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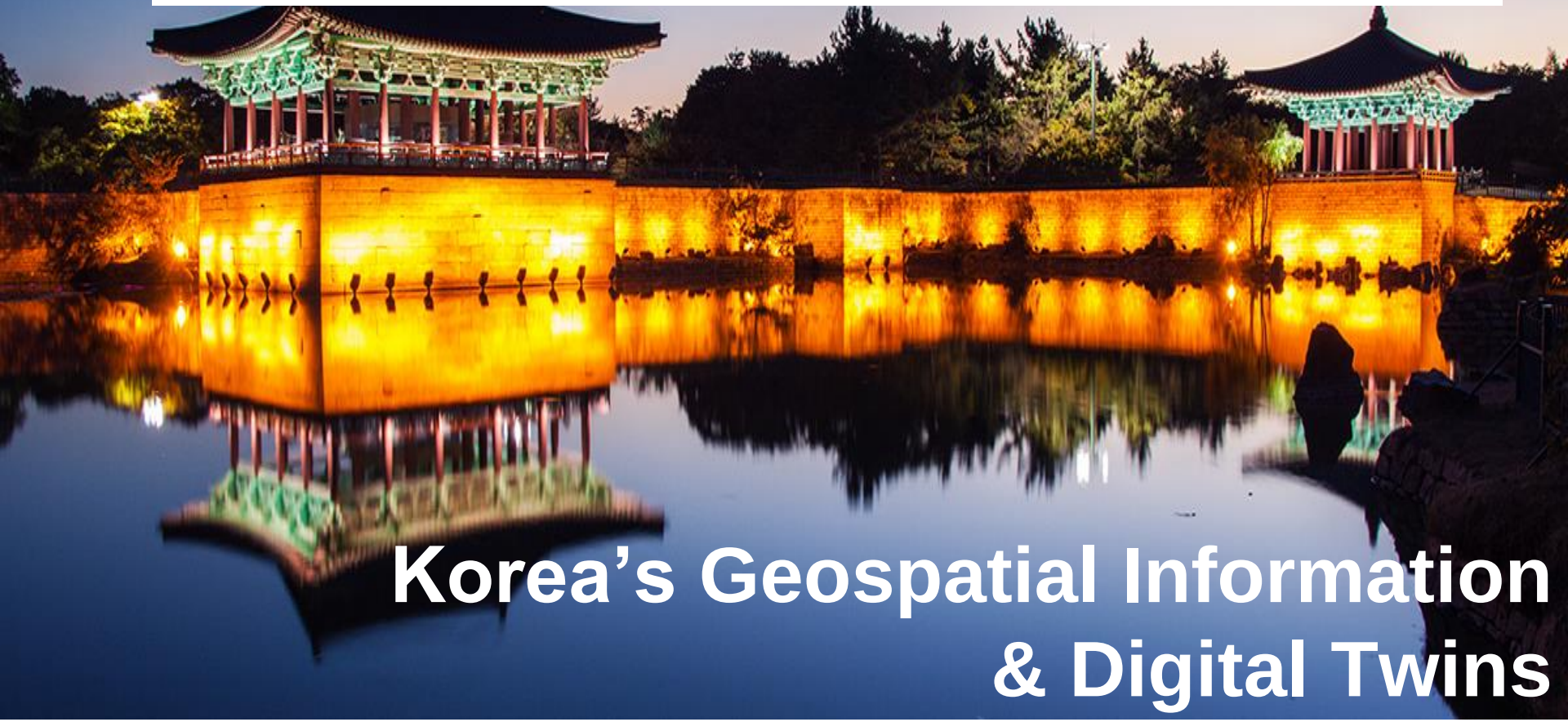

Korea's Geospatial Information & Digital Twins

October 31, 2022

Songwook CHOI

Chief Executive Director, LX

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Korea in the past

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The Korean War (1950-1953)

- Civilians killed: 0.8 million people
- Separated families: 10 million people
- More than 80% of the infrastructures and facilities in Korea were totally destroyed
- Per capita GDP: merely $67 in 1953

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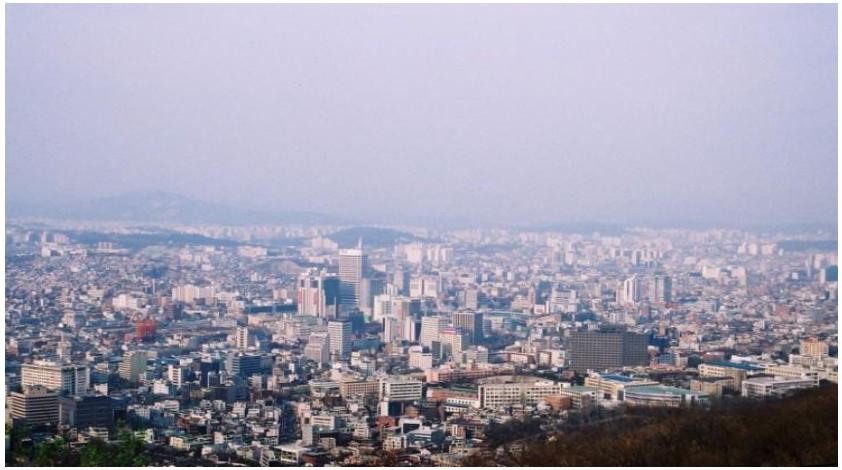
After the Korean War

<1950s>

<1970s>



<2000s>

<2020s>

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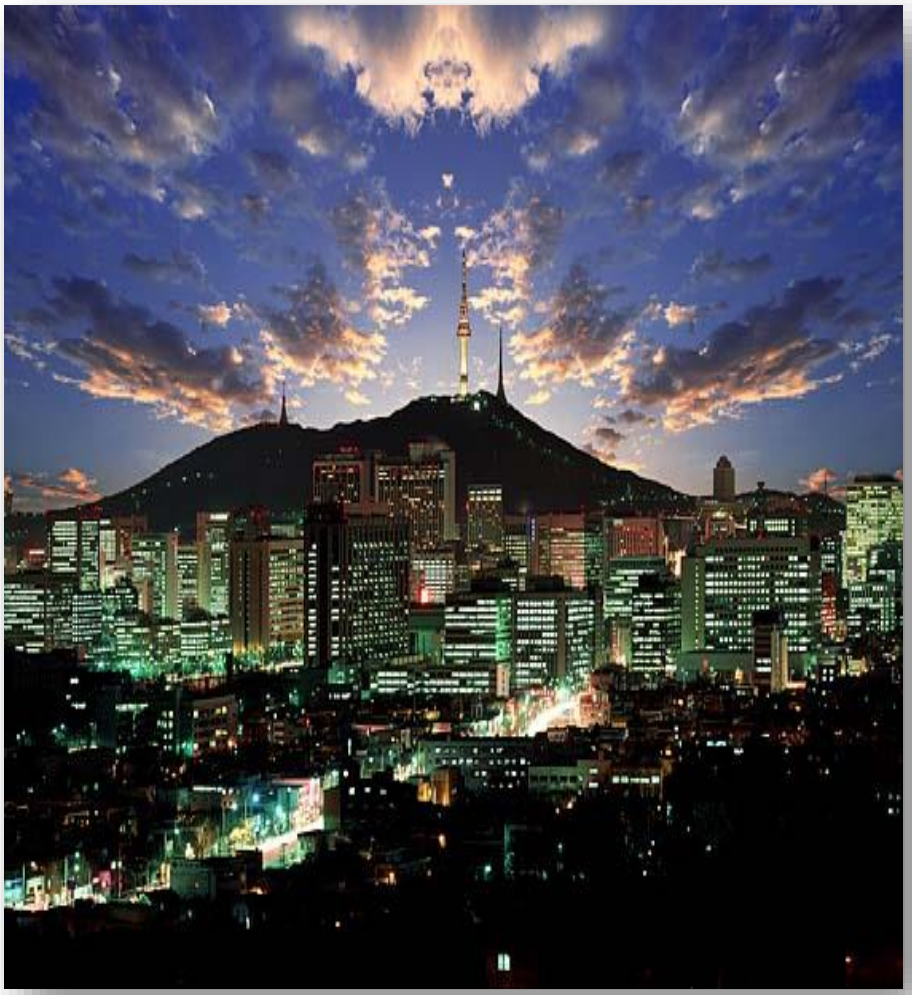
Korea.. from the ashes of war



- **OECD DAC Member**
- Per capita GNP: U$32,000
- Olympic Games(1988) & World-Cup Games(2002) & Winter Olympics (2018)
- G20 Seoul Summit(2010)
- Leading Country IT & Electronic business
- GDP($): **1.9 trillion in 2022 ranked 10th in the world**

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National 'Core' Infrastructures in Korea

Export-led Economic Growth (1970s)	Overcoming the IMF Crisis (2000)	Currently, Digital Conversion/Changeover
Expressway Seoul-Busan	High-speed Internet Network	?
		
Logistics, Automobiles	Wireless Internet, Games	New Future Industry
[Expressway] Core 'Physical' Infrastructure to support Export-led Economic growth in 1970s	[Internet Network] Core 'Soft' Infrastructure to lead IT Industry like the Internet, wireless communication, games	[Geospatial Information] Core Infrastructure to support development of Digital Economic Era

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Space…

What did you witness and imagine with/beyond space?

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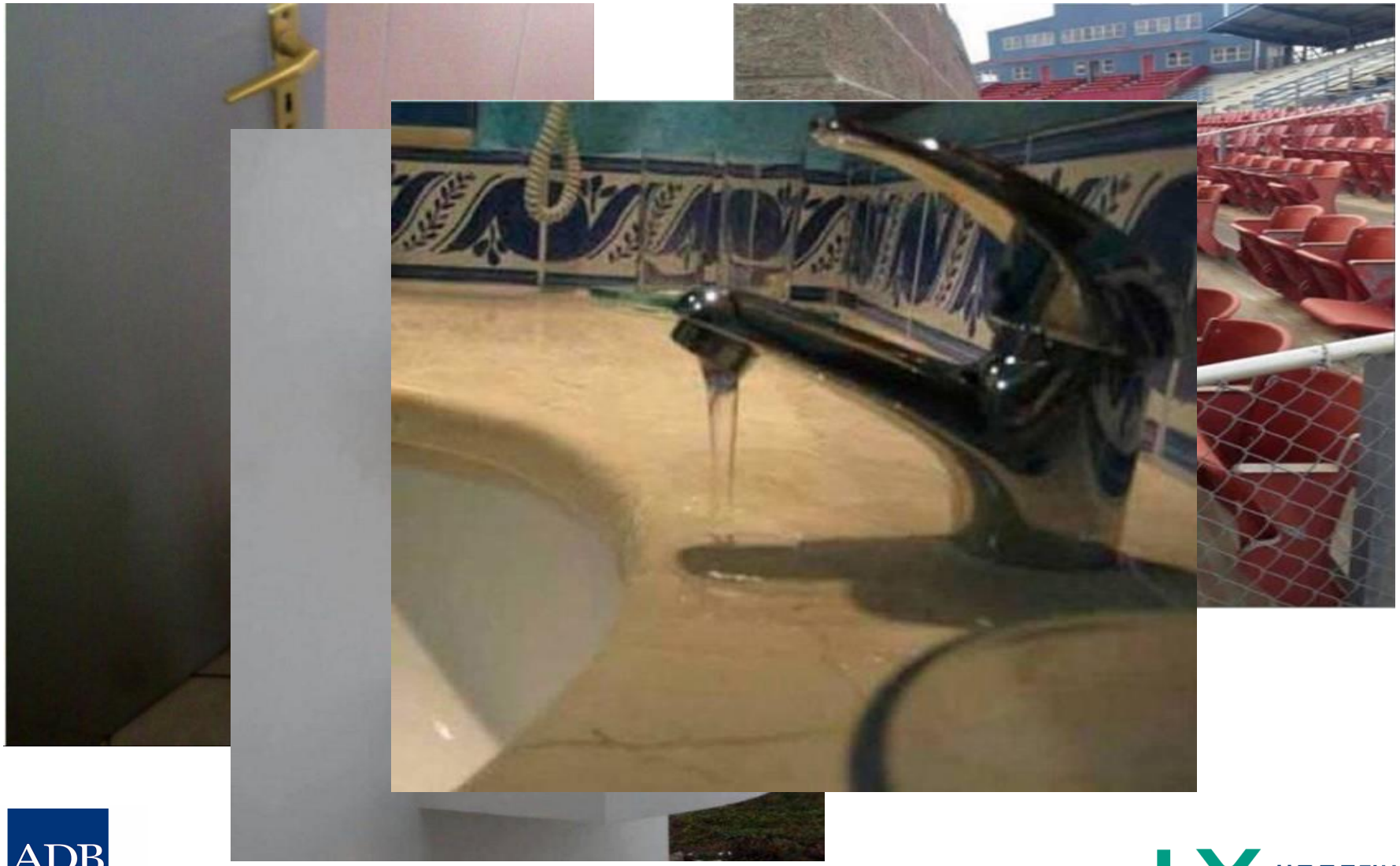
Episodes



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Traffic jam

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Have you ever imagined a Flying Taxi?

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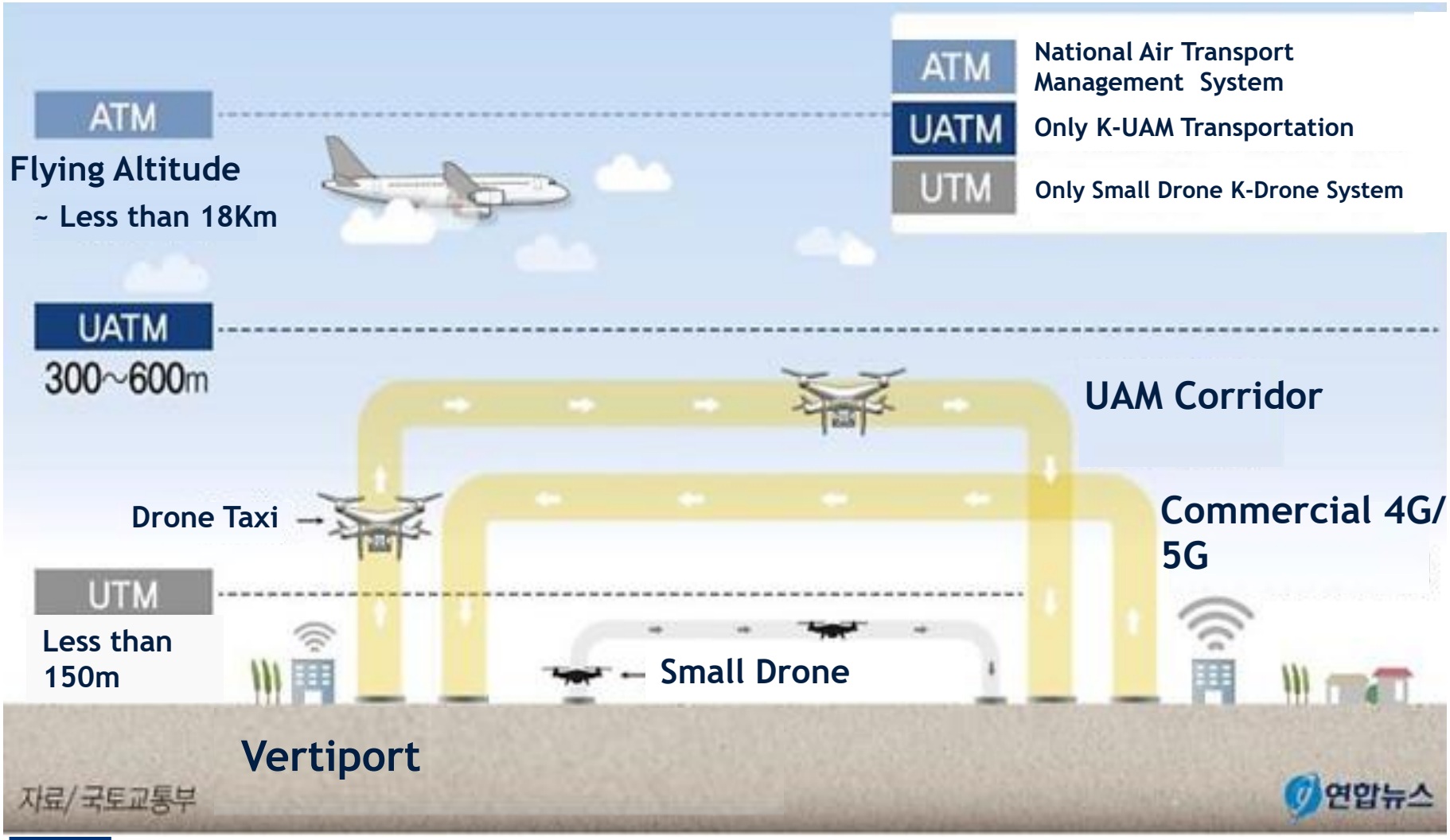
Testing a Drone Taxi in Actual World



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Geospatial Information…

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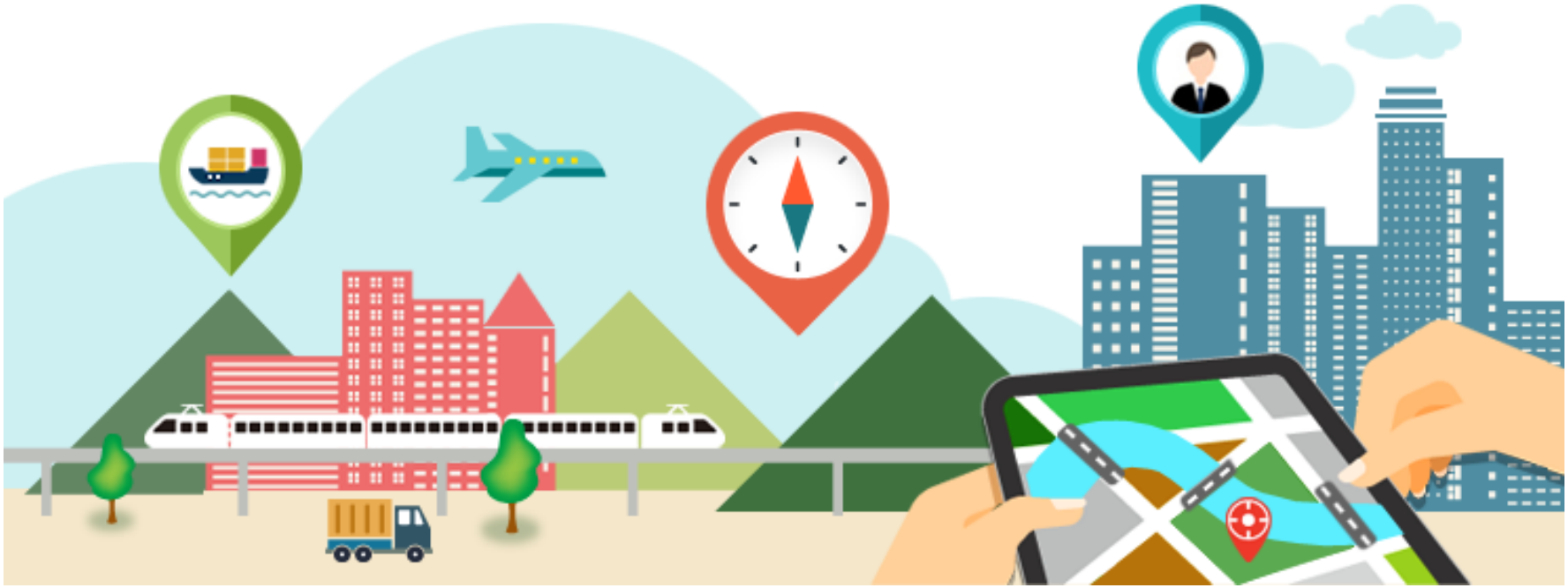
What is Geospatial Information (GI)?

‘a Combination of Location and Attribute information’

all information that provides understanding on the location and characteristics of natural or constructed features and boundaries on or about the earth



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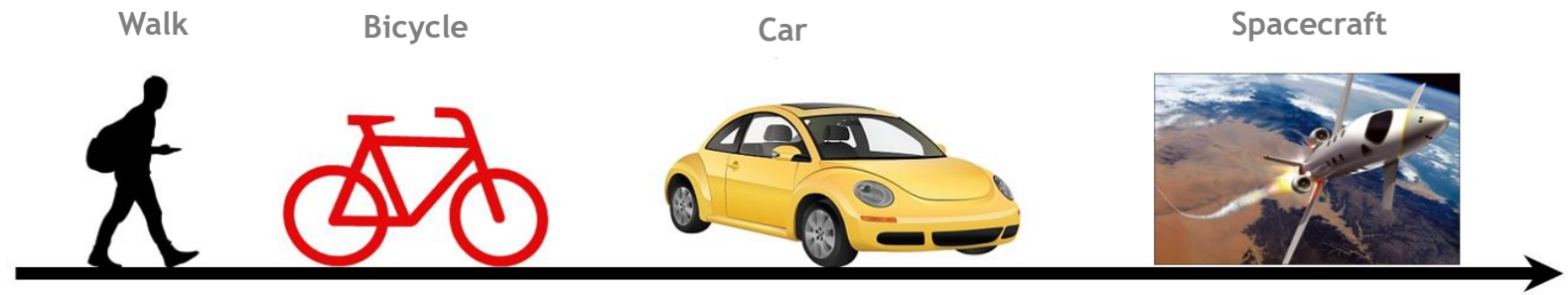
Digital Economic Era with GI



Paper-based map

2D digital map

3D Geospatial Information

Digital Twin Territory

Key Components

New Technology
(Ultra-precision, Connection, Convergence & Intelligence)

New Data
(Static, Kinetic)

New Services
(Public, Private)

New Platform
(Platform of Platforms)

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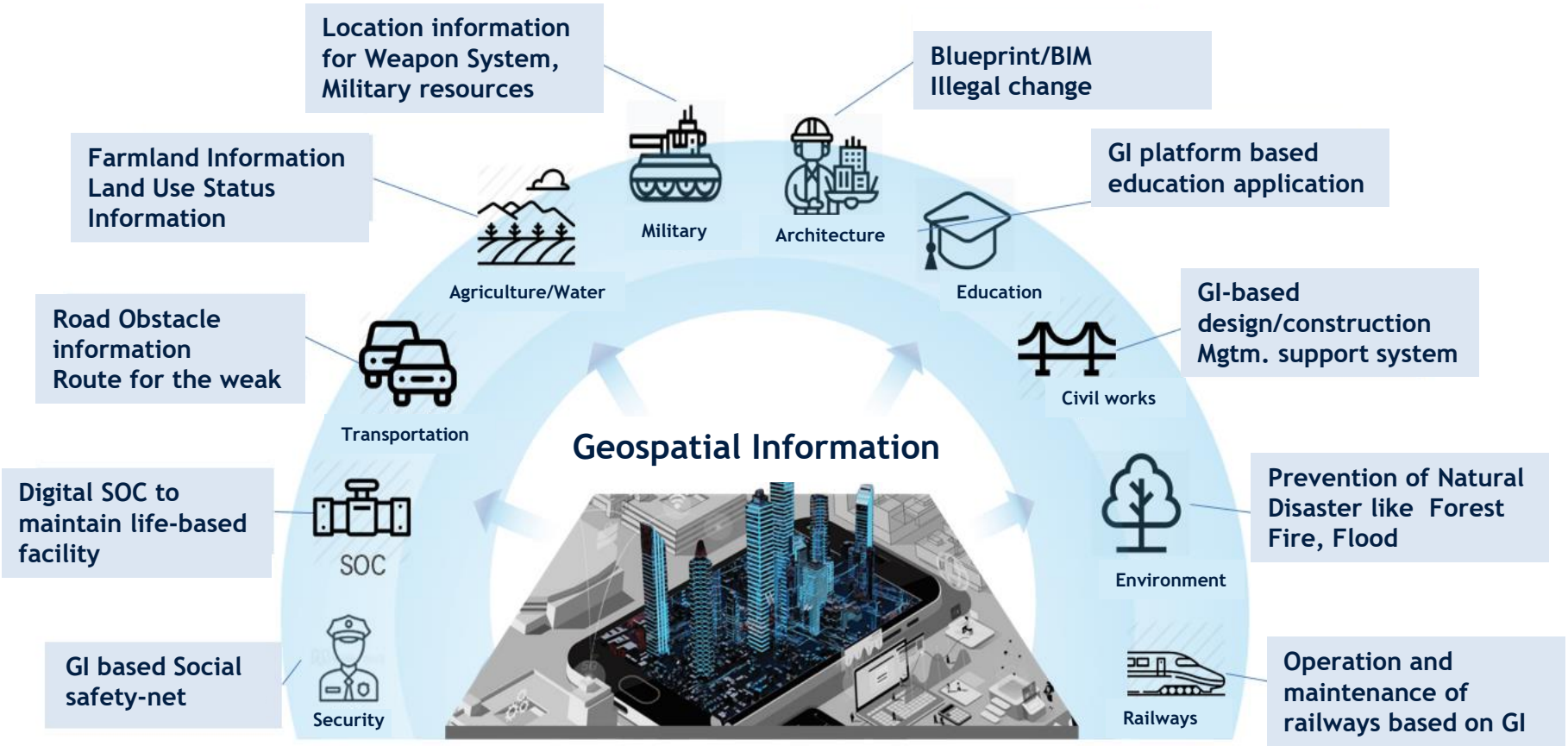
Over 80% of all Information for Decision-Making

Geospatial Information is an essential infrastructure for diverse sectors



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Industrial Revolutions & Geospatial Information

	…	1st	2nd Massification	3rd Knowledge Informatization
IR	…	1st	2nd Massification	3rd Knowledge Informatization
MAP		Castle Map (BC 507)	Old Korean Map (1861)	Japanese Colonial: Cadastral Map (1919~)	Restoration of Independence: Cartographic Map (1960s~)	NGIS 1995: Electronic Map (1990~2000s)	Web, App Map (2000~2010s)
Tech		Surveying			Aerial Photo	GPS, GIS S/W	Internet, Moblie
Role		Governance, War	De-fense, Govt.	TAX Collection	Civil Work, Land Development	Mgtm. Of Territory/Facility	Map services

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Geospatial Information for the Next?

- 4th Industrial Revolution: **Convergence** between Social/economic status and the state-of-the-art technology such as Artificial Intelligence(AI), Internet of Things(IoT), Big Data, Mobile → Ultra Connection, Intelligence & Combination

Key Technology · Industry & GI

Unmanned vehicle

Safe & efficient operation

VR · AR

Connection btw Virtual & Real

Smart City

Solution of Urban Problems

Smart Construction

Design, Construction, maintenance

AI · IoT

High Precision based Location Information

Big Data

GI based convergence

GI plays a role in **Engine** and **foundation** for the 4th IR

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Concept of GI & Trends changed

GI Concept

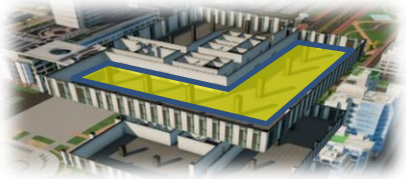
Past/Present	Future
'Person' oriented	'Machine', 'People'
See the Map	Experience-based Space
Miniature of Real World	Twins with the real

GI Technology

Past/Present	Future
2D, low-accuracy, low-capacity	3D, High-accuracy, full capacity
Separate Information	Integrated spatial information
Static Data	Real time kinetic data

GI has changed into a Platform for diverse data collection/integration/application via new Technology and divergence

3D + Platform + Real · Virtual combination




Toward「Digital Twin」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Digital Twins…

Same condition between the Virtual and Real Worlds

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Twins

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Introduction of Digital Twin Concept

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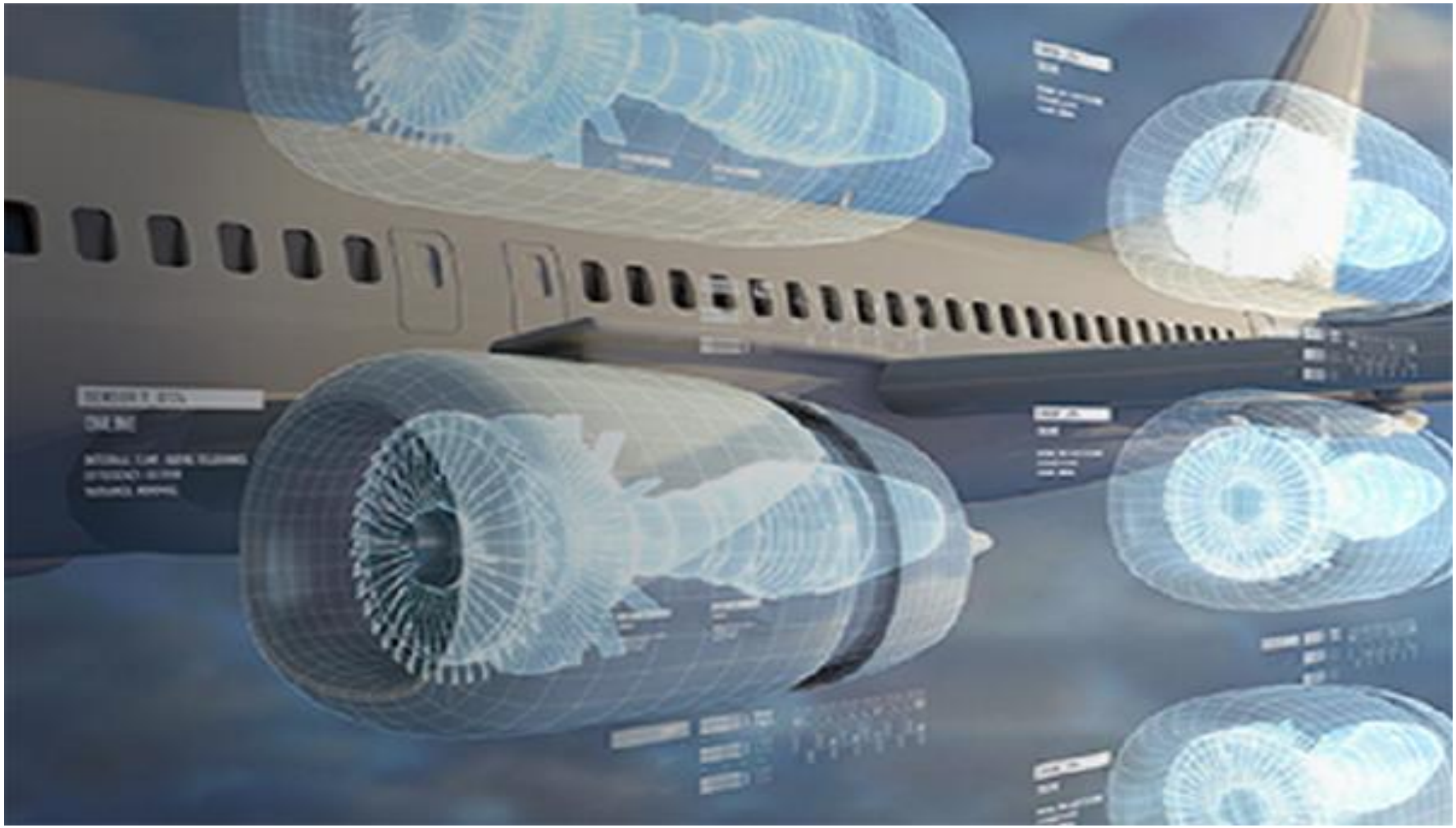
DT concept Application in other sectors (1)



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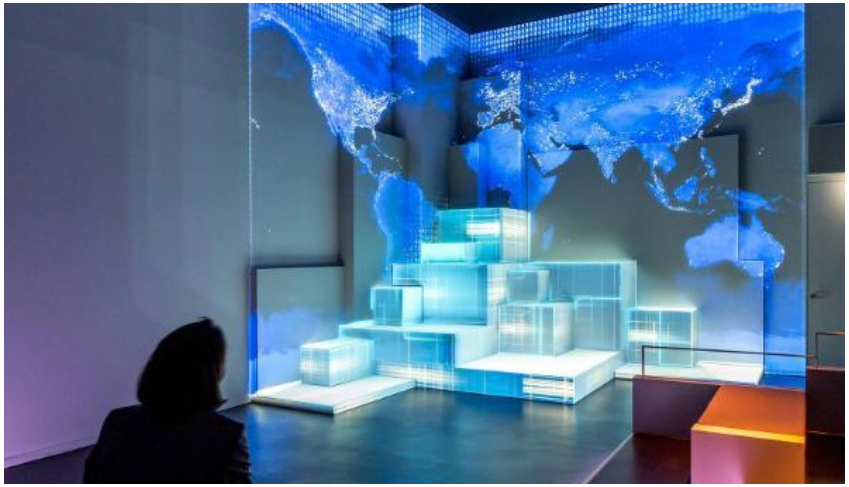
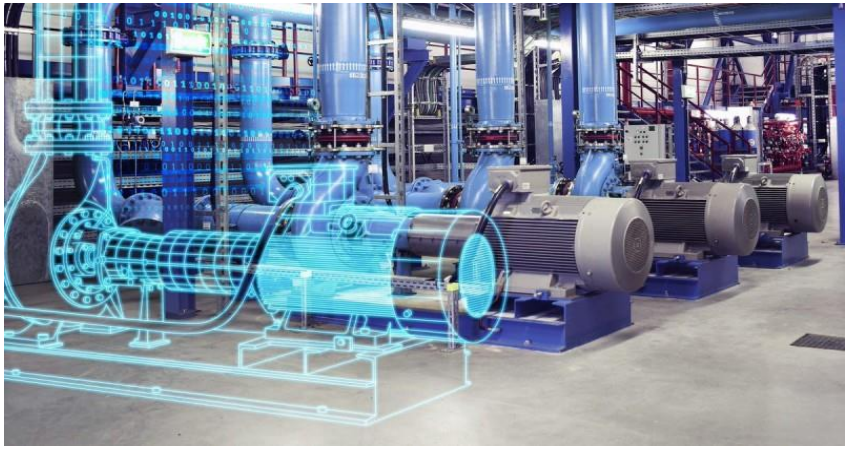
DT concept Application in other sectors (2)





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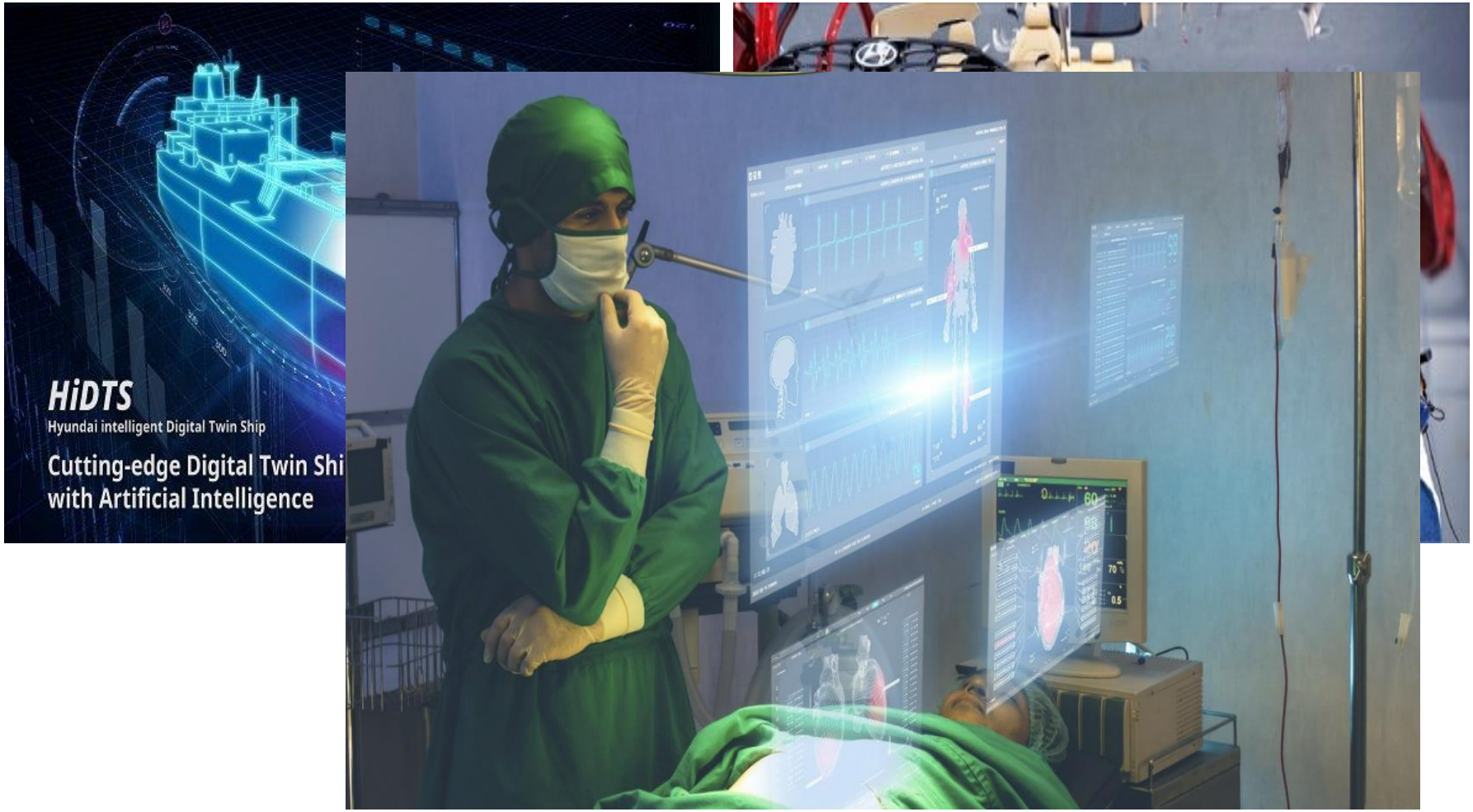
DT concept Application in other sectors (3)



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Definition of Digital Twin

Digital Twin

Technology that **accurately models the real world in digital space (2D/3D)** and then expresses changes that occur in real time, and **predicts** reality through **analysis and simulation**

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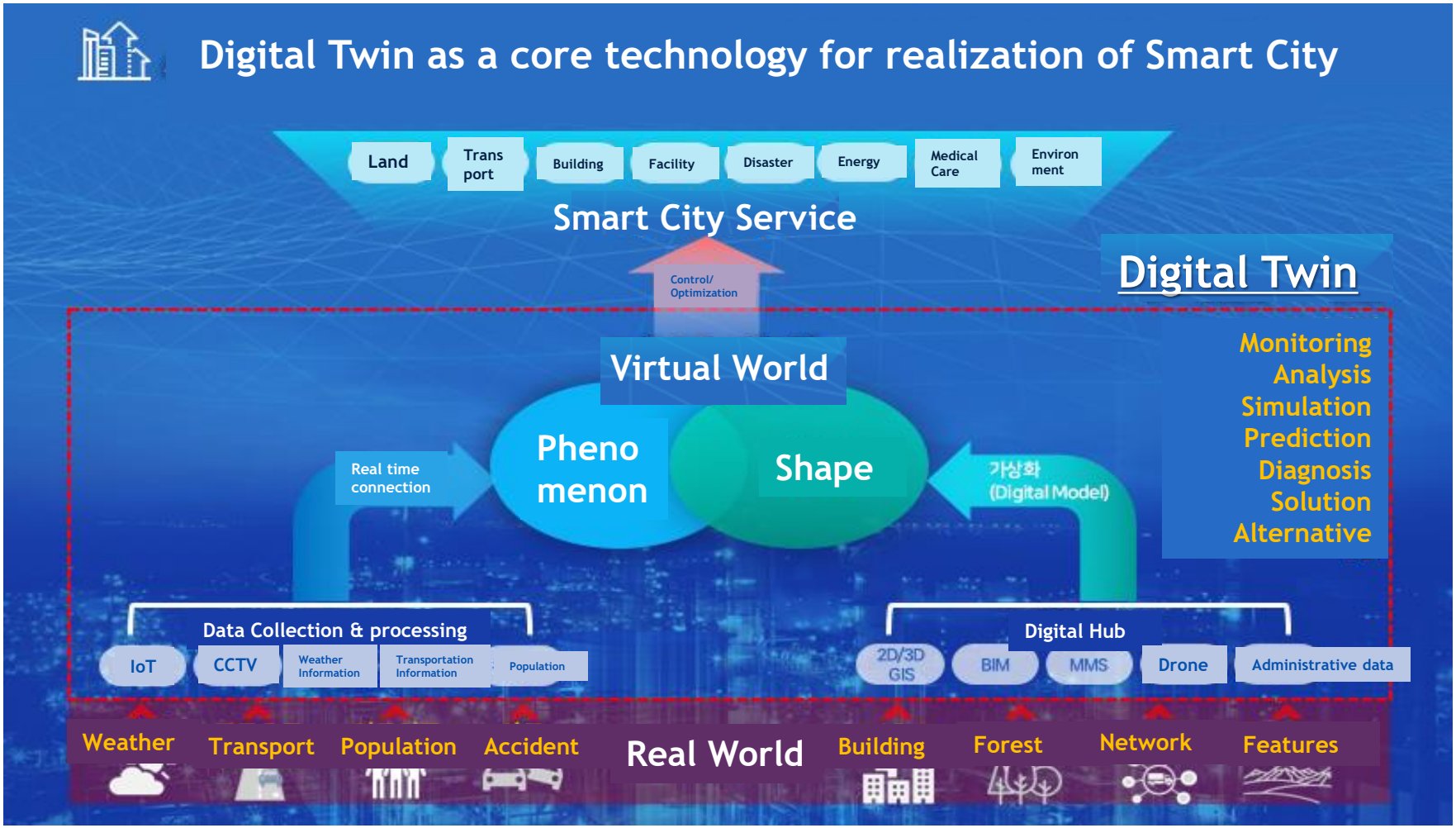
DT as a core tech for Smart City



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Collection of Data

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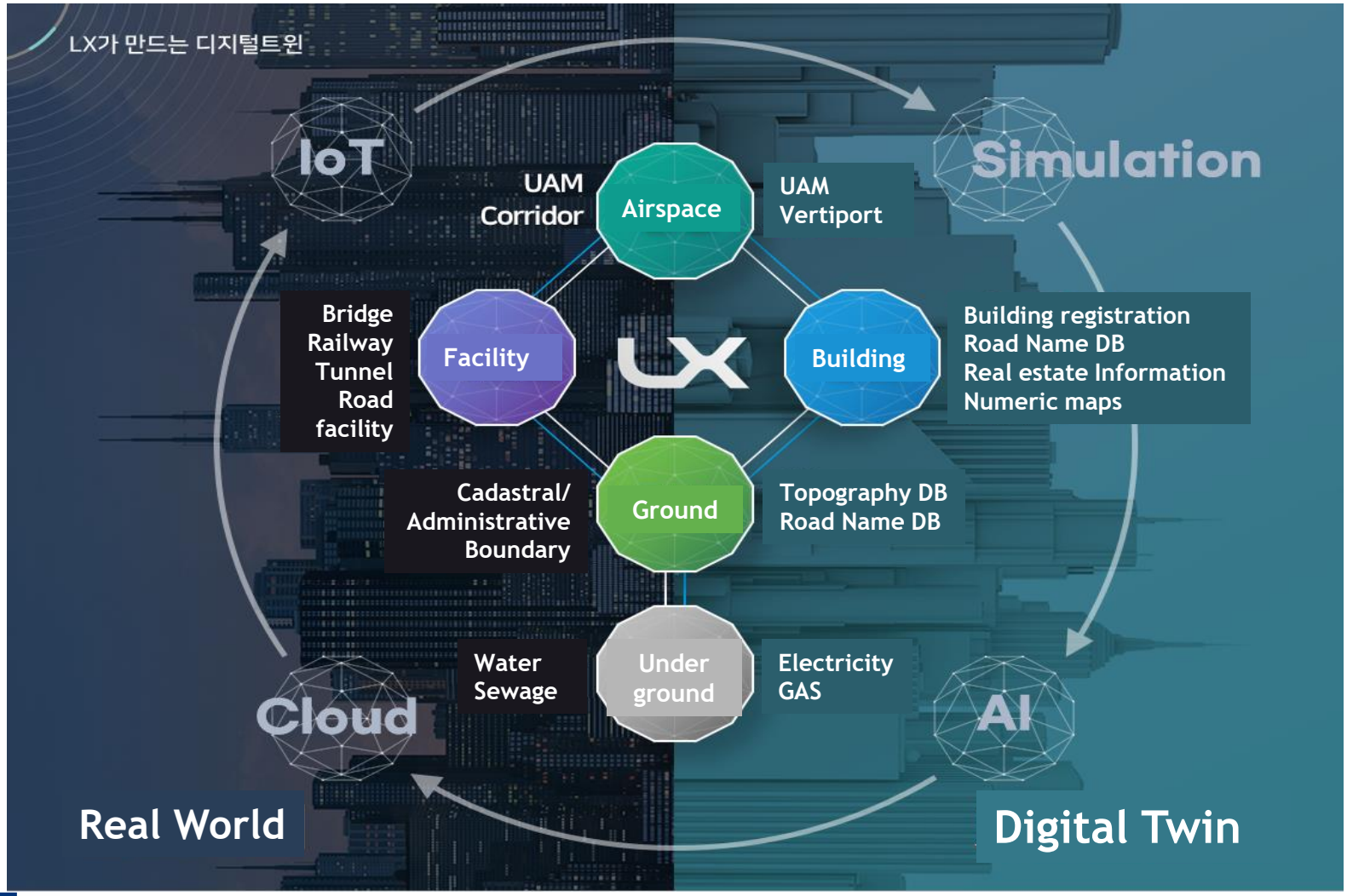
Data on/under/above the ground



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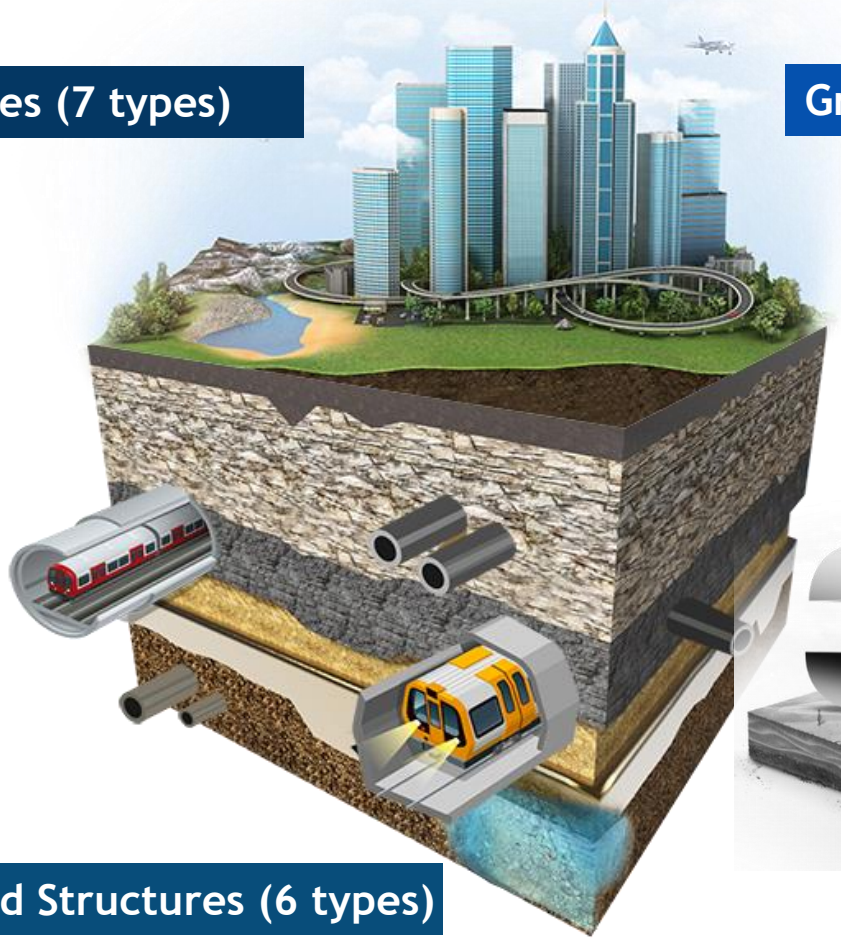
Underground data

Underground Spatial Integrated Map

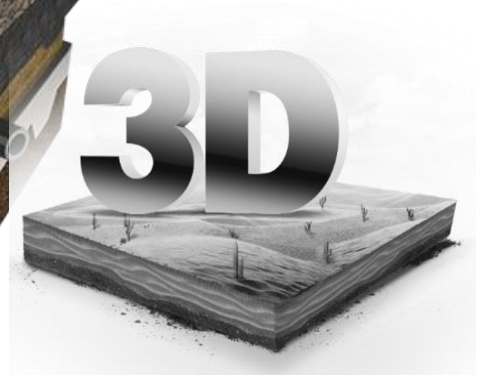
Underground facilities (7 types)

- Water line
- Sewage line
- Electric line
- Gas line
- Telecom line
- Thermal line
- Petroleum line



Ground Information(3 types)

- Drilling/Boring
- Tubular well
- Geological features



Underground Structures (6 types)

- Subway
- Underpass
- U.G. passage
- U.G. shopping center
- Common duct
- U.G. Parking Lot

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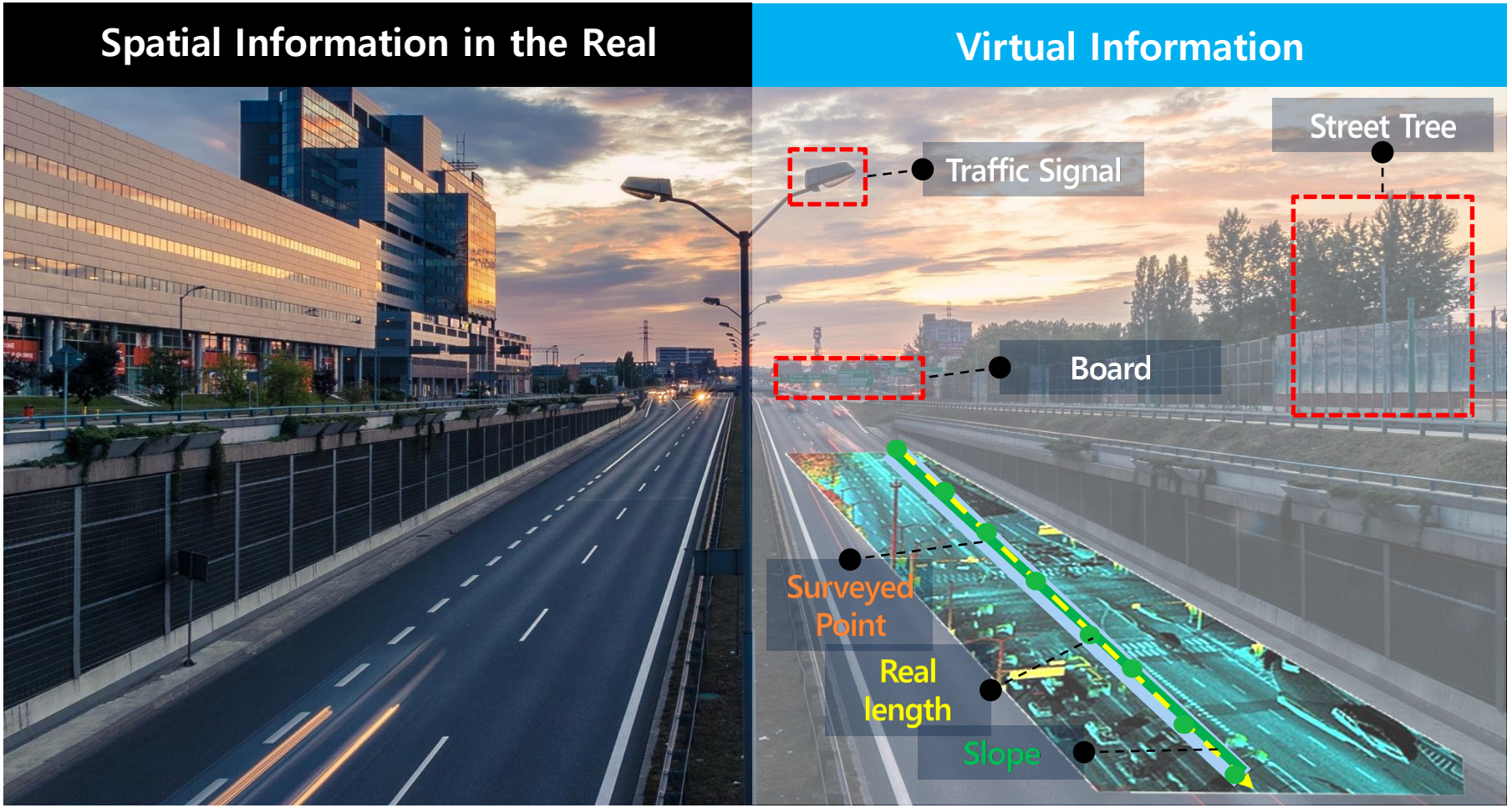
Ground data (Road)



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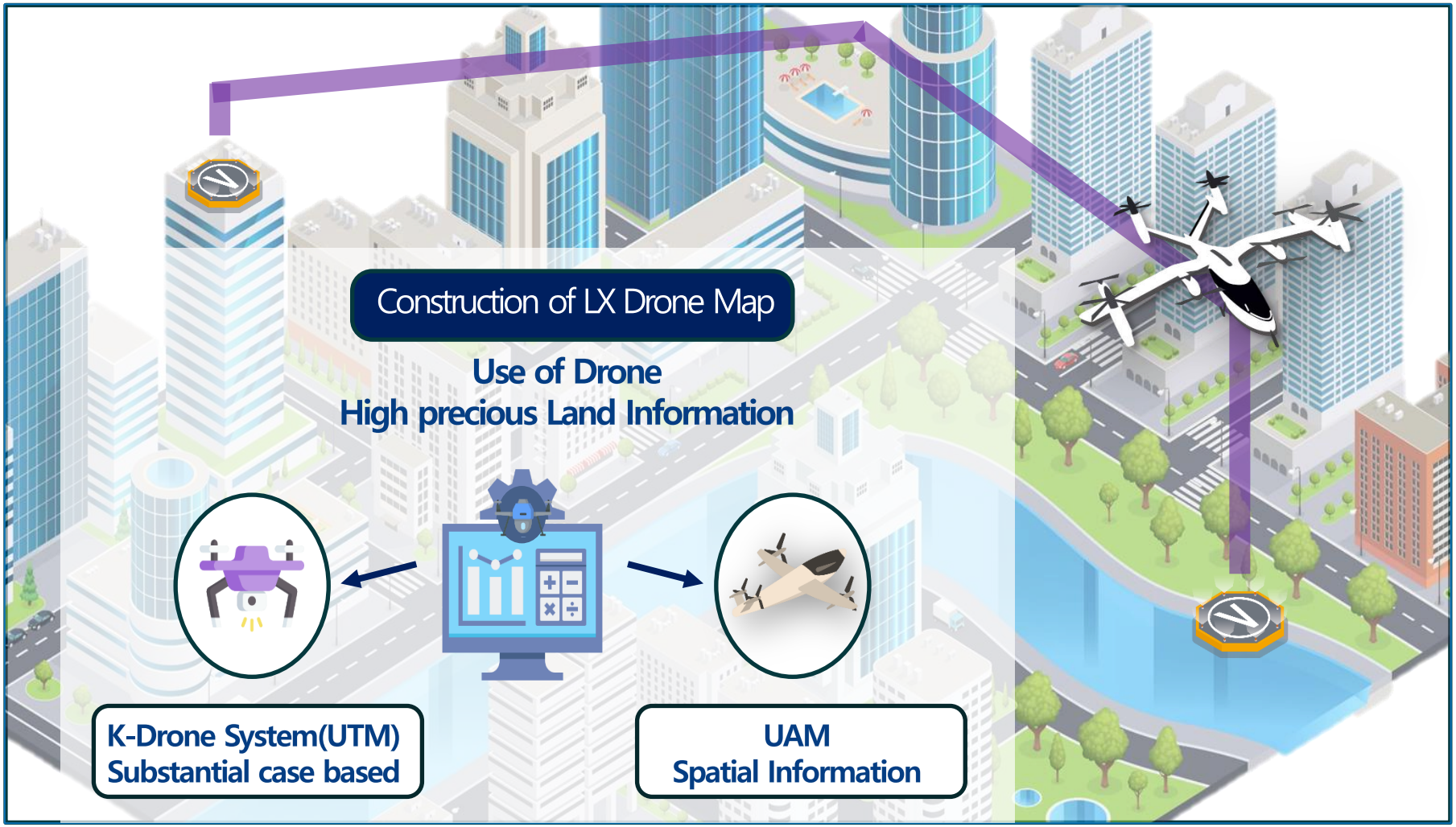
Airspace data



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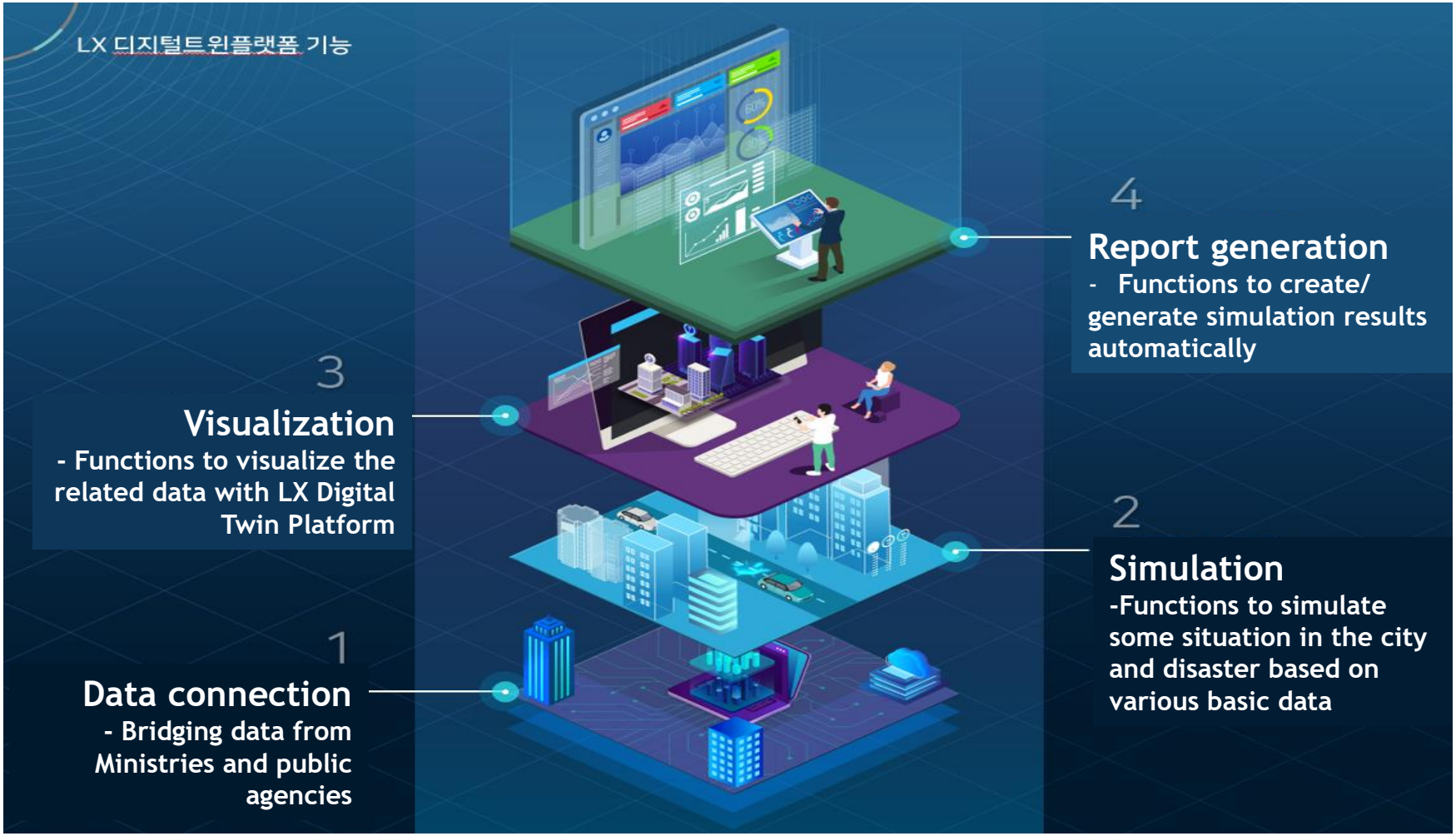
Functions of Platform



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Services

Administrative Support

Development of 3 Dimensional Services for working-level staff in the field

Building Modeling Automation & Administrative support for approval

Cultural property/Asset Mgtm. & 3D based simulation

Smart Infrastructure Management

- Efficient processing of administrative work
- Minimization of Human Error
- Efficient Budget utilization
- Improved Urban Infra Management

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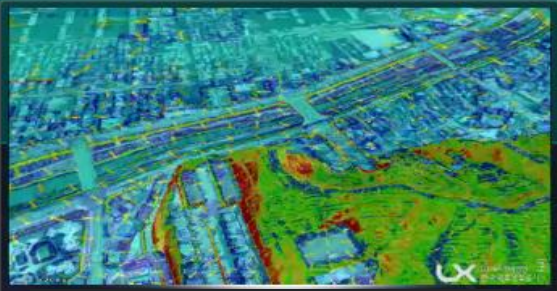
Services

Disaster response Service

Support of Decision Making/plans/extent of damage through data collection

Monitoring service for quality of water in river

Monitoring service for pollutants spread in complex



Disaster Simulation

- First response against Emergency
- Minimal risks of disaster
- Efficient planning for budget
- Prevention of disaster risks

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Services

Safe Life Service

3-dimensional service for safe use of public facilities

Digital Twin Building Monitoring Service

Navigation Service using AR for Indoor Spatial Information

Drone Simulation

- Minimization of spread of Infectious disease
- Provision of safe flight route
- Improvement of convenience for People's life
- Promotion of Bilateral Communication

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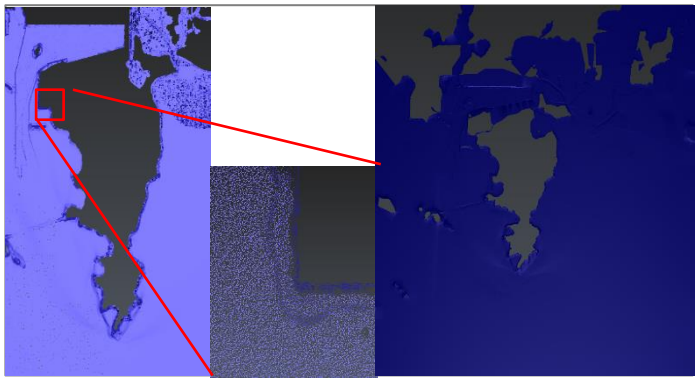
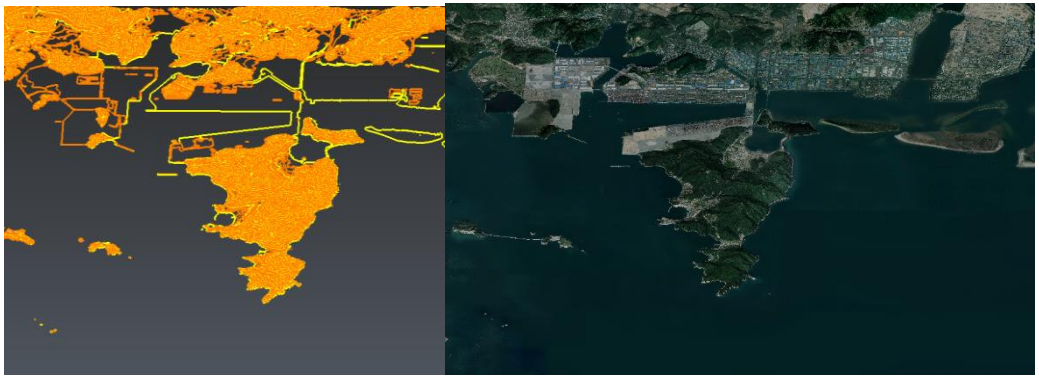
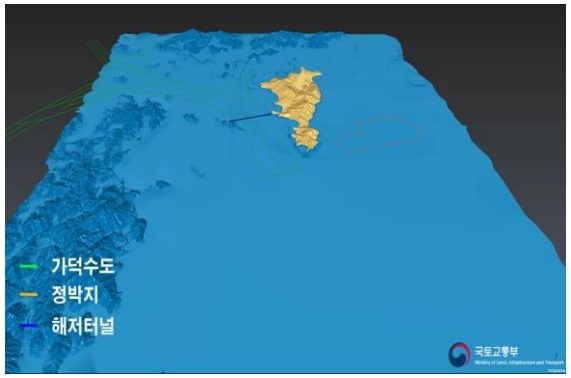
Services (for construction of Airport)



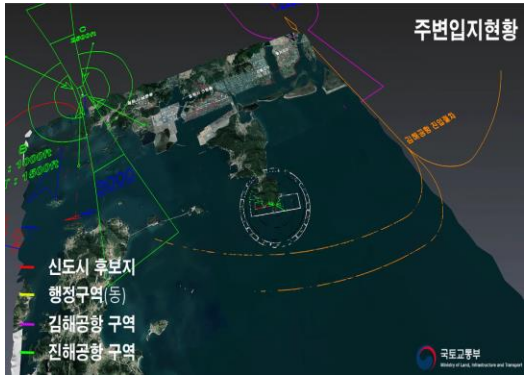
Creation of
submarine 3D topographic data



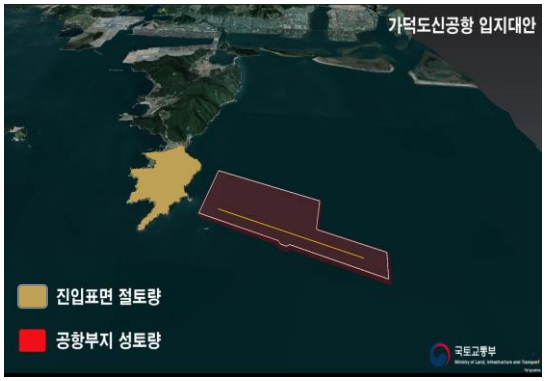
Creation of
3D topographic data



Location Analysis
around Airport



Location Analysis
around Airport



Earth-Volume
Calculation

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Services (for Industrial Complex)

Provision of 3D Data Infra for the core procedures and enterprises' main products

Technical Support & Streamlined work process

1st Phase	2nd Phase	3rd Phase	Total
16	47	27	90

Support of 3D modeling for product processing & main products

Construction of 3D based Indoor Geospatial Information

SW development to prevent wireless trespass

VR, AR, Metaverse Development of Contents to be promoted

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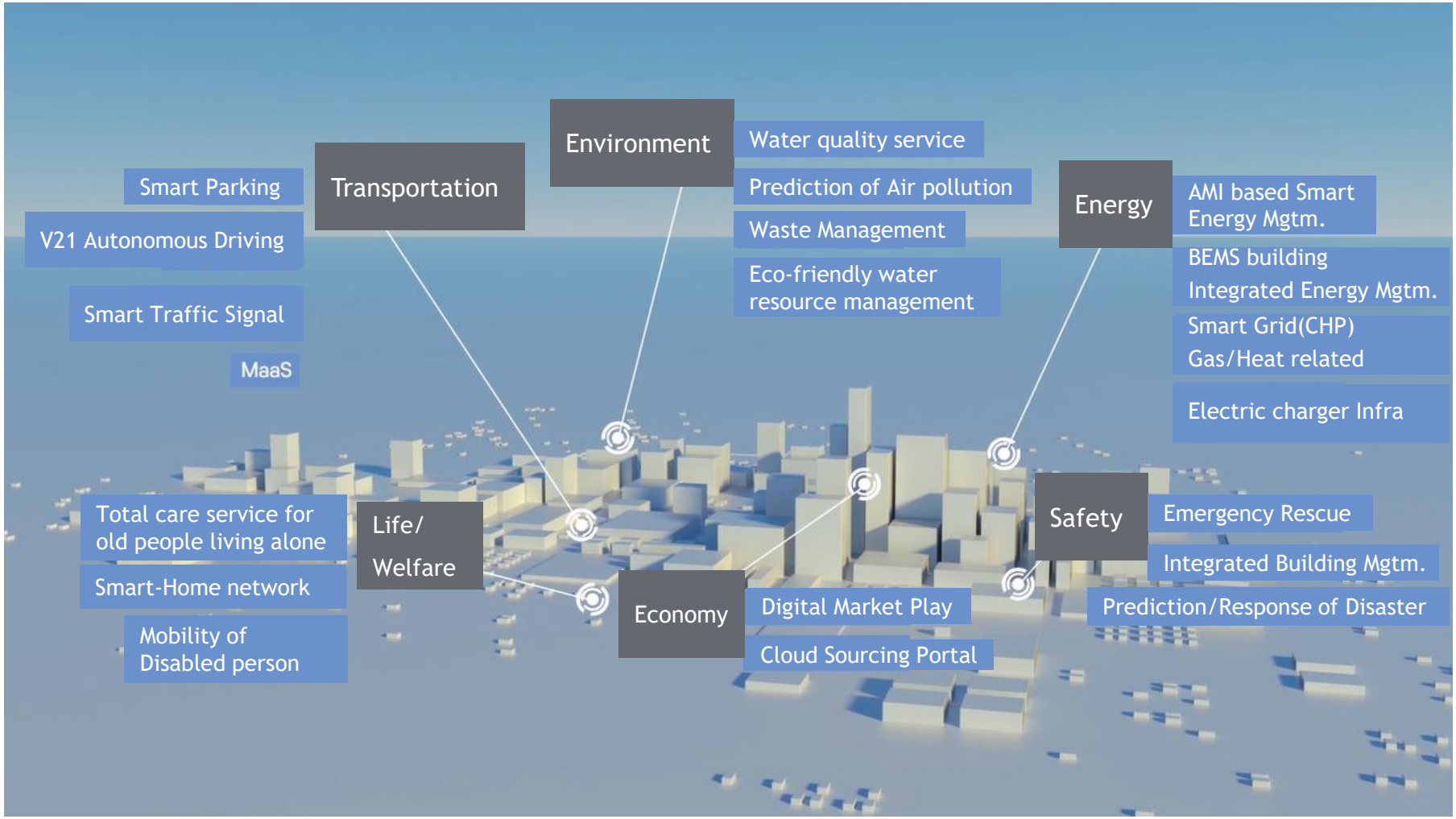
Services (future application field)



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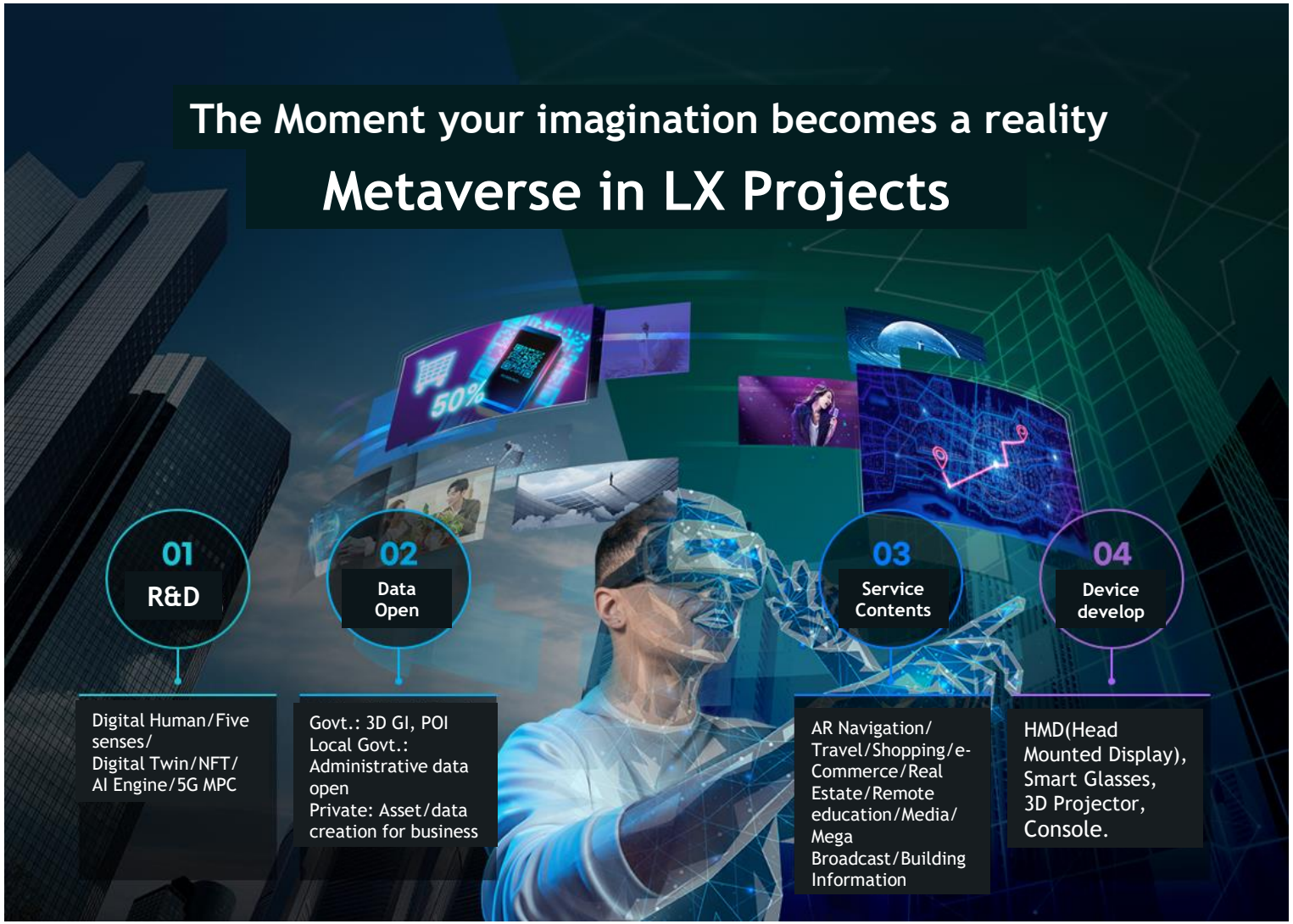
Services (Metaverse)



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The NEW CHAPTER…

Beyond conventional ways

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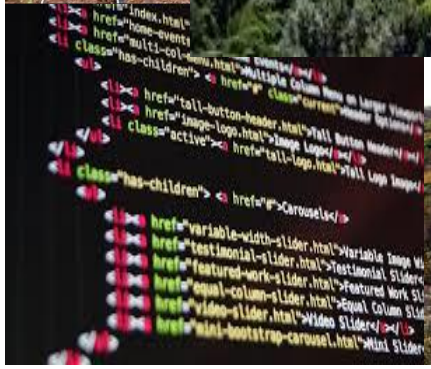
The Globe… Going forward, including all







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Why Korean cases spark interest?

[Brown-Bag Meeting in ADB, 2012]

- **Not Conceptual But Real**
  - everything happens in the real
- **Identification**
  - ICT-based geospatial information management
- **Government-led economic model**
  - strong central-govt. initiative
- **Emotional bond** and relatable sentiment in Asia
- **Goldilocks rule** (proper size)

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Further Collaboration btw LX and ADB

Why should WE cooperate with each other?

The latest technology	Public entity	Fit-for-Purpose
Geospatial experience from various successful cases in Korea	Not profit but sharing experience & Knowledge	Under the similar culture, exactly know what they need

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THANK YOU
감사합니다

Dr. CHOI, Songwook

Chief Executive Director for Spatial Information Division

ccsw4625@lx.or.kr

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