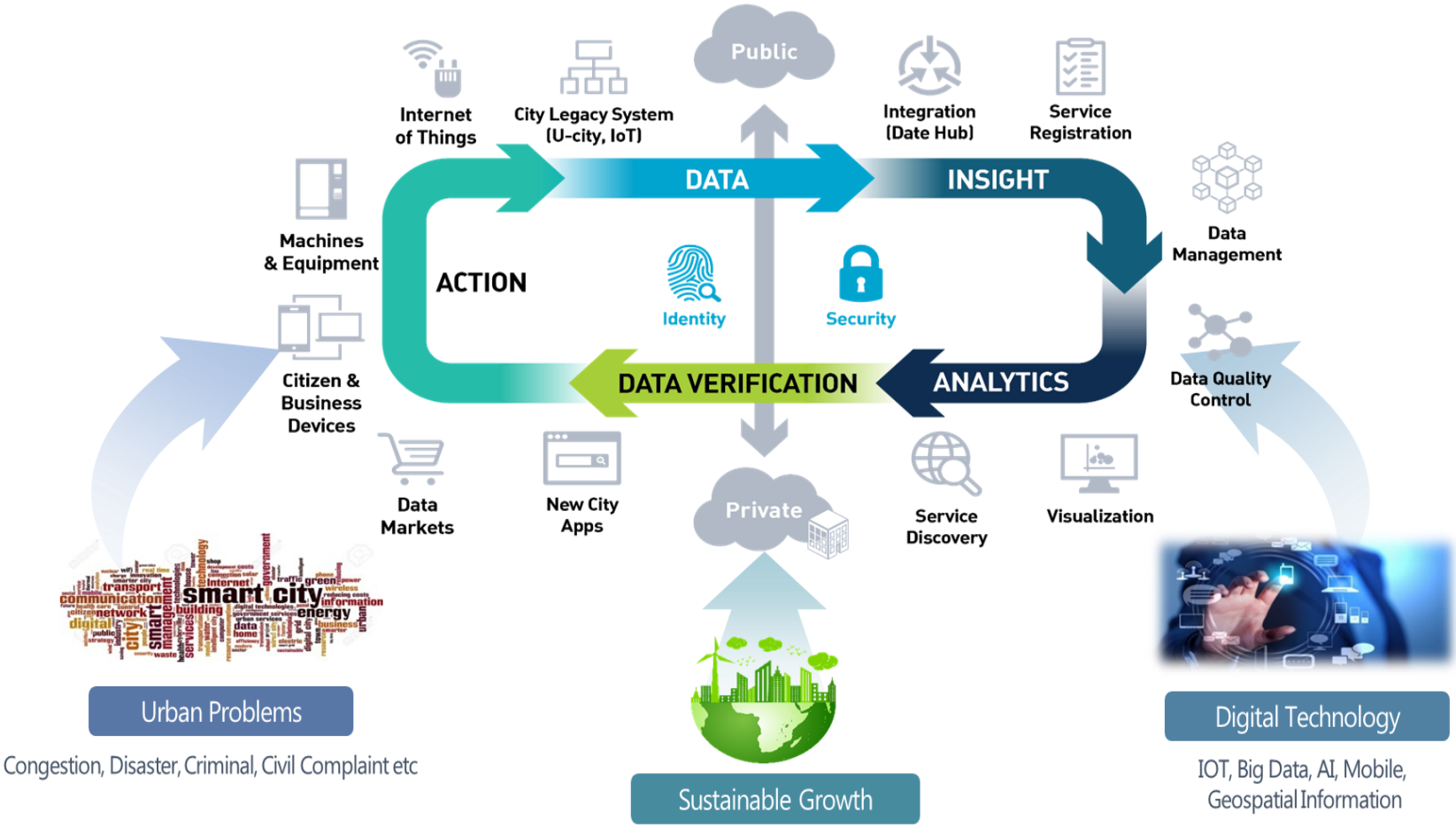
Smart **transport**, smart **water** management, smart **energy** management, smart **building**, and smart **governance**.



1. Overview _ Smart City

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.



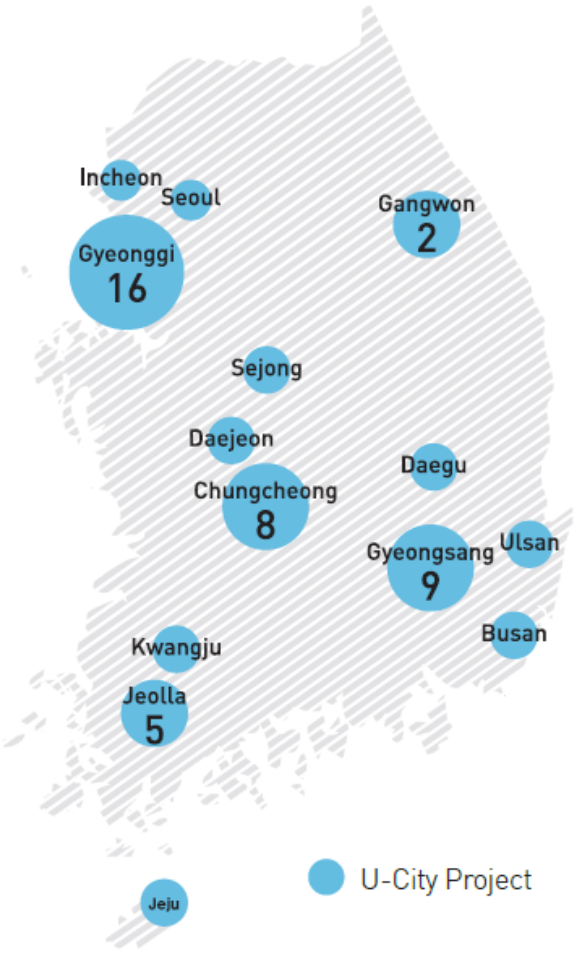
2. Korea Smart City R&D Activities

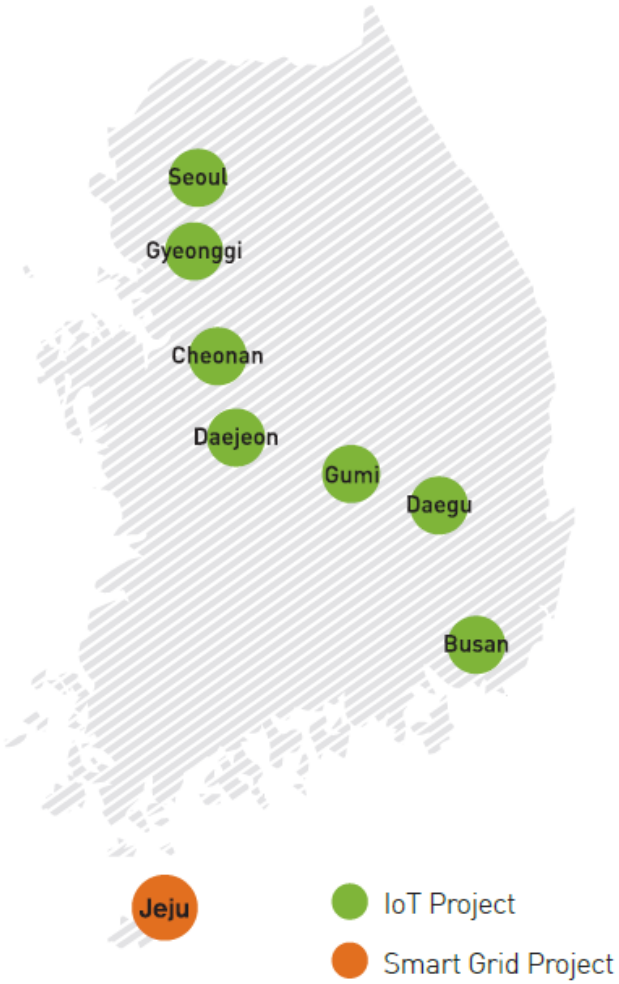
Smart Cities in Korea

U-City
A city where ubiquitous services are provided through ubiquitous city infrastructure using ubiquitous city technologies

U-ECO City
A city that promises to provide an environmentally friendly urban milieu with advanced ubiquitous infrastructures and services for residents and visitors

K-Smart City
A customized city that employs ICT technologies to solve a variety of urban problems services are provided through ubiquitous city infrastructure using ubiquitous city technologies





2. Korea Smart City R&D Activities

Research Consortia

1st

KETI · ETRI · 서울시립대학교 · KICT · INNOGRID · LG U+ · TTA 한국정보통신기술협회 · KAIST · PINE · en·core · Daumsoft · N2M · DASAN · HANDYSOFT · MAPINUS · DataAlliance · ARAD · NESSLAB · mobileeco · kt · CROSSENT · IPMA

2nd

Colorful DAEGU

SK telecom · THE KOREA TRANSPORT INSTITUTE · LH · 대구테크노파크 · KEIMYUNG UNIVERSITY · 유페이먼트 · MYONGJI UNIVERSITY · ARO InTech · WITECH · easió · TS 한국교통안전공단 · KOREA UNIVERSITY · KAIST · NECOREA · DONPOOM · U&E · nexmore · ntels · FROTOMA · WK · been

3rd

kt · kepco · hidea · Kweather · DKI · SOGANG UNIVERSITY · ICTC · KETI · GELIX · CNU GLOBAL · Vasco · GYEYOUNG · KAIST · PINE · 대영유비텍(주) · GKeS · Digital Seoul Co.,Ltd · kth · sga · ACE

3. Implementation of Smart City

Conceptual Design

1st Smart City Model and Base Technology

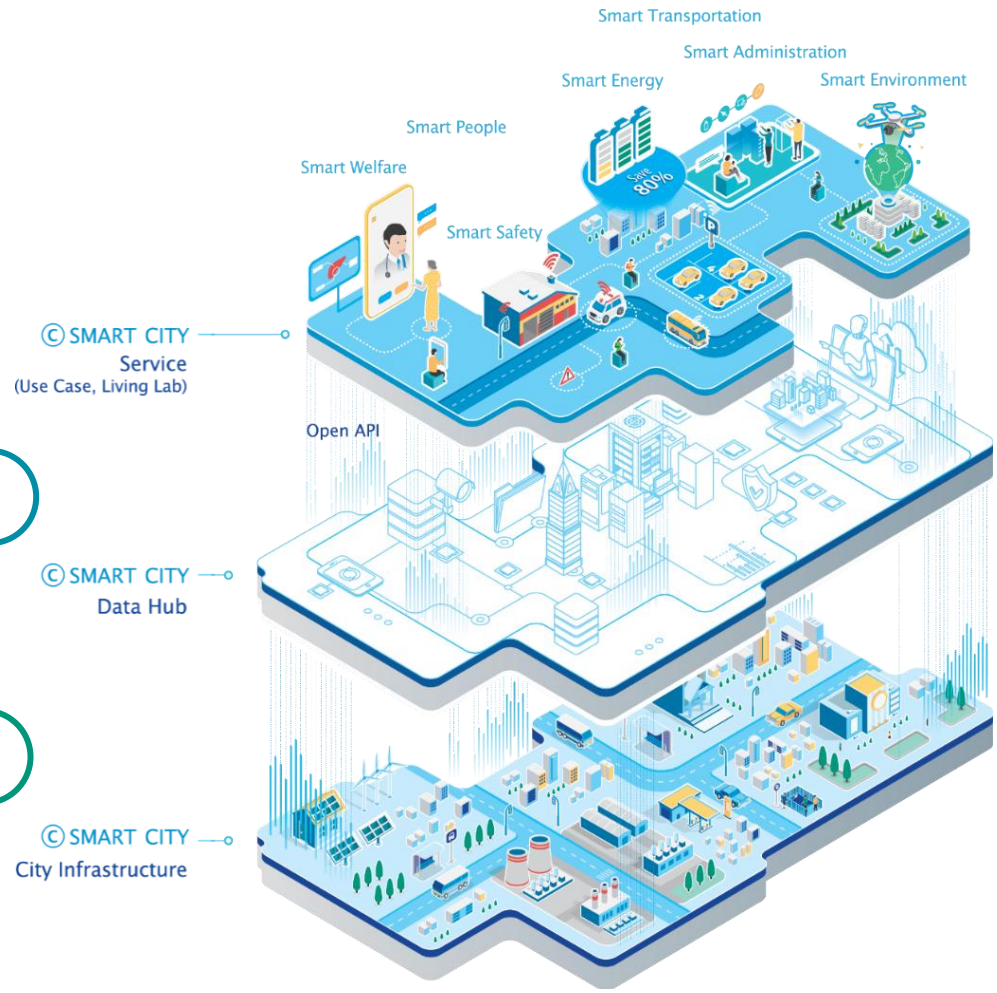
- Open Data Hub Architecture
- Massive IoT
- Digital Twin

2nd Citizen-centric Service Enhancement (Use Case Model)

- Mobility
- Safety
- City Administration

3rd Technology Innovation & Business Intelligence (Living Lab Model)

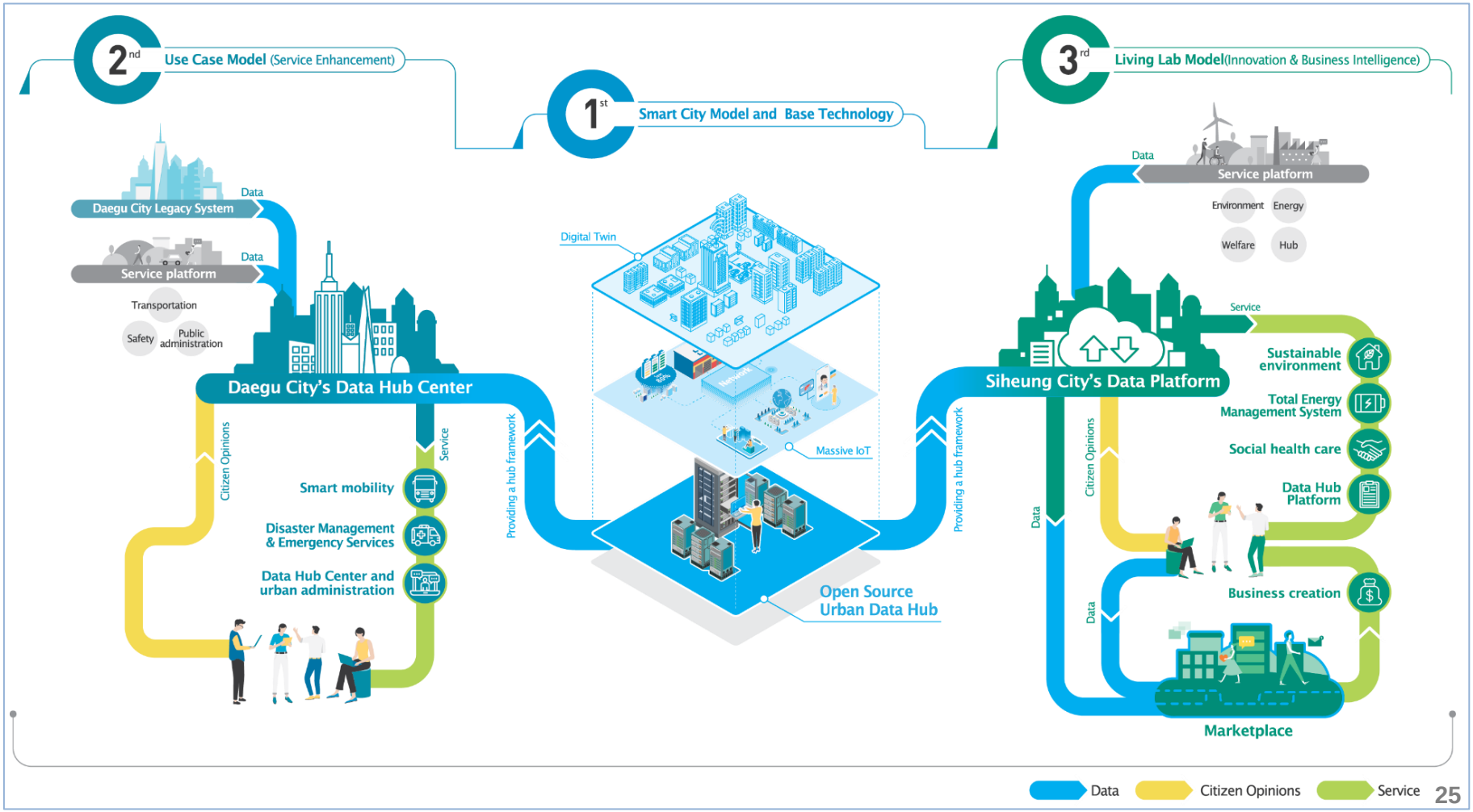
- Environment
- Energy
- Welfare



3. Implementation of Smart City

Project Alliances within NSSC

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

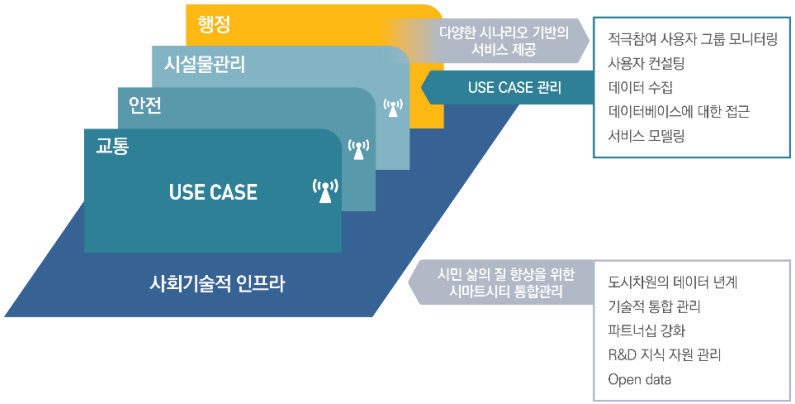


3. Implementation of Smart City

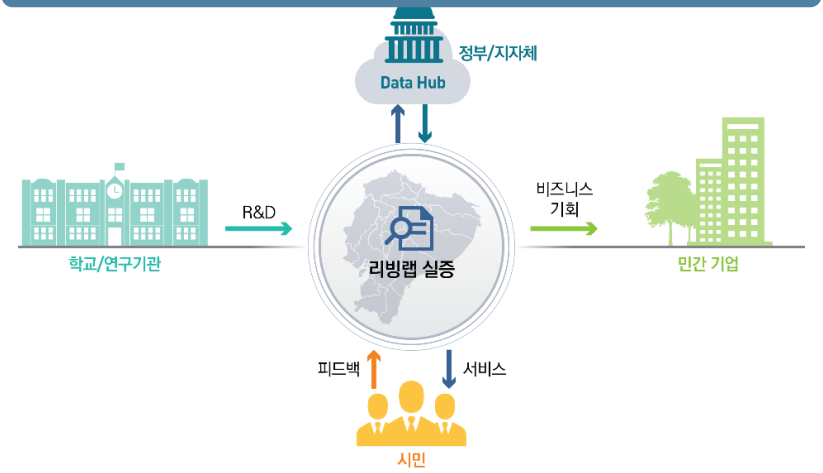
Demonstration to Existing Cities

- **Daegu City** : Transport, Safety and **Urban Management**
- **Siheung City** : Environment, Energy and Social Welfare **Living Lab**

Use-case demonstration for advanced services



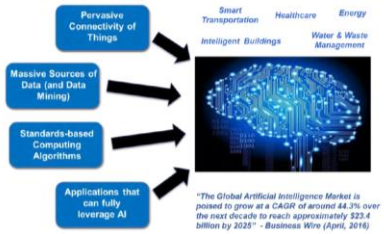
Living lab demonstration for business models



3. Implementation of Smart City

Final Model of NSSC (2018~2022)

Big Data & Cloud



Artificial Intelligence

MOBILITY

- SMART PARKING
- V2I AUONOMOUS VEHICLE
- C-ITS & TRAFFIC MANAGEMENT
- MOBILITY AS A SERVICE (MaaS)

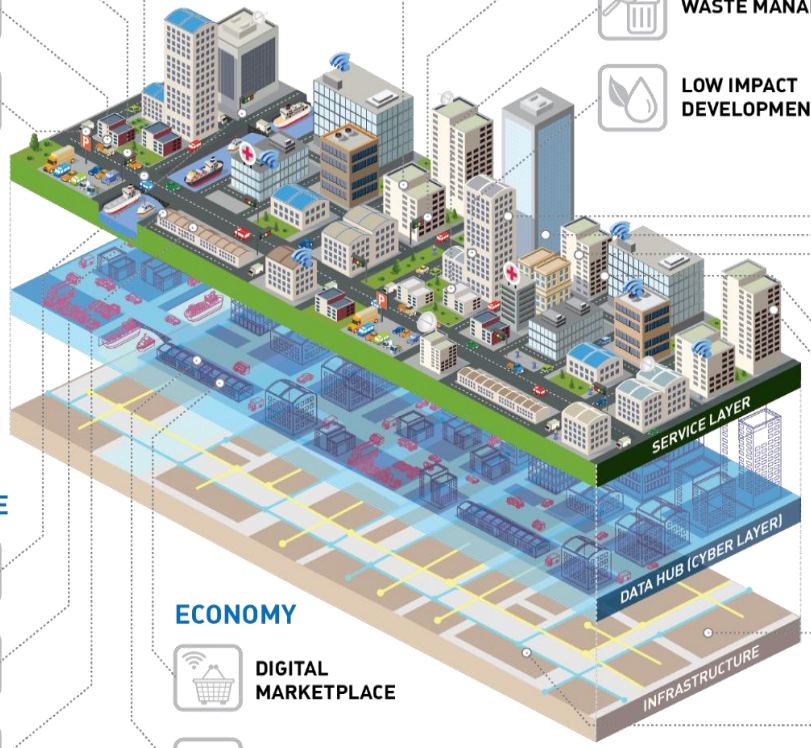
ENVIRONMENT

- WATER QUALITY CONTROL
- AIR POLLUTION PREDICTION SERVICE
- WASTE MANANGEMENT
- LOW IMPACT DEVELOPMENT(LID)

PUBLIC SAFETY

- REAL-TIME EMERGENCY RESCUE
- DISASTER PREDICTION & COUNTERMEASURE
- PUBLIC FACILITY INTEGRATED MANAGEMENT

IoT, Network



LIVING & WELFARE

- SMART HEALTHCARE
- SMARTHOME NETWORK SUPPORT
- MOBILITY FOR THE DISABLED

ECONOMY

- DIGITAL MARKETPLACE
- CROWDSOURCING PORTAL

ENERGY

- ELECTRIC VEHICLE CHARGING STATION
- BUILDING ENERGY MANAGEMENT SYSTEM
- EXHAUST HEAT CONNECTED CHP
- AMI BASED ENERGY MANAGEMENT

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