Korea's Smart City Development Cases and its implications

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Human Settlements (KRIHS)

International Case Studies of Smart Cities

ANYANG
REPUBLIC OF KOREA

International Case Studies of Smart Cities

NAMYANGJU
REPUBLIC OF KOREA

International Case Studies of Smart Cities

SONGDO
REPUBLIC OF KOREA

IDB-KRIHS Joint Research

International Case Studies of Smart Cities

PANGYO
REPUBLIC OF KOREA

IDB-KRIHS Joint Research

- **Development potential of a city or a country**

Population

Land

Energy

Human Capital

+
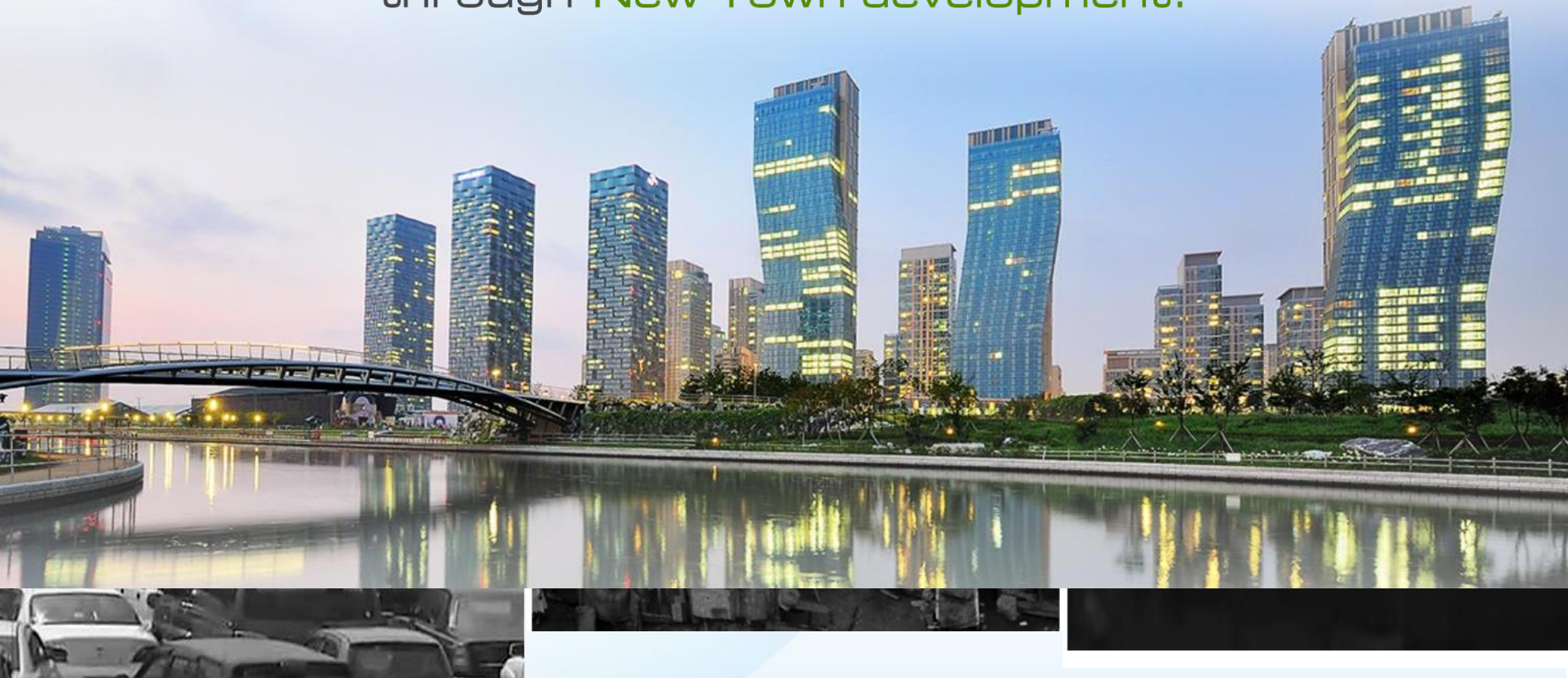
Information and **C**ommunication **T**echnology

The economic growth was accompanied by rapid urbanization.

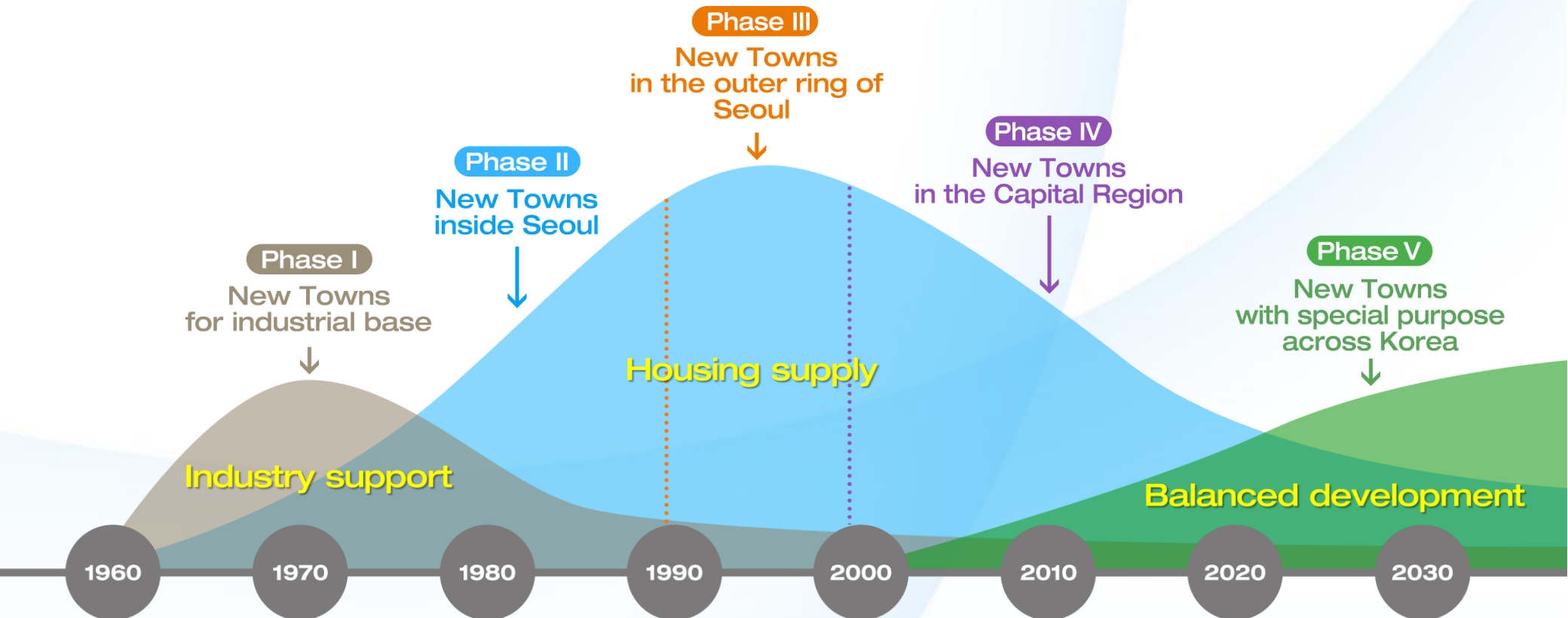In the process of rapid urbanization,
Korea was faced with severe urban problems.

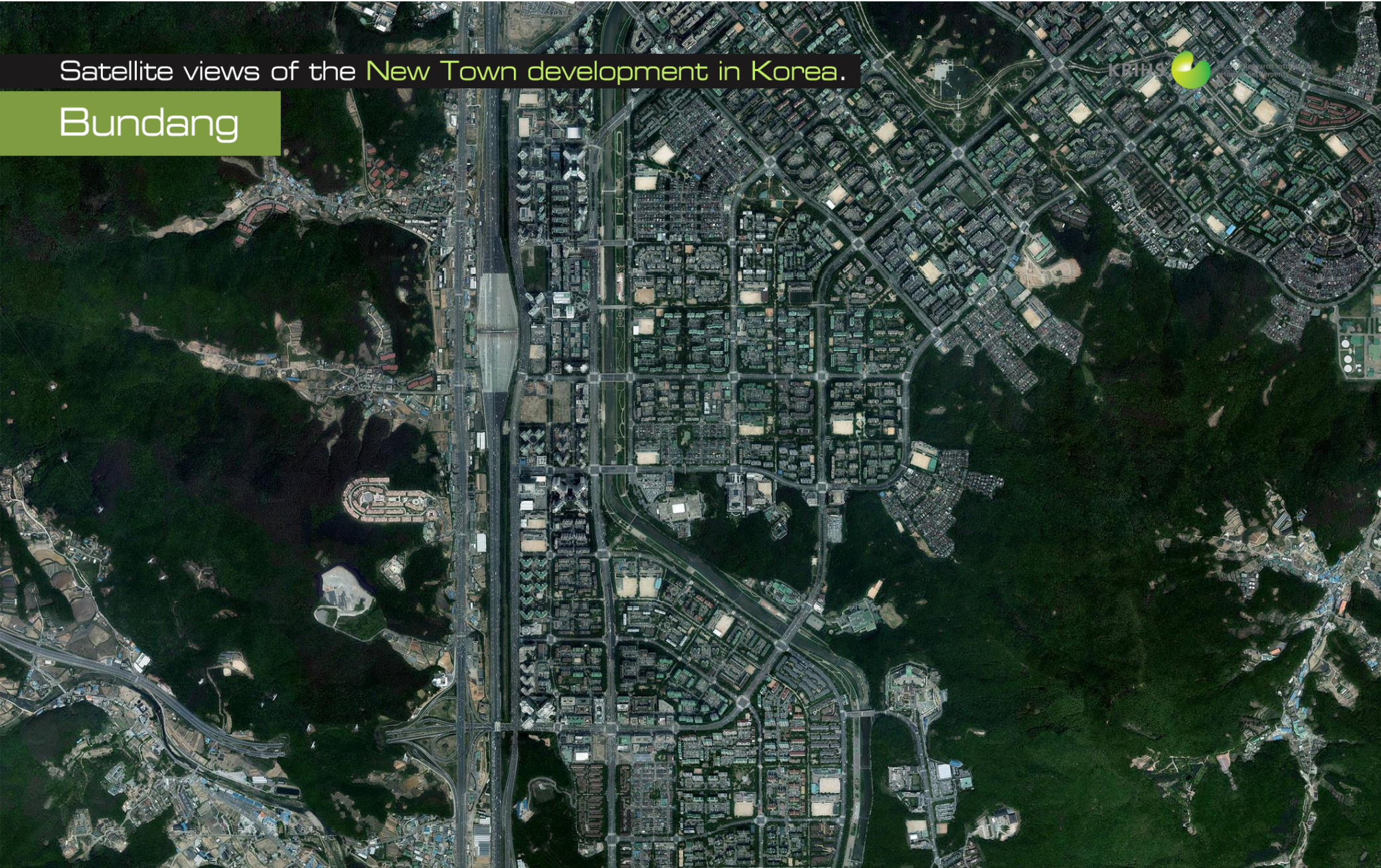Korea has responded to these urban challenges through New Town development.

Five Phases of Korea's New Town development

Phase I
New Towns
for industrial base

Phase II
New Towns
inside Seoul

Phase III
New Towns
in the outer ring of
Seoul

Phase IV
New Towns
in the Capital Region

Phase V
New Towns
with special purpose
across Korea

Industry support

Housing supply

Balanced development

1960 1970 1980 1990 2000 2010 2020 2030

Bundang

KRIHS

Pangyo

Basic Concept of Smart City

Smart Home · Smart Car · Smart Traffic · Smart Lifestyle · Green Energy · Green Product

Smart city center

4G	USN	LBS	SOA	SaaS	HCI	Cloud Computing	Web 3.0
Waste	Gray	Fresh	Rain	Cable	Elec.	Gas	Heat	Oil	Utility

- **How ICT functions in addressing city issues**

Smart City	ICT Function	Target	Effect
	24-hour Monitoring	**Environment :** Air, Energy, Water, Disaster …	**Increasing :** Efficiency, Productivity, Transparency, Competitiveness, Monitoring, Land Management
	Sharing Real-Time Information		
	Analysis Based upon Real-time Field Data	**City :** Transportation, Security, Waste …	
	Ubiquitous Controlling		**Decreasing :** Green Gas, Crime, Pollution, Vulnerability
	Prompt Feedback and Improvement	**Governance :** Tax, Procurement, Custom ..	

I Korea's Smart City Implementation Status

Incheon (2)
- 🟠 Songdo
- 🟡 Incheon

Gyeonggi (19)
- 🟠 Ansan, Namyangju, Bucheon
- 🔵🟡 Yongin, Hwasung, Osan, Shiheung, Namyangju, Uijeongbu, Gimpo, Suwon, Sungnam, Gwangmyeong, Paju, Pyeongtaek, Anyang, Yangju
- 🟢 Goyang, Dongducheon

Chungcheong (8)
- 🔵🟡 Cheonan, Hongsung, Asan
- ⚪ Jincheon
- 🟡 Jecheon, Chungju, Gyeryeung
- 🟢 Geumsan

Sejong (1)
- 🟡 Sejong

Jeonra (10)
- 🟠 Naju, Jeonju, Yeosu
- 🔵🟡 Yeosu
- ⚪ Jeonju, Naju
- 🟢 Gimjae, Jeonju, Muan

Seoul (2)
- 🟠 Eunpyeong, Mapo

Daejeon (1)
- 🟡 Southwest Daejeon

Gangwon (5)
- 🟠 Gangneung, Samcheok
- 🔵🟡 Wonju
- ⚪ Wonju
- 🟡 Gangneung

Daegu (1)
- ⚪ Daegu

Gyeongsang (10)
- 🟠 Yeongju, Yangsan
- 🔵🟡 Yangsan, Shisong
- ⚪ Jinju, Gimcheon
- 🟡 Gyeongju, Gumi, Yeongyang
- 🟢 Gimhae, Tongyeong

Ulsan (1)
- ⚪ Ulsan

Busan (4)
- 🟠 Sanbokdoro
- 🔵🟡 Busan
- ⚪🟡 Busan

Jeju (2)
- ⚪ Seogwipo
- 🟢 Jeju

Total 73 Smart Cities

Pilot City	15	Innovation City	11	U-City Plan Approved	15	U-City Plan Recognized	8	Foundation Project	10	Other Project	14

Why do we call these cities as "Smart City"?

Because they are

S — Securing their citizen's safety from crime and disaster

M — Managing their urban traffic and facilities efficiently
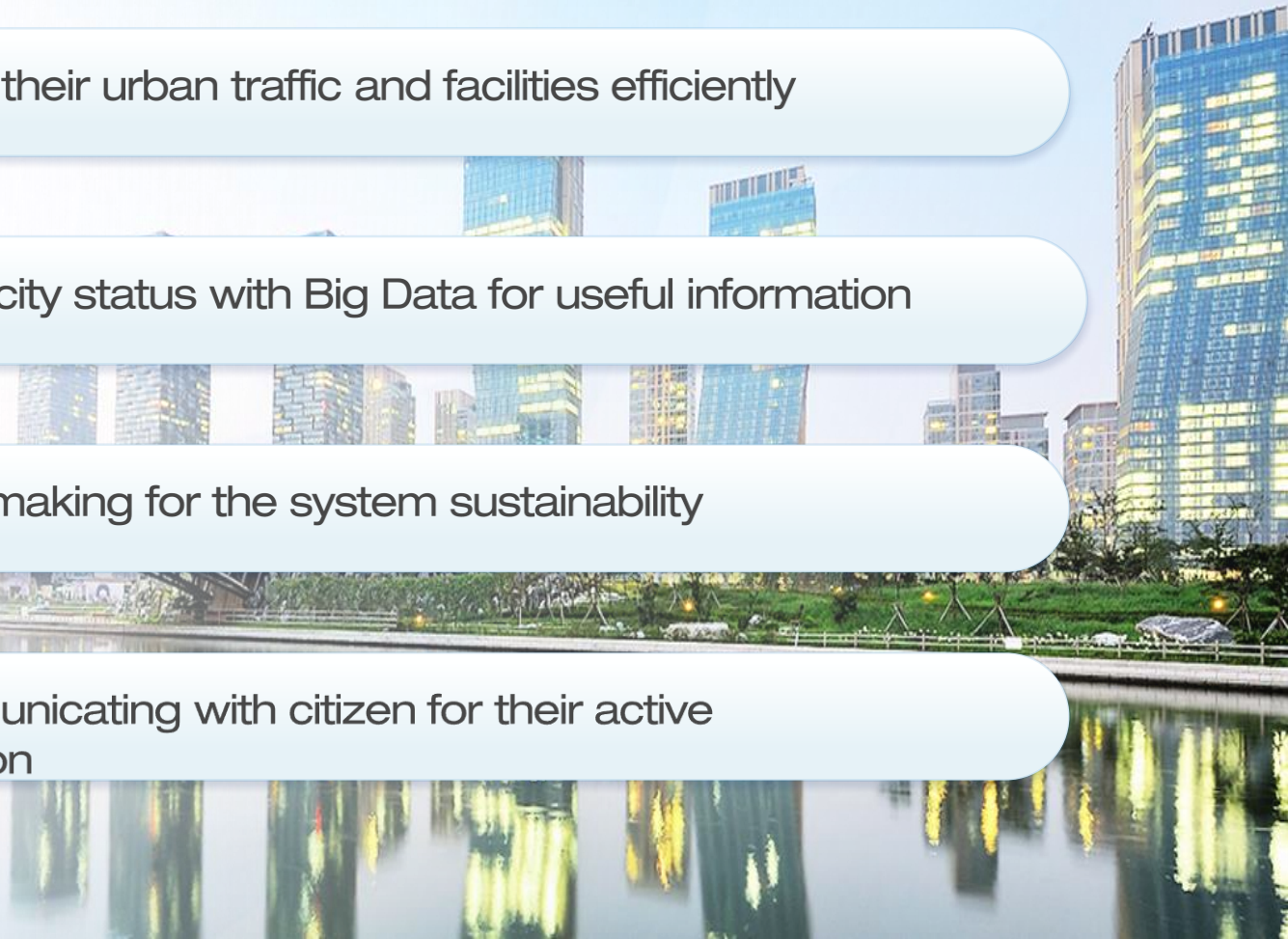
A — Analyzing city status with Big Data for useful information
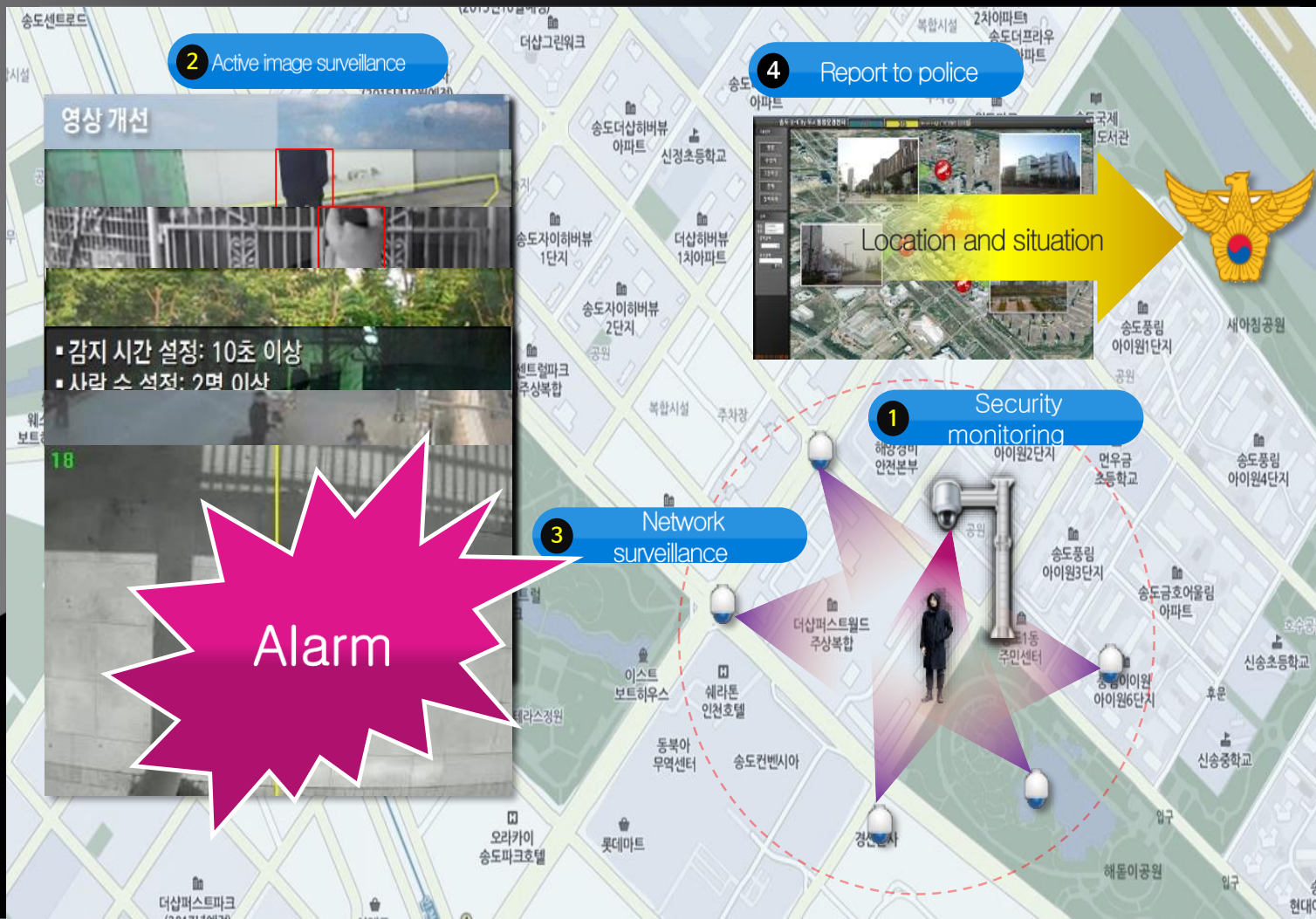
R — Revenue-making for the system sustainability

T — Telecommunicating with citizen for their active participation

KRIHS — Korea Research Institute for Human Settlements

SMART Securing their citizen's safety from crime and disaster

KRIHS — Korea Research Institute for Human Settlements

Vehicle monitoring

1. Automatic Number Plate Recognition

12모 4567
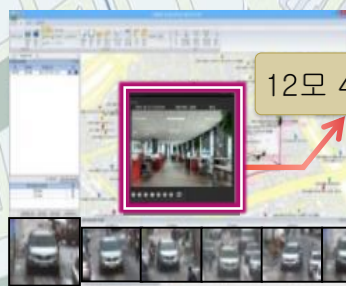
2. Retrieve vehicle DB

Police DB   Tax DB

3. Identify problem

4. Report and dispatch

SMART
Securing their citizen's safety from crime and disaster

KRIHS — Korea Research Institute for Human Settlements

3 Emergency alert

2 CCTV monitoring

Emergency Alert

Fire sensors for major buildings

Environmental sensors on bridges for water, air and road surface

WEB Service

SMART

Securing their citizen's safety from crime and disaster

KRIHS Korea Research Institute for Human Settlements

- ◗ Monitoring without blind spots
- ◗ Floodlight camera
- ◗ Speaker
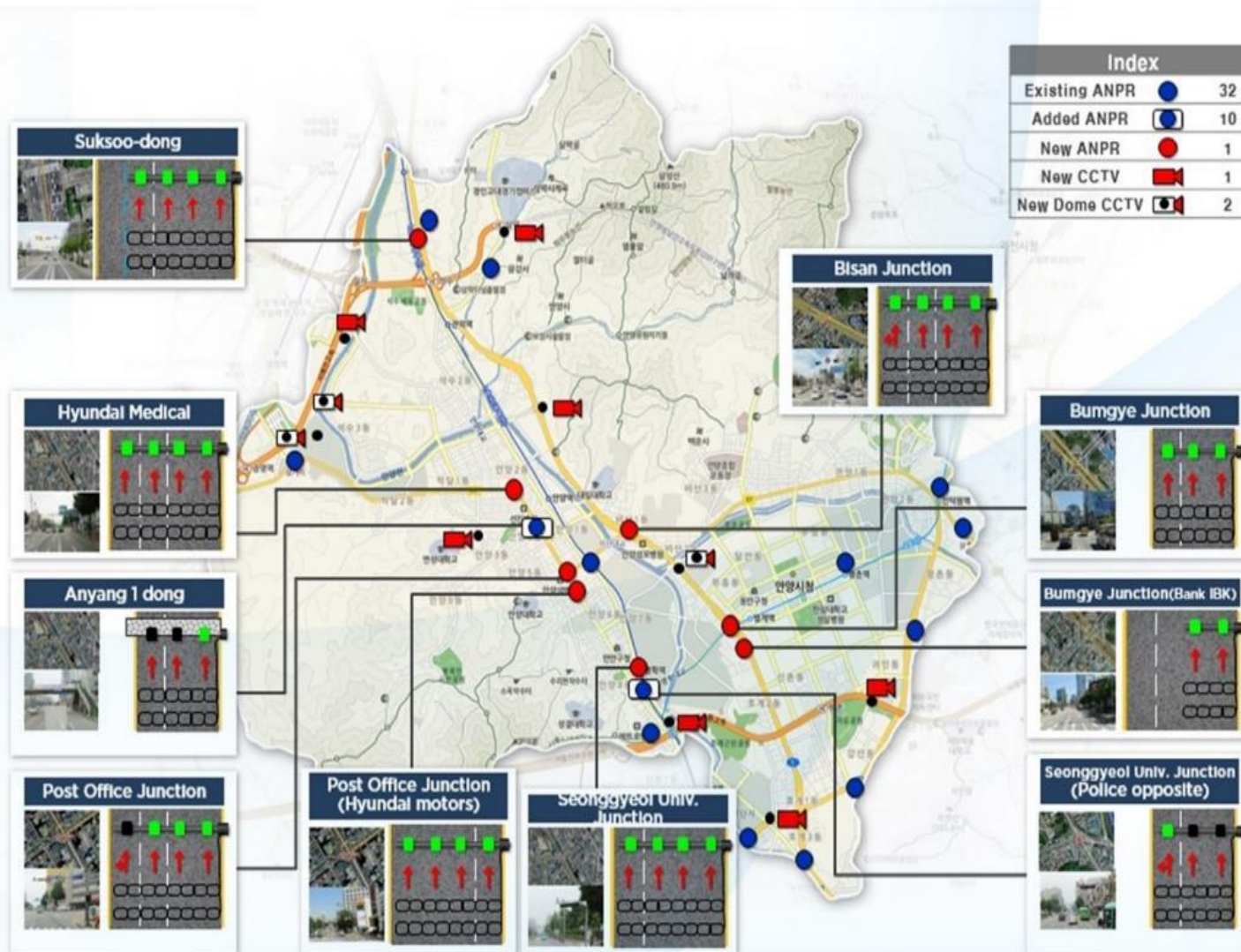- ◗ Provide patrol cars With CCTV video
- ◗ Tracking camera
- ◗ Emergency bell

SMART — Securing their citizen's safety from crime and disaster

Managing their urban traffic and facilities efficiently

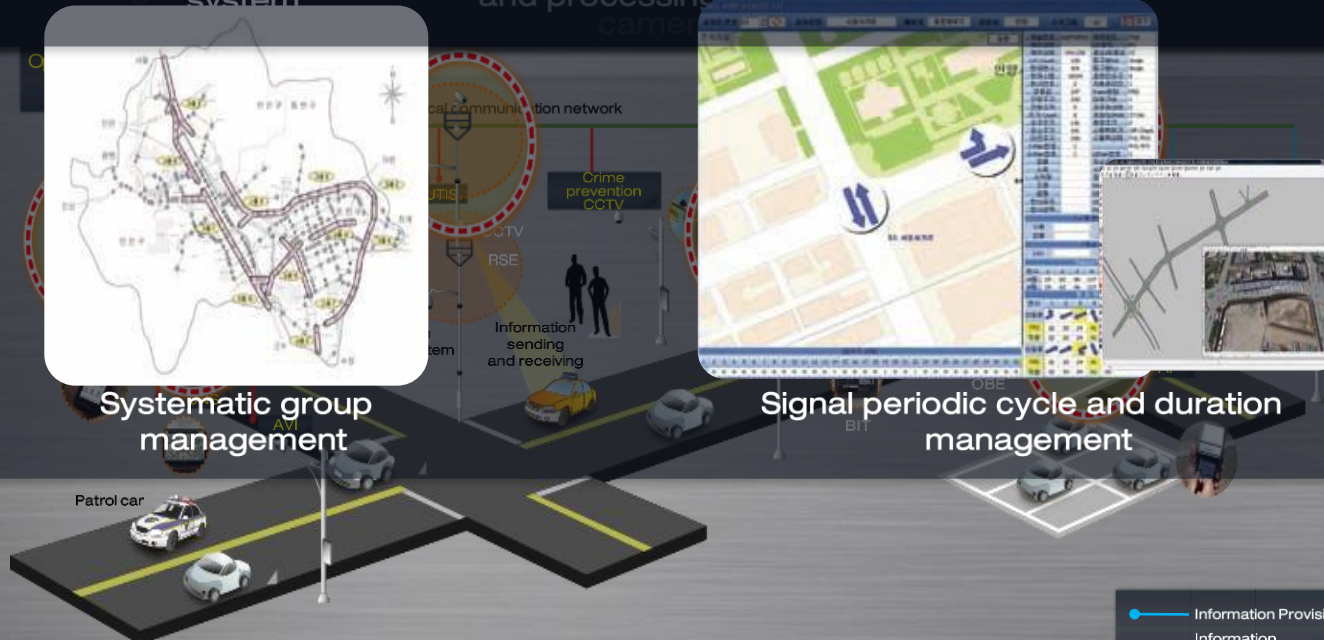**Prioritize mass transport system** demand

- Exclusive bus lanes
- Artery Bus
- Illegal parking patrol camera
- Systematic group management
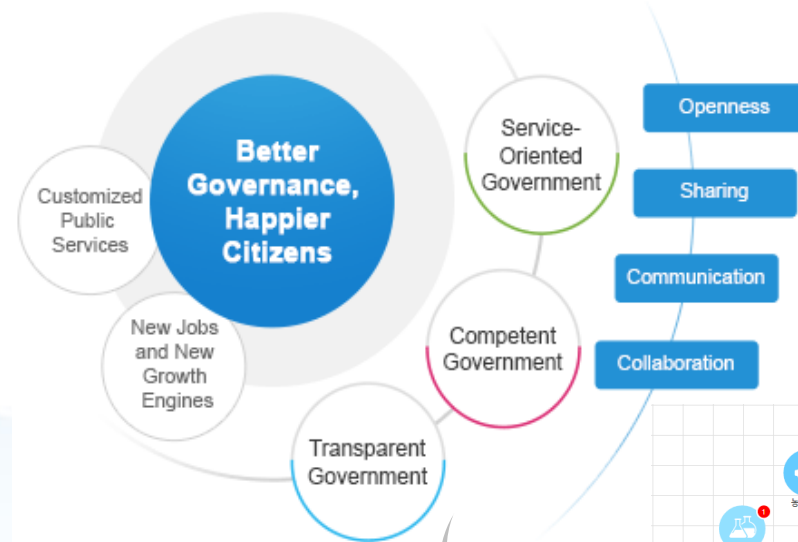- Signal periodic cycle and duration management

Managing their urban traffic and facilities efficiently

Analyzing City Status with Big data

The Government 3.0 Initiative

Data and Technology Innovations

Analytics

Better Governance, Happier Citizens

Customized Public Services

New Jobs and New Growth Engines

Transparent Government

Competent Government

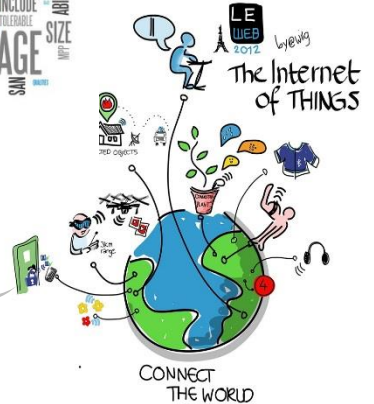Service-Oriented Government

Openness

Sharing

Communication

Collaboration

http://www.moi.go.kr/images/eng/sub4/Government30_img1.gif

Public Open Data

http://www.itnews.or.kr/wpcontent/uploads/2015/12/%EA%B3%B5%EA%B3%B5%EB%8D%B0%EC%9D%B4%ED%84%B0.png
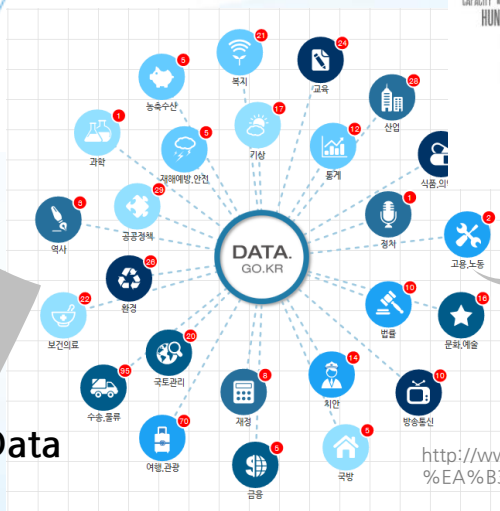
Big Data in Development Planning is really powerful !!!

Because they can do

S — Sampling almost 100% of total population

U — Ubiquitous context-awareness
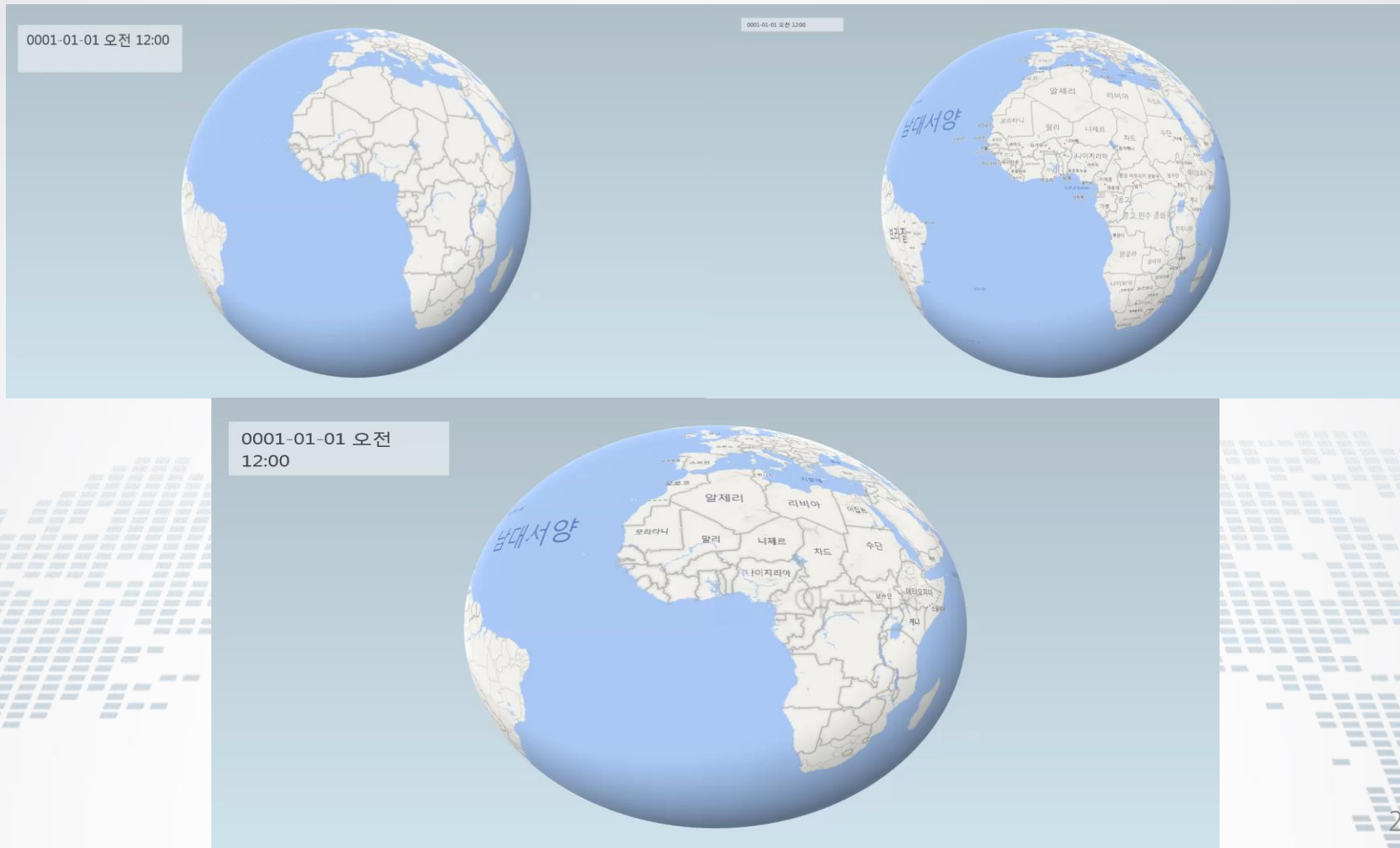
P — Prompt feedback and reaction

E — E-government for sharing info. with private sector

R — Reality Simulation – Virtual and Augmented

S U P E R Sampling almost 100% of total population

Smart cell analysis based on the mobile phone provides very fine granularity for the people and vehicle dynamics

Evidence based Policy implementation:
Seoul's Case of Night Owl Bus Services by Big data Analysis

심야버스 노선개발 - 상세화면   ● 노선 최적화
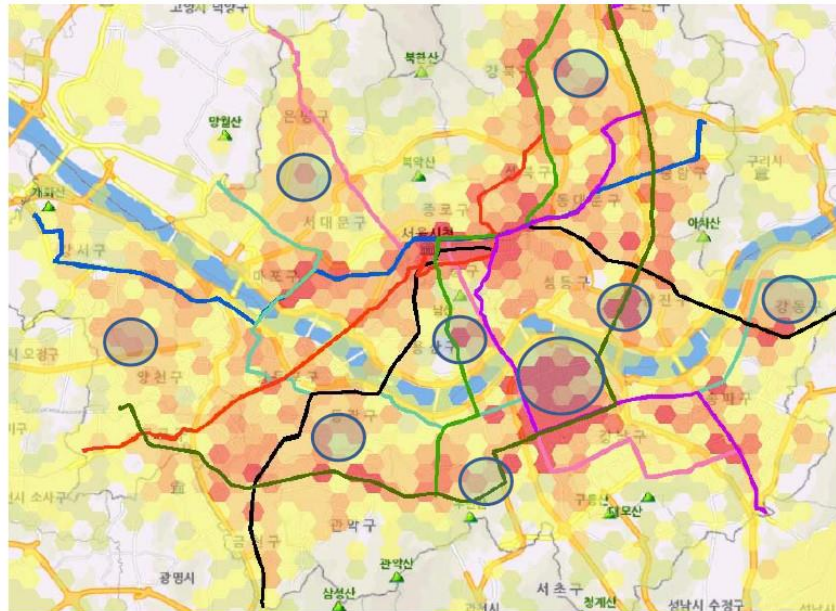
S U P E R Ubiquitous Context-awareness

- Monitoring without blind spots

- Floodlight camera

- Speaker

- Provide patrol cars With CCTV video

- Tracking camera

- Emergency bell

방범용 CCTV 작동중
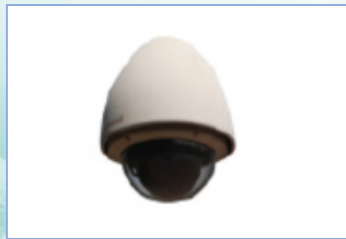
S U P E R Prompt Feedback and reaction

Wireless AP location
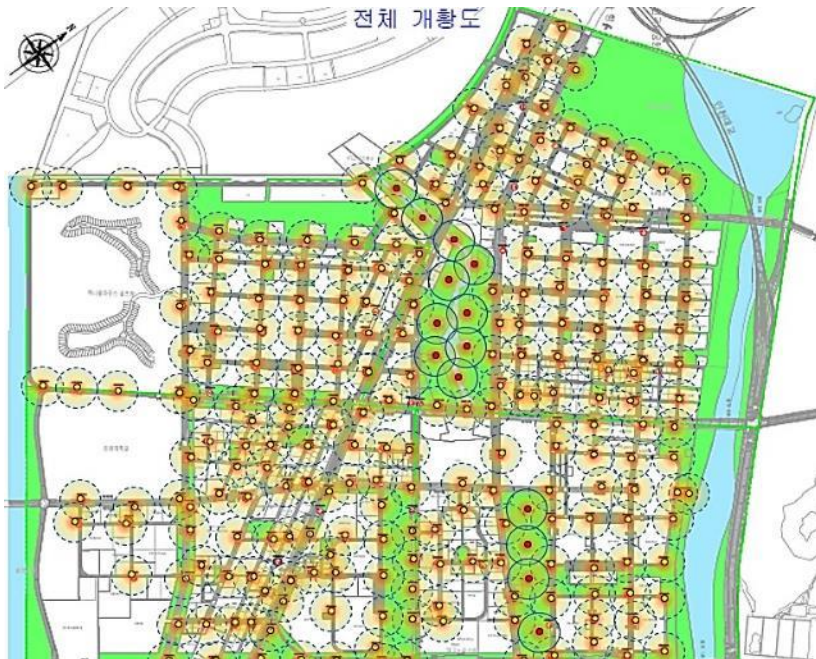
Wired network location

(S)(U)(P)(E)(R) E-government to share info. with private sector

As a data platform for information sharing between public and private sector

Vision of Government 3.0

" **Trusted Government, Happier People** "

Service-oriented Government — **Competent Government** — **Transparent Government**

Openness | Sharing | Communication | Collaboration

3

Reality Simulation – **Virtual and Augmented**

Reinforcement of CCTV surveillance based on GIS analysis

비산동 1152번지 앞
관양동 659-9번지 앞
관양동 1436-23번지 앞
석수동 755번지 앞
안양동 1088-5번지 앞
안양동 557-2번지 앞

LEGEND
● Added CCTV (143)
● Existing CCTV (241)

Revenue-making for the system sustainability

INCHEON U-CITY CORPORATION
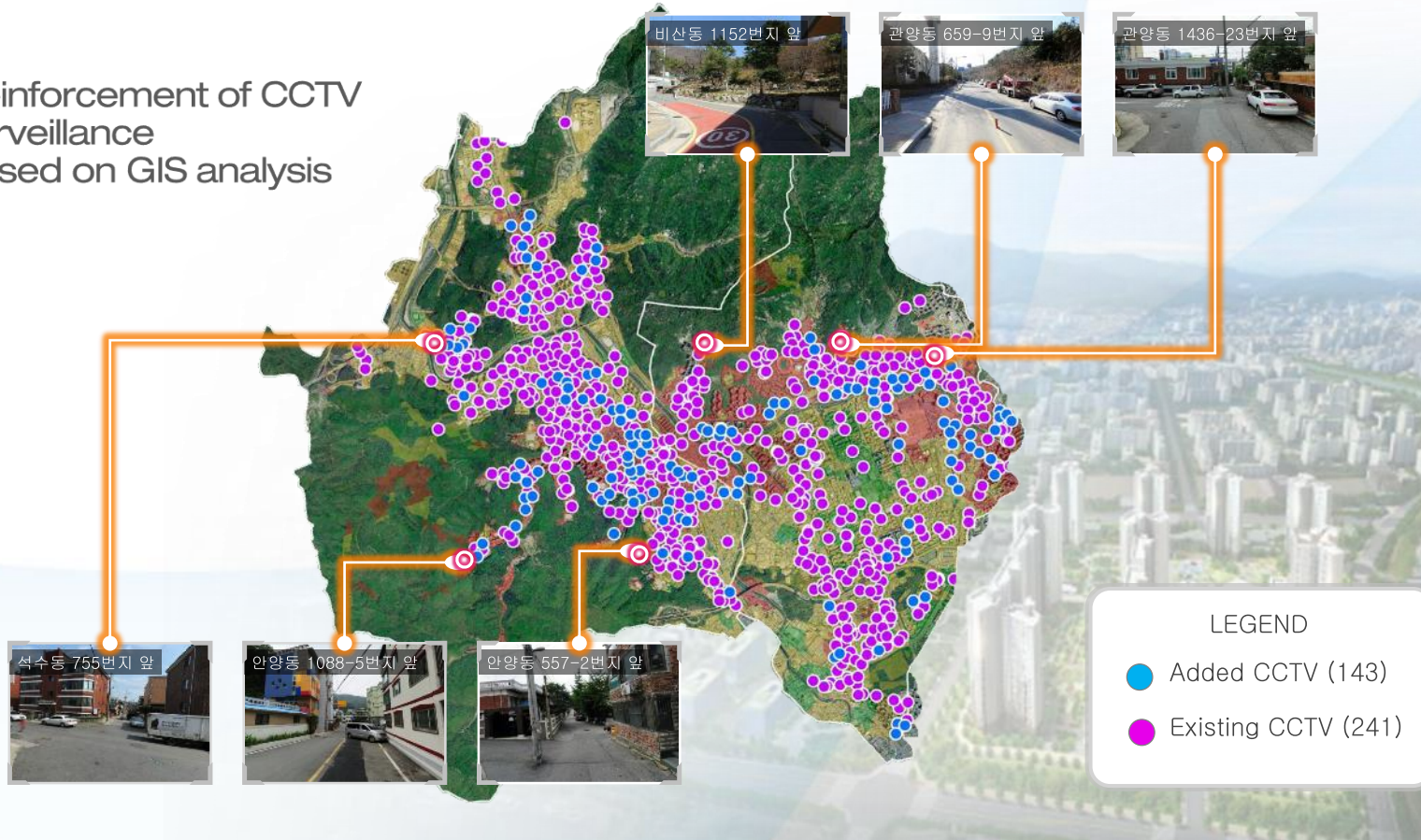
World's first PPP corporation

	Institutional support	ifez	INCHEON U-CITY CORPORATION	Technical support	

- Provide legal base and supervision

- Construction and maintenance

- Integration Of 3 cities
- Reduce operational cost
- Provide policy-making information
- Profit reinvestment

Telecommunicating with citizen for their active participation

Smart City by Smart Citizen
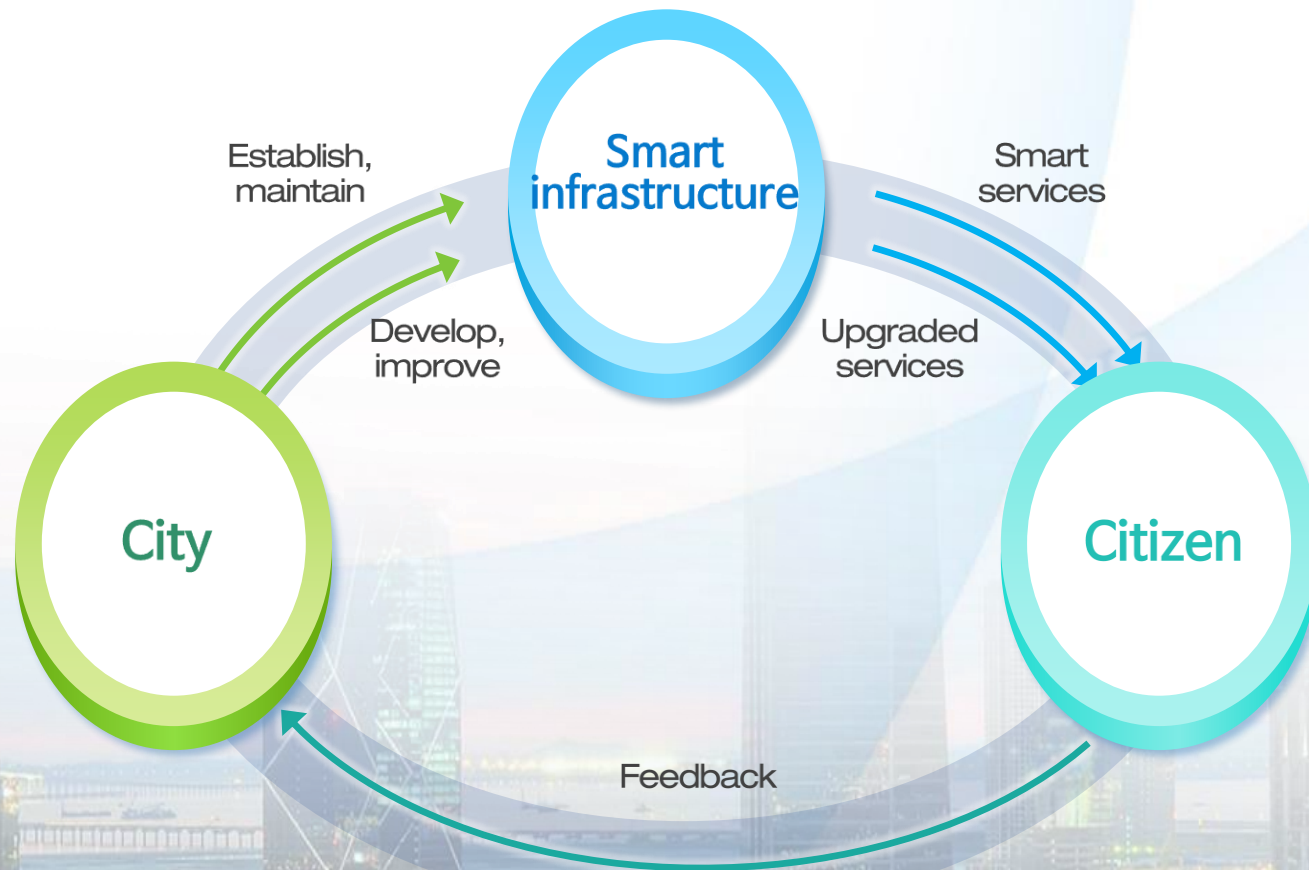
Telecommunicating with citizen for their active participation

Public Wi-Fi Service

City and citizen connected anytime, anywhere

248 Access Points

Key public spaces

Key parks and bus stops

Solid Waste Mgmt System – Benchmarking Korea

Energy [Power/Heating/Cooling]

Domestic Waste

Sewage

Graywater

Food Waste

Sewage Sludge

Waste Heat

Combined heat and power plant

Waste Incinerator

Waste Water

Sewage / Waste Water Treatment Plant

Left-over Food Waste Incinerated

Fuel(Bio Gas)

Facility for Recycling Food Waste

Waste Water
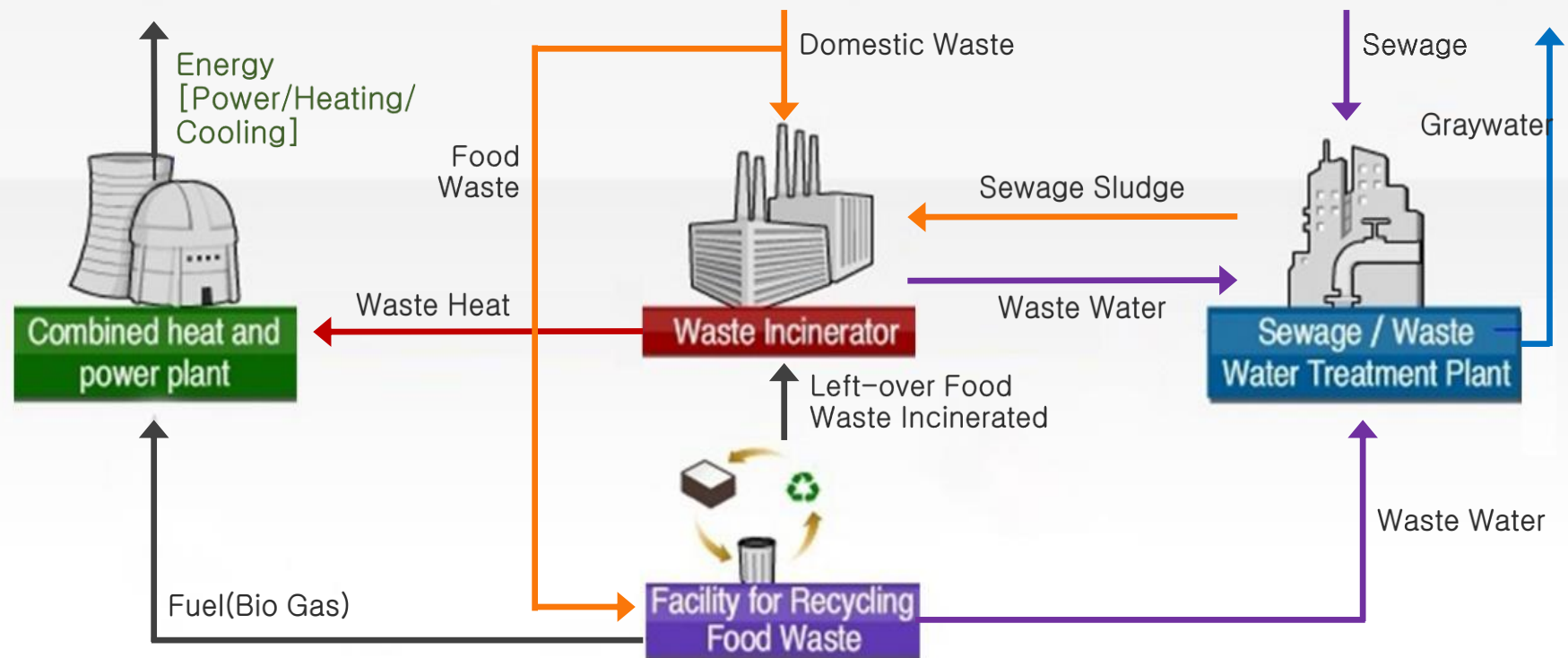
How beneficial are these Smart Cities?

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ANYANG

20,854 cases (2008) → **Crime rate 18.5%** ↓ → 16,990 cases (2012)

Arrest rate 25.3% ↑ (2009 → 2010)

▶ CCTV image evidence provision to police(since 2009) : 22,204 cases
▶ No. of arrest through smart city center monitoring(since 2009) : 1,266 cases

Namyangju

Travel speed 7.2kph ↑

Unit : kmm/h

	Pre-test	Pre-test
Local road 1	33.8	37.3
2	31	44.5
3	35.4	37.1
4	47.5	53.4

Unit : m

	Pre-test	Pre-test
Intersection 1	34.2	21.9
2	16.1	11.7
3	12.8	6.6
4	38.5	30.3
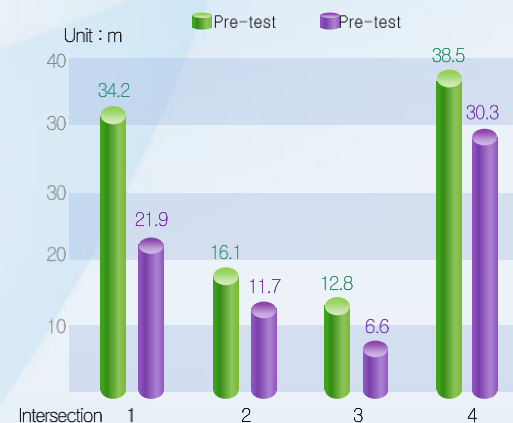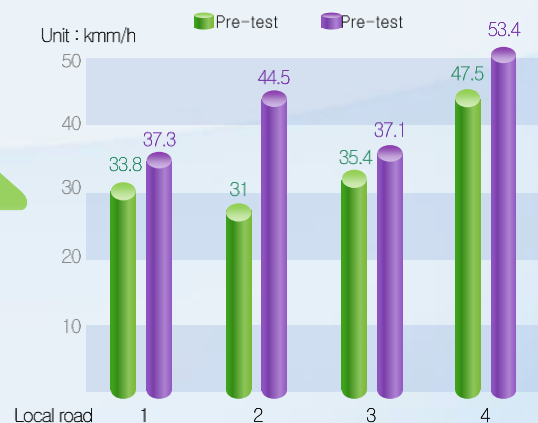
Intersection waiting time 43sec ↓

▶ Citizen satisfaction rate on traffic information : 30%(2011) → 80%(2012)

Six issues to be addressed for the successful smart city implementation

1 Privacy vs Security?

2 White elephant vs Must-have item?

3 Ready-made vs Tailor-made?

4 Public-driven vs Private-driven?

5 Rotating staff vs Dedicated expert staff?

6 Role of Central Gov.

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Sacrificing privacy will guarantee the Security?

Impossible to escape the city without getting LPN (License Plate Number) taken
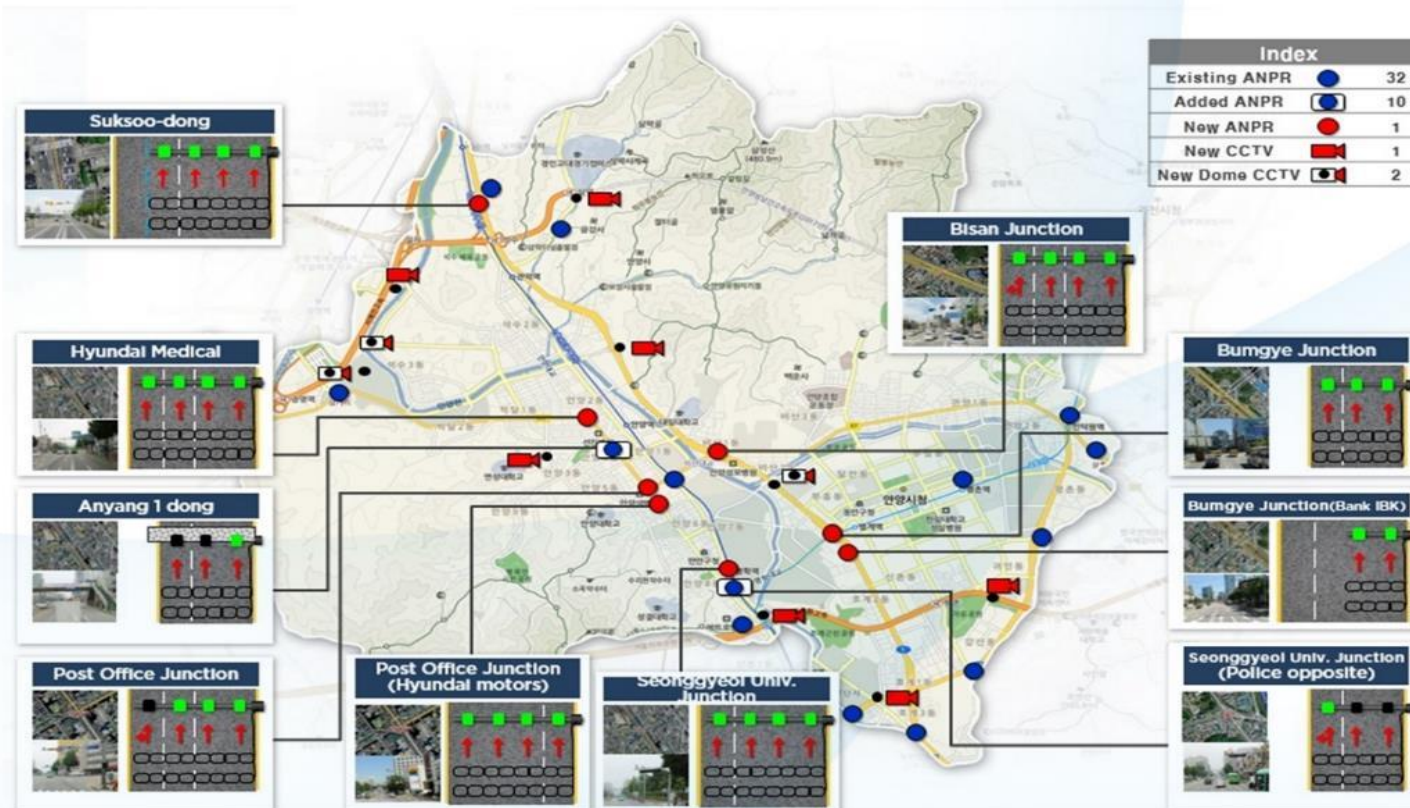
If the information system produces little benefit and fails to become must-have item, it will become a white elephant.

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Ready-made cutting edge design will not always work in the development planning – based on KRIHS's Asuncion ATMS experiences

Roadmap for tailor-made development planning and Implementation

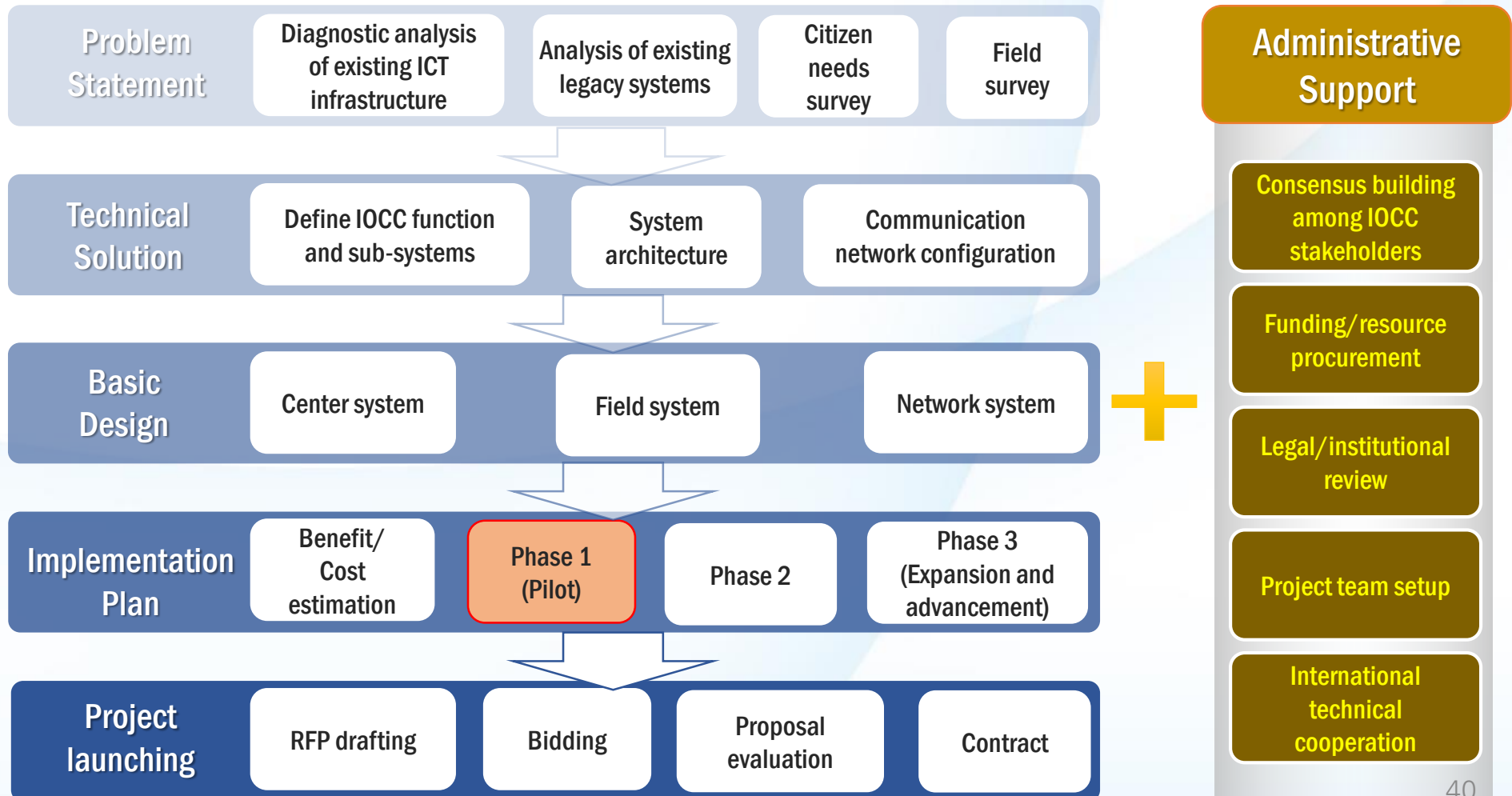| Problem Statement	Diagnostic analysis of existing ICT infrastructure	Analysis of existing legacy systems	Citizen needs survey	Field survey

Technical Solution	Define IOCC function and sub-systems	System architecture	Communication network configuration

Basic Design	Center system	Field system	Network system

+

Implementation Plan	Benefit/ Cost estimation	Phase 1 (Pilot)	Phase 2	Phase 3 (Expansion and advancement)

Project launching	RFP drafting	Bidding	Proposal evaluation	Contract

Administrative Support

- Consensus building among IOCC stakeholders
- Funding/resource procurement
- Legal/institutional review
- Project team setup
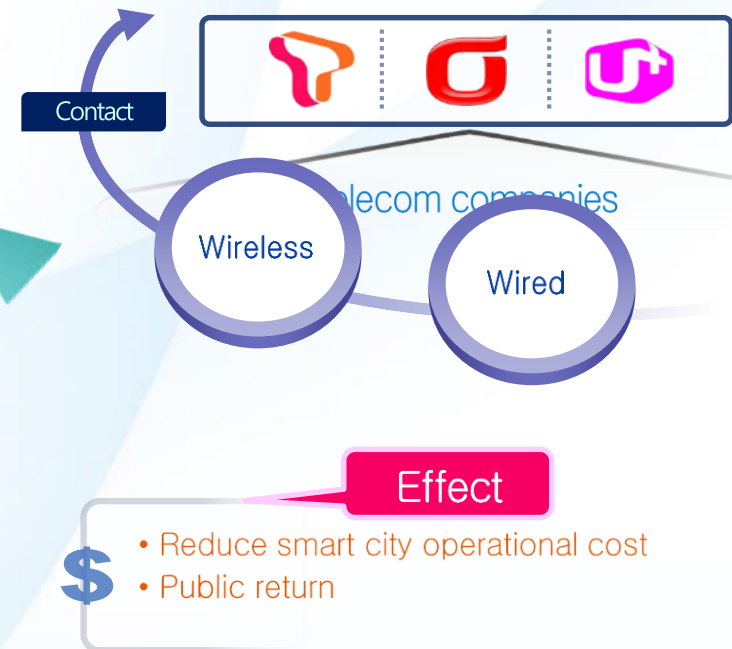- International technical cooperation

40

The necessity of Business Model for the system sustainability
(eg. Songdo Smart City Project)

City and citizen connected anytime, anywhere

$5 million — Saving within 5 years

Cost

City-owned
Rental

2015 2016 2017 2018 2019 2020 2021

Business model

Contact

Telecom companies

Wireless

Wired

Effect
- Reduce smart city operational cost
- Public return

$

Provide feasible funding plan

Provide customized technical consulting

Derive city government's driving force by dedicated expert officers

Initiate Pilot Project
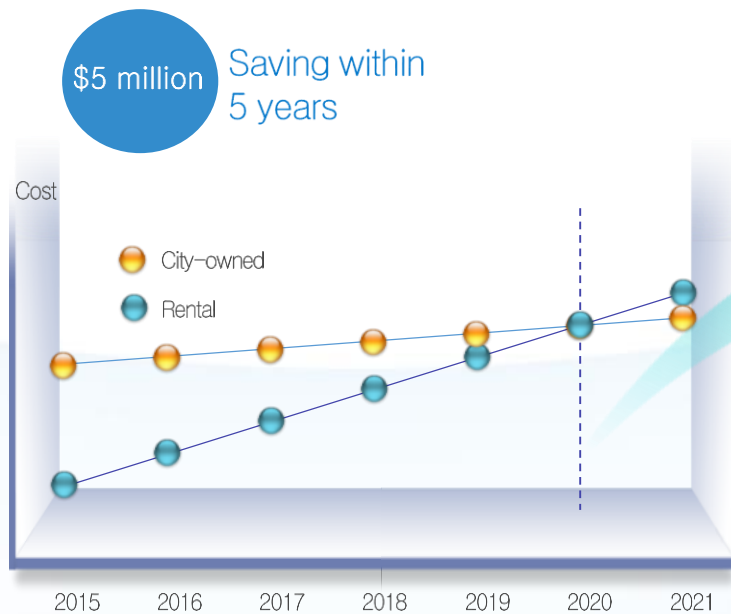
STEP 1

Mar.2008.
(Enforcement Date Sep.2008.)

U-Cities Act   ACT ON THE CONSTRUCTION, ETC. OF UBIQUITOUS CITIES

The purpose of this Act was to improve living standards and contribute toward a balanced national growth through the efficient building and management of ubiquitous cities in order to enhance city competitiveness and facilitate sustainable development.

Nov.2009.

The 1st Comprehensive Plans for U-Cities

May 2012.
(Enforcement Date Nov.2012.)

Partial Amendment of U-Cities Act

The Act was partially amended to establish an institutional framework for formulating Ubiquitous City Plans, revitalize ubiquitous city services, and develop new technologies.

STEP 2

Feb.2013.

The 2nd Comprehensive Plans for U-Cities

Dec. 2015.
(Enforcement Date Jun.2016.)

Partial amendment of the U-Cities Act

By the enactment of the Special Act on Promotion of and Support for Urban Regeneration, urban regeneration projects were added to the Act, and the ubiquitous urban construction project planning procedure was integrated with the implementation plan.

Mar.2017.
(Enforcement Date Sep.2017.)

Smart City Act
ACT ON THE PROMOTION OF SMART CITY DEVELOPMENT AND INDUSTRY

The term, "ubiquitous," was changed to "smart" to help improve the understanding of the general public, and the project site liable by the Act was extended to existing urban centers so that smart cities could be efficiently developed, managed, and operated.

STEP 3

Jan.2018.

Implementation Strategies for realizing Smart Cities

Seven major policies and the basic direction for building smart cities were announced.

Apr.2019.
(Enforcement Date Aug.2019.)

Partial amendment of the Smart City Act

The Act was partly amended to enlarge the scope of managing smart city projects by expanding the number of project implementers, commissioning private experts, and establishing a private sector proposal system, etc. In addition, the Act was amended to address the shortcomings of the current system and promote national pilot smart city projects.
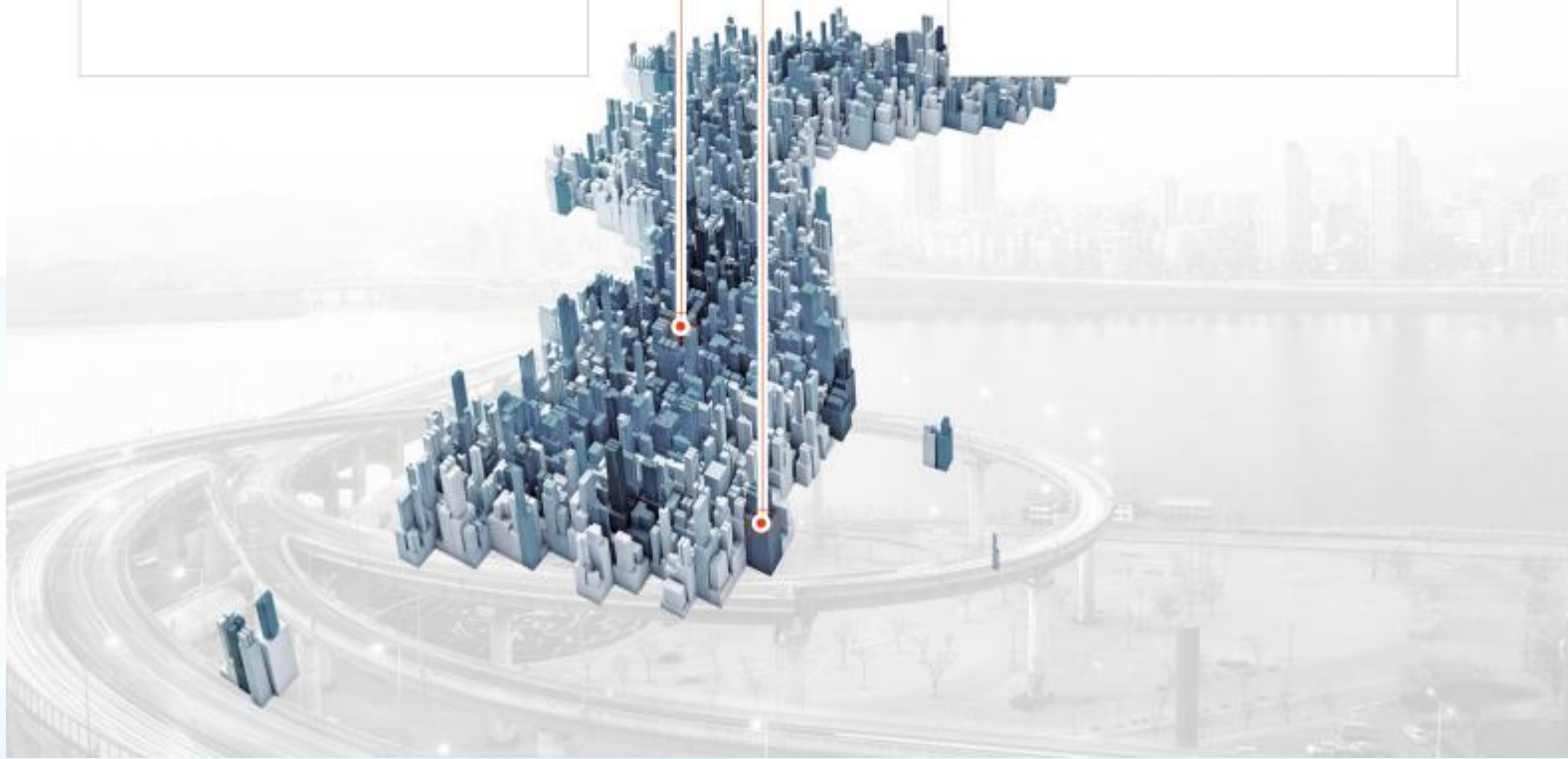
Jul.2019.

The 3rd Comprehensive Plan for Smart Cities(2019-2023)
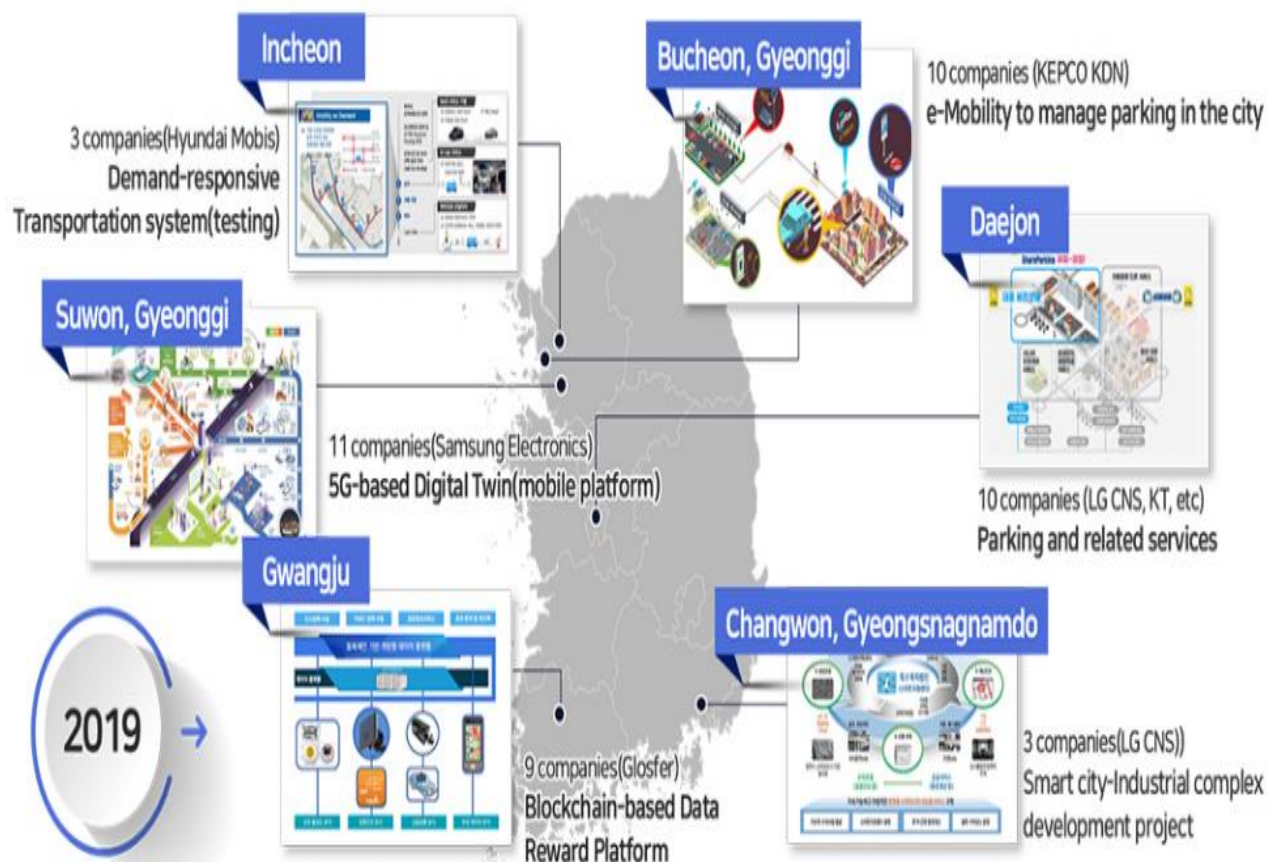
SEJONG

- MP : Prof. Jae-sueng Jung (Brain Scientist)
- Executor : LH corp.
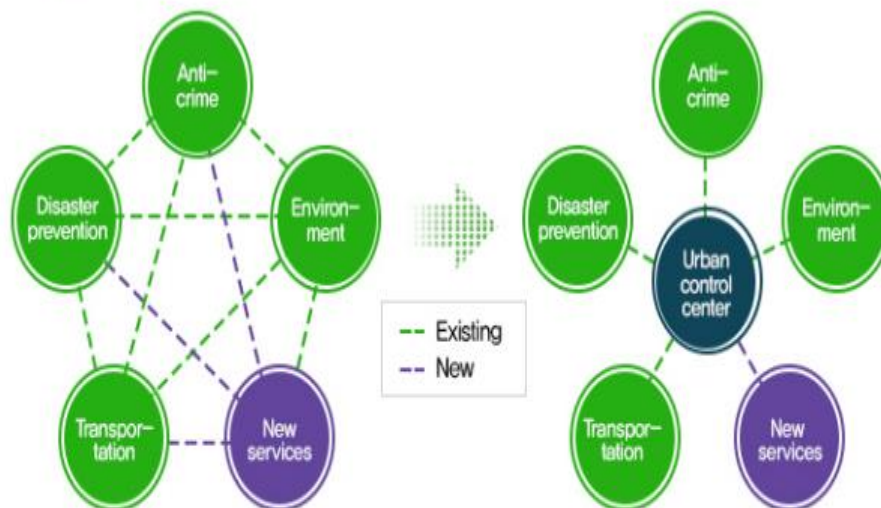- Area: 2.7㎢
- Population: 22,500
- Completion : 2022~

BUSAN

- MP : Doctor Jong-sung Hwang (Data & Platform Expert)
- Executor : K-Water corp.
- Area: 2.2 ㎢
- Population : 8,500
- Completion : 2021~

1st year — Funding for planning & pilot projects (6 cities/year, 1.5billion KRW/project)

2nd year — Funding for expansion (1~2cities/year, 20billion KRW/project)

Incheon — 3 companies(Hyundai Mobis) Demand-responsive Transportation system(testing)

Bucheon, Gyeonggi — 10 companies (KEPCO KDN) e-Mobility to manage parking in the city

Daejon — 10 companies (LG CNS, KT, etc) Parking and related services

Suwon, Gyeonggi — 11 companies(Samsung Electronics) 5G-based Digital Twin(mobile platform)

Gwangju — 9 companies(Glosfer) Blockchain-based Data Reward Platform

Changwon, Gyeongsnagnamdo — 3 companies(LG CNS)) Smart city-Industrial complex development project

2019 →

CCTV Monitoring

112 dispatch coordination

119 dispatch coordination

Emergency response coordination

Support for vulnerable groups

Unified Data Platform Concept

Anti-crime

Disaster prevention

Environ-ment

Transpor-tation

New services

Urban control center

-- Existing
-- New

Results from Deajon (2018)

Crime rate	Criminal arrests	Dispatch time (fire engine)	Support for vulnerable groups	Emergency Response
6,2% Down	2,7% Up	15,4% Down	142 cases	438 cases

Let's share Korean's Smart City Development Experiences For promoting African Smart City Projects

Thank you so much !!!

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