

# Introduction to LX Platform Configuration

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LX Digital Twin Dept.

Park Chung

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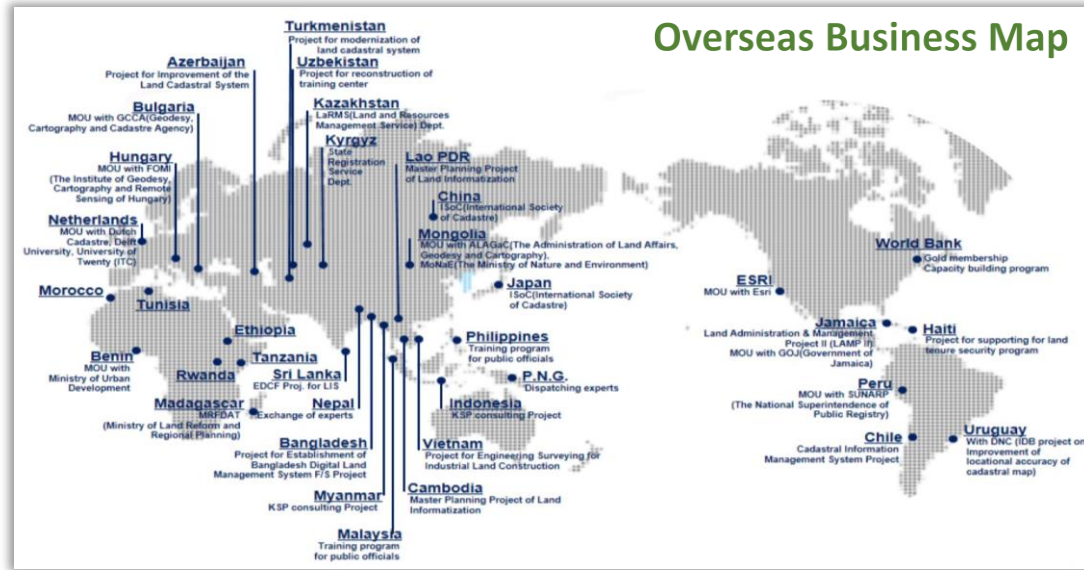
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# I. Overview

# Introduction of LX



Public Enterprise

## Under the MOLIT

\* MOLIT : Ministry of Land, Infrastructure and Transport

**Established in**

# 1977

**Num. of Employees**

# 4,611

**Organization**

# 167 offices

(nationwide)

### Main Business Areas

#### Geospatial Information

- Construction and Management of Geospatial Information
- Support for Development of Digital Twin Service based on LX Platform
- Geospatial Data Standards

#### Cadastral Survey

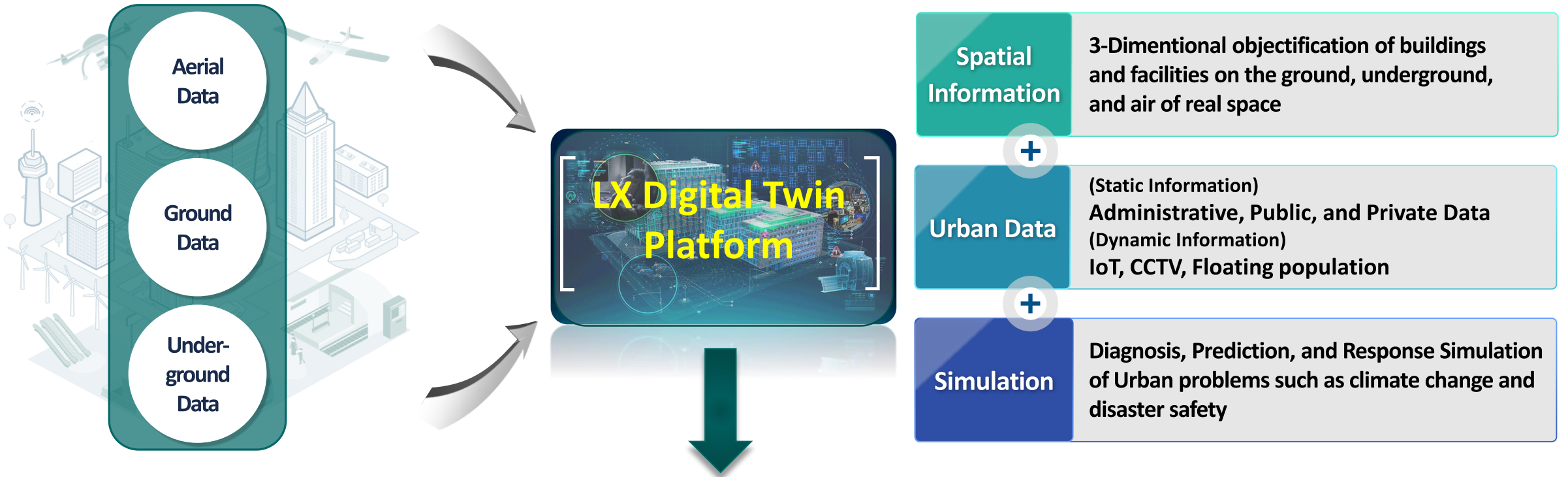
- Cadastral Status & Confirmation Survey
- Registration Conversion & Boundary Restoration Survey
- Division Survey and Up to date Land Information Service

#### R&D

- Research for the Development of the national Geospatial Information Industry
- Implementation of new GIS Technologies
- Overseas Business



# What is LX Platform?



**Provide digital twin service development environment (DevOps)**

<b>Safety</b> 	<b>Traffic</b> 	<b>Agriculture</b> 	<b>N-Defense</b> 	<b>Construct</b> 	<b>Engineering</b> 	<b>Environment</b> 	<b>SOC</b> 
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# Why LX Platform?

The LX Platform is a public platform in Korea that provides various digital twin services to multiple cities and has infinite scalability

## Verified



Designated as a Public Platform by the Korea Government



LX Platform's Digital Twin Service is being used in many cities in Korea

Verified Digital Twin Platform

## Various



It provides various basic function and common services



Digital Twin Service development is easy with Micro Service Architecture

Various Platform Services

## Expandable



Platform expansion is easy by applying a DevOps environment



Development and maintenance costs are low due to open source application

Easy Expansion

## Powerful



It is possible to load and visualize various geospatial data



It is possible to configure 2D, 3D and user-customized map environment

Powerful Platform Service

# LX Platform Architecture

## LX Platform

### Platform Services (MSA)

- Providing DT General Features
- City Planning, Building Code Violation, Flood Simulation, City Monitoring, etc
- Integration with National GIS data layers
- Providing Additional Feature

I/F

#### National GIS System

- WMS, WMTS Layer Interface
- Open Map Interface
- GEO Coding
- Spatial Analysis

#### DT Platform Back-End

- 3D Visualization
- 3D Analysis
- 3D Data Control
- Simulation Core

#### Management System

##### Access & Map Management

- User ID & Password Management
- Digital Twin Map Layer Control

##### Service Management

- Micro Service Management
- Customized Service Deployment
- Service Data Connection

##### Portal Management

- Grant User Permission
- Group Management
- Platform Data Access Control

##### Data Management

- Integrated Data Management
- External Data Connection & Loading
- Integrated Data Deployment Management

#### DevOps

##### Development

Configuration Management      CI-CD

Test & QA      Developer Community

Framework      Deployment

##### Operation

Monitoring      JOB

Process      Logging

Back Up      Asset Management

#### Infra Management

Physical Server

Storage

Network Segmentation & Connection

DAC, SAC

Infra Security

Disaster Recovery

#### Cloud Management

Life Cycle

Automation

Resource Optimization

Service Request

Cloud Security

Provisioning

#### Infra

Bare Metal (WAS, DB)

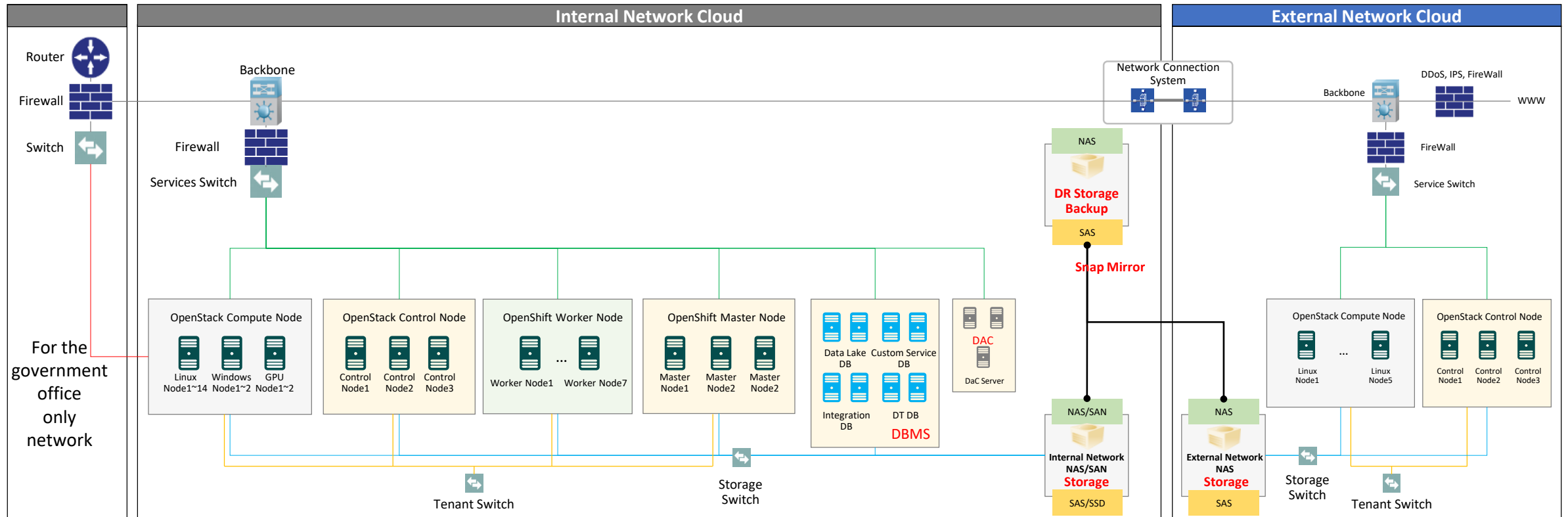
Cloud IaaS

Cloud PaaS

## II. Infrastructure



# LX Platform Architecture (Network/Sec/Storage/DR/Access Control)



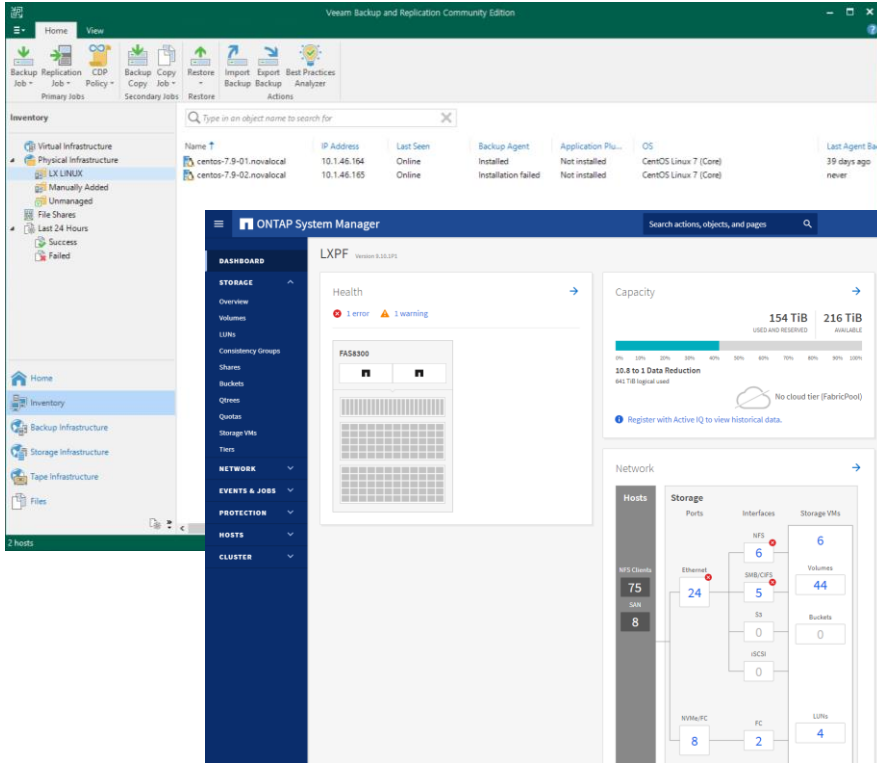
## Infra Management

## Cloud Management

DBMS	Storage	Network Segmentation & Connection
DAC, SAC	Infra Security	Disaster Recovery

Life Cycle	Automation	Resource Optimization
Service Request	Cloud Security	Provisioning

# LX Platform Architecture (Storage Management/DR Snapmirror/Backup Recovery)



Veeam

NetAPP Storage



DBMS

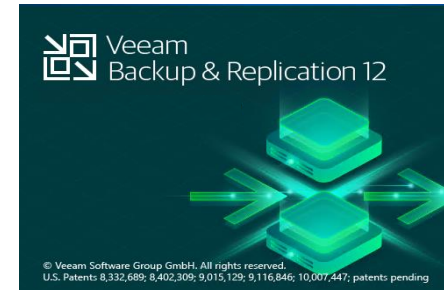


VM

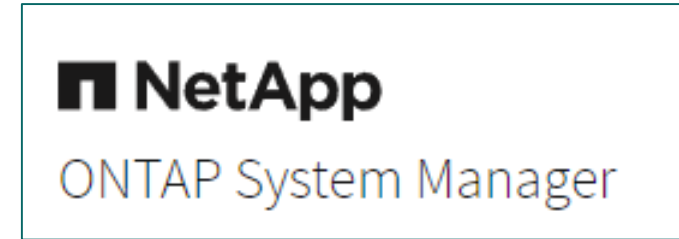


POD

Backup Recovery  
(POD: kasten '24 y Expected)



OPR - DR Backup Storage : Snapmirror



## Infra Management

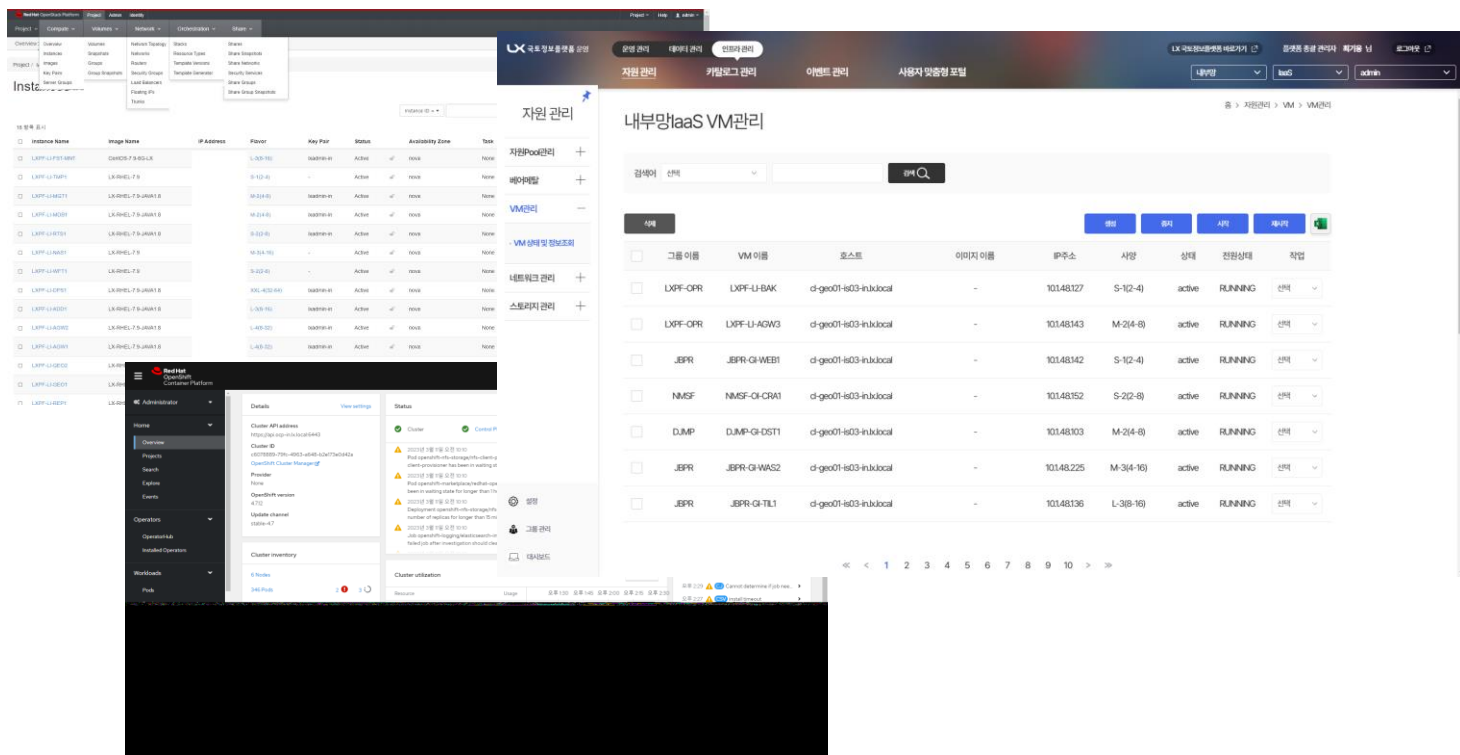
## Cloud Management

DBMS	Storage	Network Segmentation & Connection
DAC, SAC	Infra Security	Disaster Recovery

Life Cycle	Automation	Resource Optimization
Service Request	Cloud Security	Provisioning

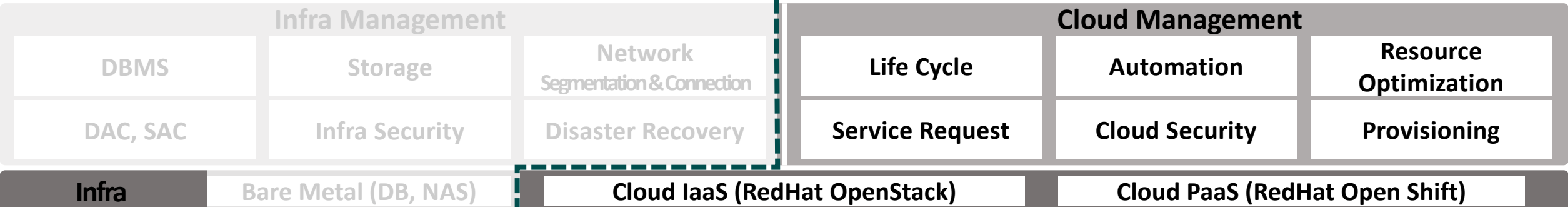
Infra      Bare Metal (DB, NAS)      Cloud IaaS (RedHat OpenStack)      Cloud PaaS (RedHat Open Shift)

# LX Platform Architecture (Cloud Management)



OSP – OCP  
 Integrated Management

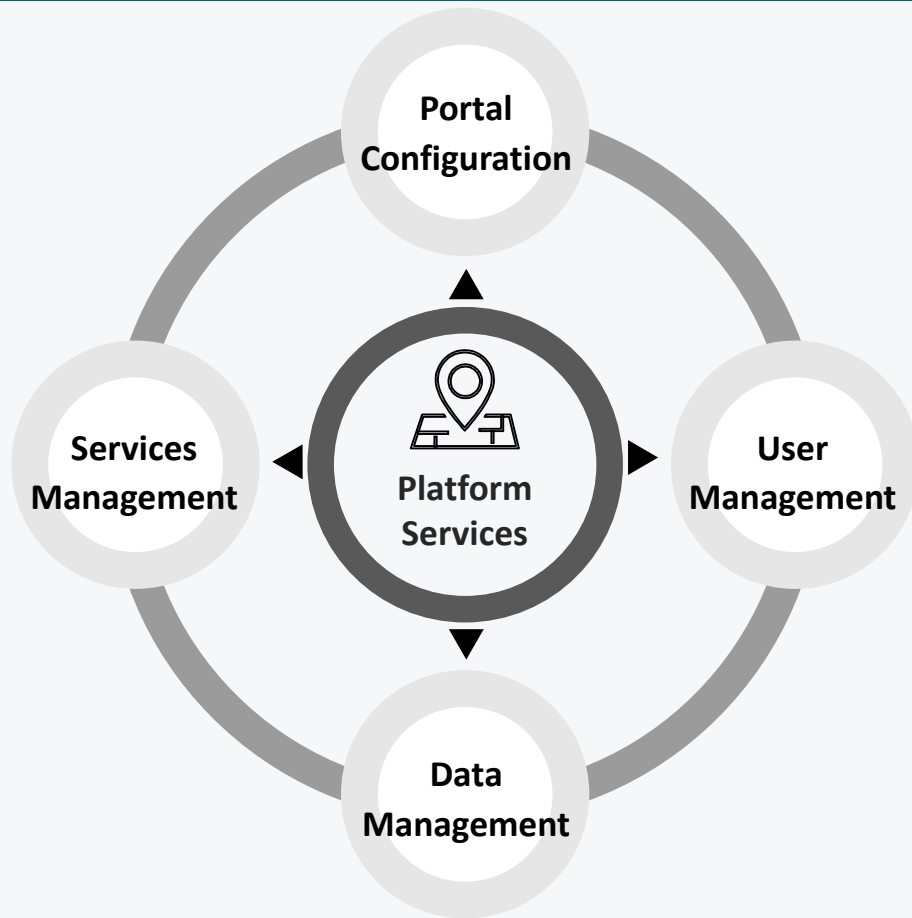
1. Flavor(size)
2. Load Balancer
3. Firewall
4. Account
5. Orchestration(Scale Out)
6. PaaS Gateway
7. Etc.



## **III. Management Systems**

# LX Platform Management Systems

“LX Platform's various and powerful **Management Systems** helps you manage platform efficiently.”



## Integration

- Maximizing operational efficiency through integrated environments
- Enhancing productivity and resource utilization by integrating distributed systems and data

## Scalability

- Developed with Micro-Services Architecture for easy scalability
- Utilize features developed using open source for diverse service development

## Automation

- Supporting automation systems from development to deployment
- Automating repetitive system management tasks to reduce operational burdens

## Customization

- Customized service for users is possible
- Enhance security through user-specific policies

# Portal Configuration

## Portal Configuration

### User Management

### Services Management

### Data Management

## Features

### 1. Dashboard.

You can freely customize your dashboard.

### 2. Design Template.

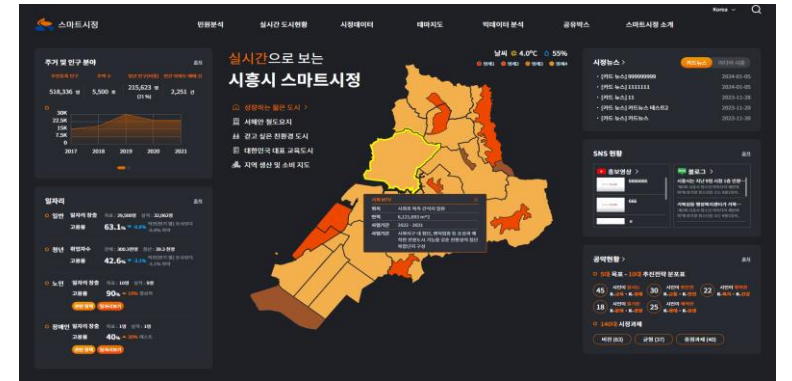
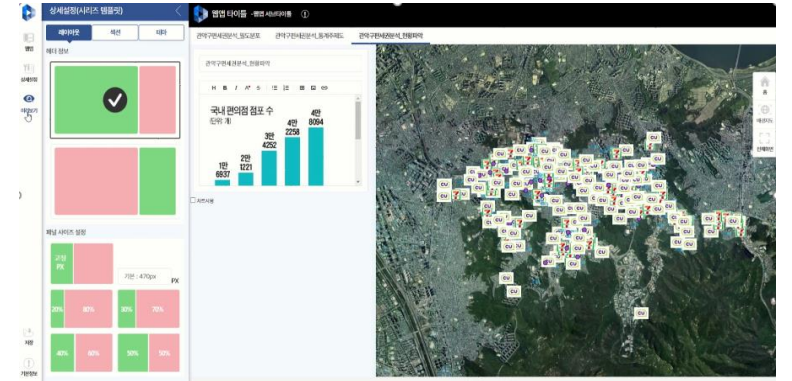
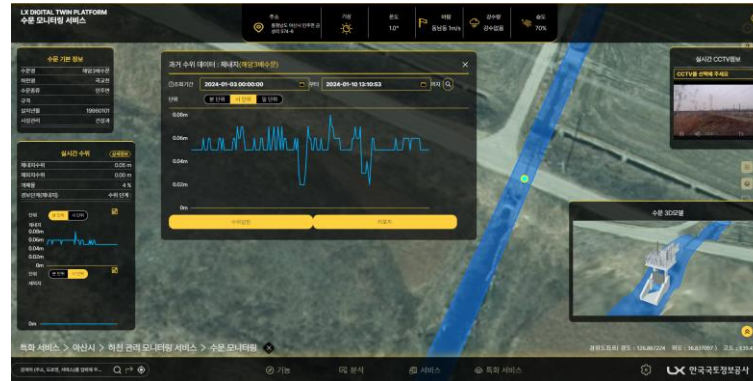
Provide a variety of design templates.

### 3. Menu Configuration.

By linking with the user management system, you can configure menus for each user.

### 4. Custom Pages

You can create your own page by connecting with services.



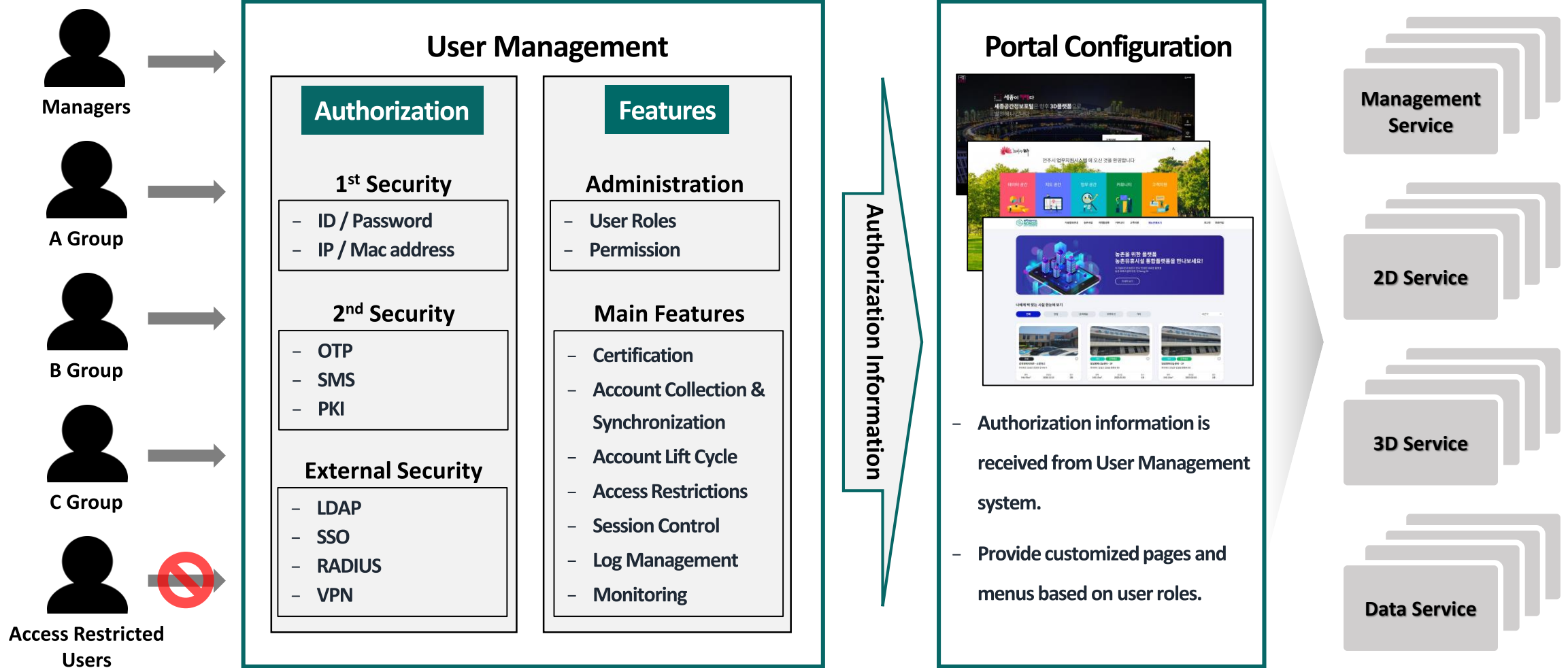
# User Management

Portal Configuration

User Management

Services Management

Data Management



# Services Management

Portal Configuration

User Management

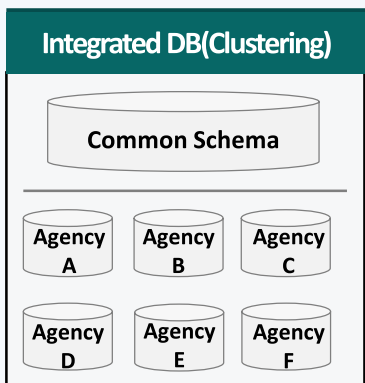
Services Management

Data Management

Provides Service APIs to users and developers.

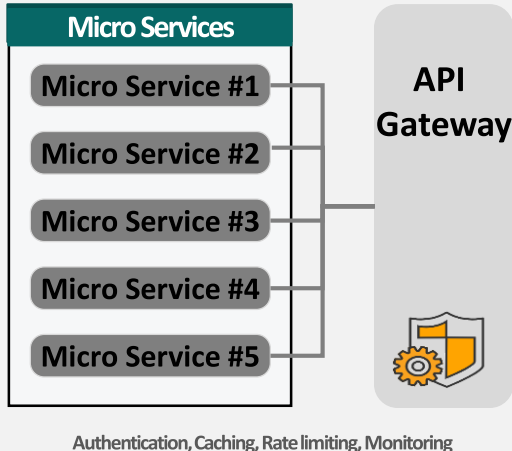
Management

### Platform Data Sector



Read  
Write

### Data API(Back-End)



Request  
Response

### Services Development



- New service development
- Service advancement

### Platform Services(Front-End)

#### General Features



#### Analysis



#### Planning



#### Monitoring



#### Simulation



#### ETC



Request  
Response



# Data Management System

Portal Configuration

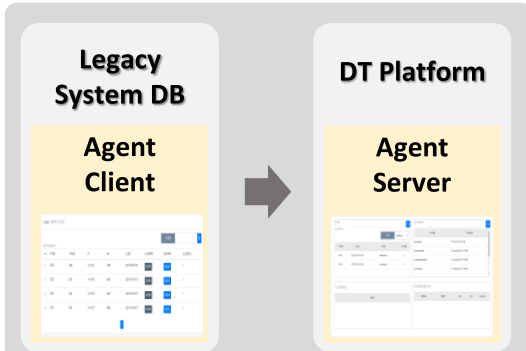
User Management

Services Management

**Data Management**

**Data Linkage**

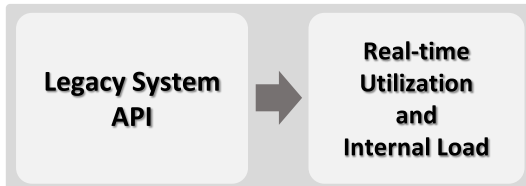
• Data Agent



☞ External data collection and processing solution

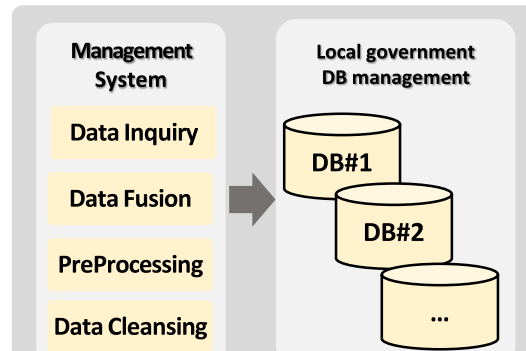
- Schedule Management
- Batch Processing
- Update
- Data Filter
- DB2DB
- File2File

• Open API



**Data List Management**

• Loading Management



☞ By local government DB creation and management

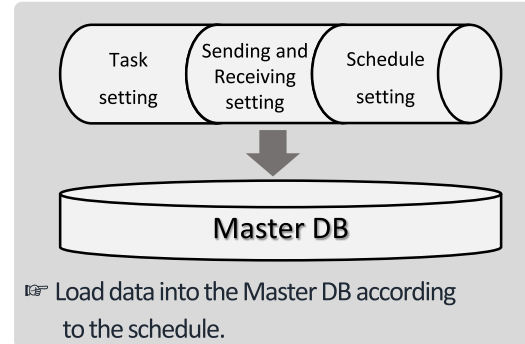
• Geometry Operation

- Geo Area
- Geo Contains
- Geo Distance
- Geo Within

☞ DB Processing and Loading

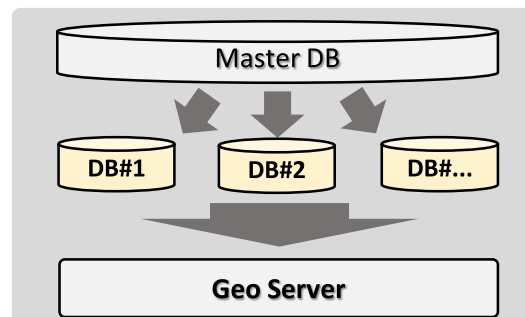
**Task Management**

• Task and Schedule Management



☞ Load data into the Master DB according to the schedule.

• Data distribution and Publish



☞ Publish data to GeoServer

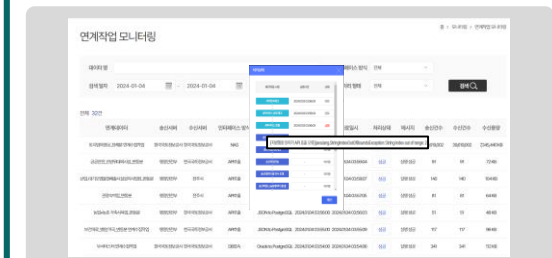
**Monitoring**

• Dash Board



☞ Displaying the status of data retention, integration, and distribution

• Task Monitoring



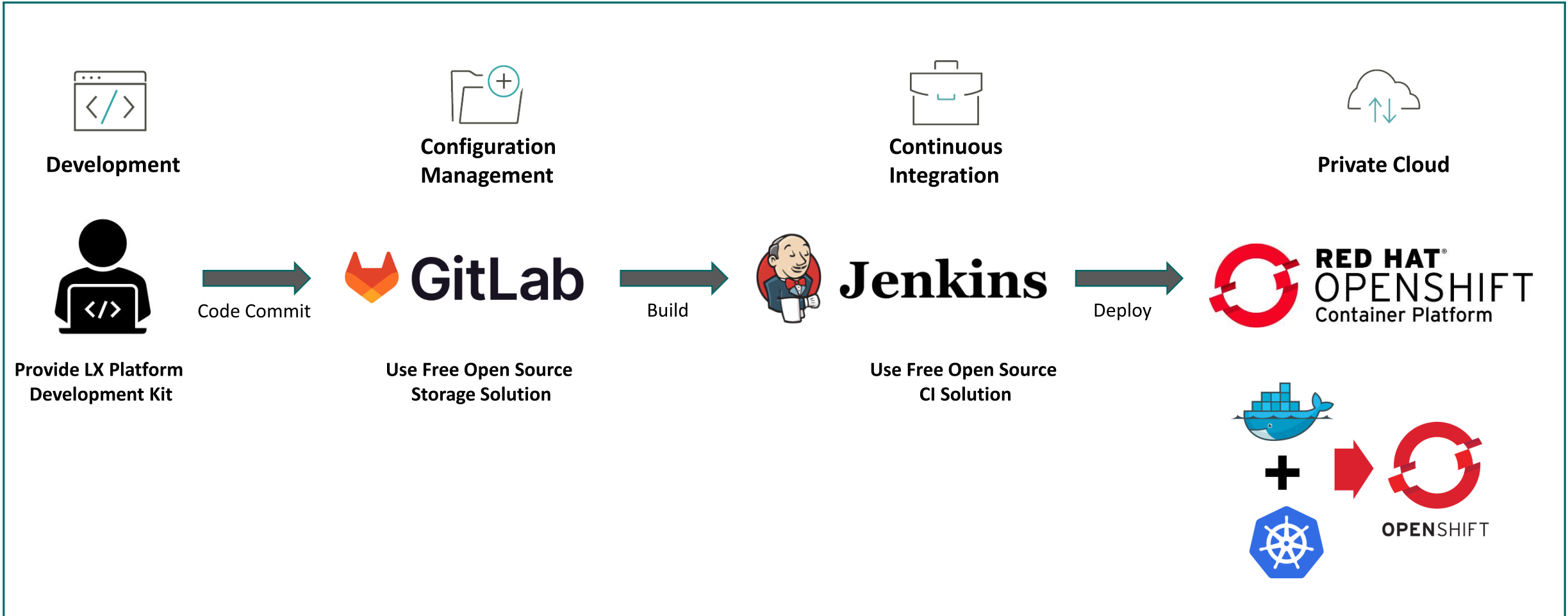
☞ Monitoring task status

- Task details
- Task Status
- Log

## **IV. DevOps Environment**

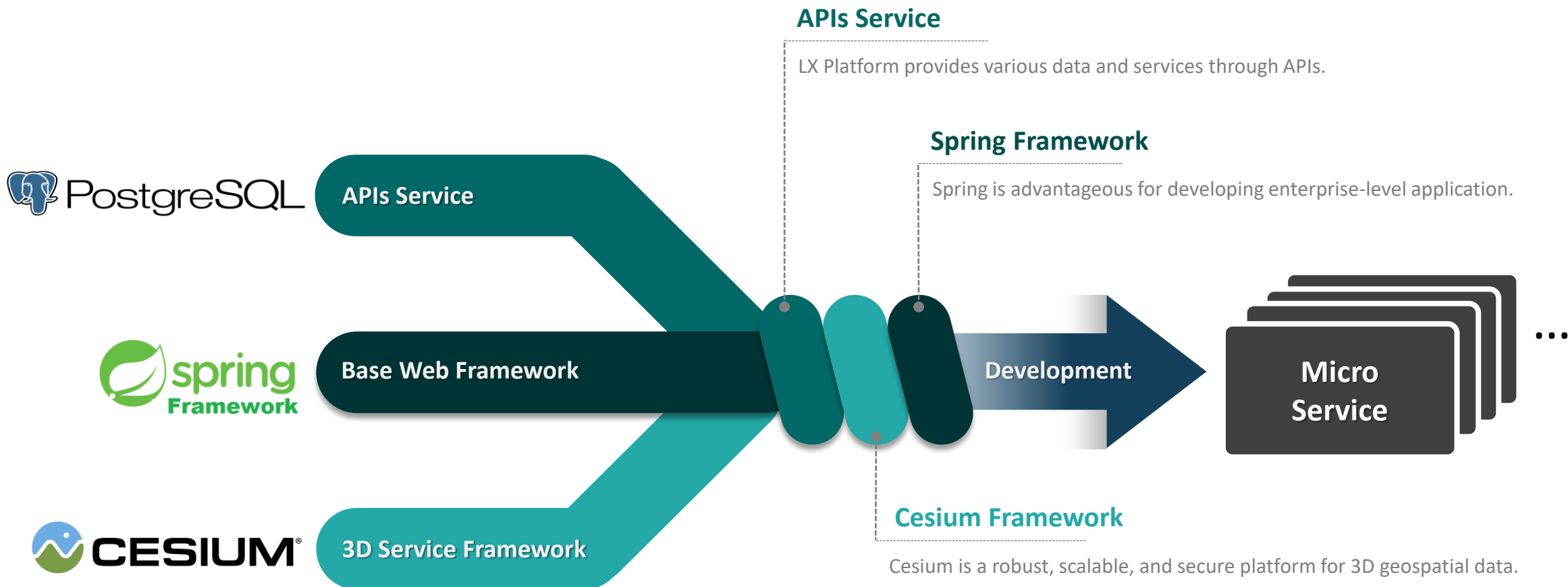
# LX Platform DevOps Pipeline

“LX Platform DevOps pipelines are designed to be general purpose!!”

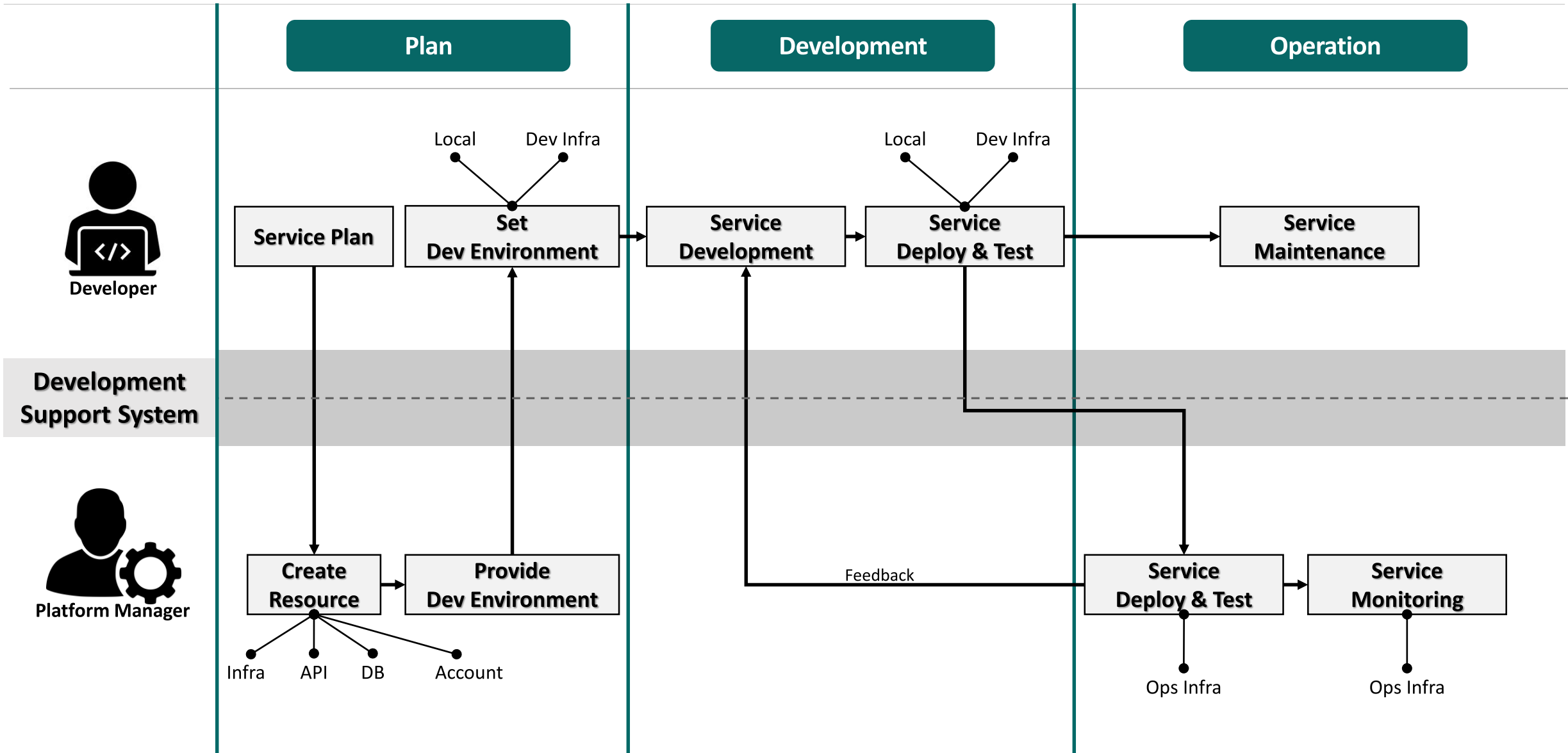


# LX Platform Development Kit

“We provide a development environment optimized for LX Platform.”



# LX Platform Service Development Process



## **IV. Main Features and Service of The LX Platform**

# Features and Services of the LX Platform



The LX Platform has variety of services to support efficient city management

Common Functions			Analysis Functions			General Services			Specialized Services		
Search	Finding a way	Full Screen	Terrain Section Analysis	Soil volume Analysis	Analysis of Gradient	Shielding Rate Analysis	Inquiry of disaster information		Management of pre-examination claims	Monitoring hydrological Information	Review licensing history
2D/3D Switch	LOD1 On/Off	snapping	Shading Analysis	Slope direction Analysis	Lateral section Analysis	Urban Forest Simulation	Estimated occupancy fee calculation		Authorization ledger management	Monitoring the Shape Change of a River	Simulation of parking facilities
Time	Display Information	Screen zoom				Tree Planting					
3D tiles Display control	Background map	Display Building properties	View right Analysis	Analysis of the mean number of floors	Terrain Section Analysis	Air Quality Inquiry	Management of state-owned property parcels		Facility management	Parcel division	Review of Location Plan
Virtual Weather	Layer Management	Shading	Lateral section Analysis	Analysis of the visual field	Skyline Analysis	Search for cultural properties	Wind Road Analysis	Noise Pollution Analysis	Inquiry of underground facilities	CCTV Visibility Analysis	Noise Information Monitoring
	Select a map	Setting									

# Feature & Usecase (summary)





# Introduction to Digital Twin Services of LX Platform

City Improvement

Disaster Management

Improving Urban Environment

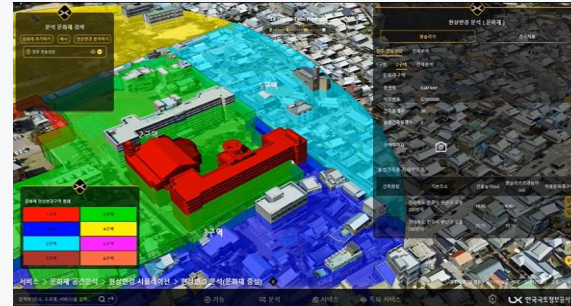
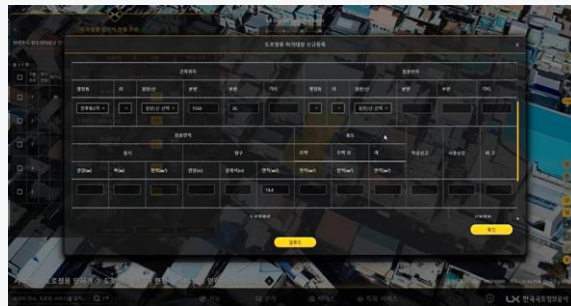
## Efficient decision making support for optimal urban management

### Building Permit Support

### Road Occupancy Permit Support

### Cultural Heritage Protection

### Facility Management



Building Permit Status Inquiry  
and Simulation

Road Use Permit Inquiry and  
Prohibited Section Management

Review of Cultural Heritage Areas  
and Analysis of Visibility

Facility Installation Simulation and  
3D Model Management

Data-Based Administrative  
Decision-Making Support

Efficient Management of  
City Data Using

Digital Twin Simulation for  
Cultural Property Protection

3D-Based Urban Facility  
Management

# Introduction to Digital Twin Services of LX Platform

City Improvement

Disaster Management

Improving Urban Environment

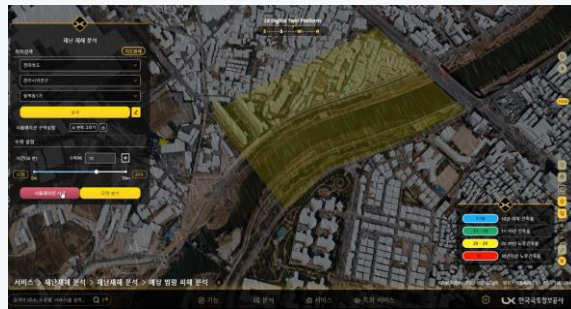
## Digital twin service for proactive response and management of disaster situations

### River Monitoring



Real-Time River Level Monitoring

### Flood Damage Analysis



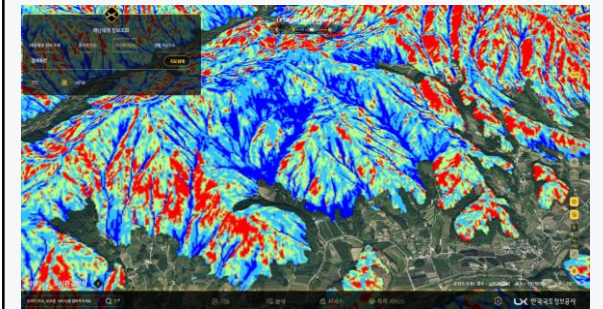
Analysis of Expected River Flooding Areas

### Emergency Evacuation Simulation



Emergency Evacuation Facility Management and Simulation

### Integrated Disaster Information



Check Typhoon Occurrence Information and Landslide Risk

Real-Time National Disaster Situation Monitoring

Preemptive Response Through Digital Twin Simulation

Minimize Disaster Damage and Supporting Recovery

Support for Integrated Management of Disaster Data

# Introduction to Digital Twin Services of LX Platform

City Improvement

Disaster Management

Improving Urban Environment

## Digital twin service to improve the quality of human life and revitalize the city economy

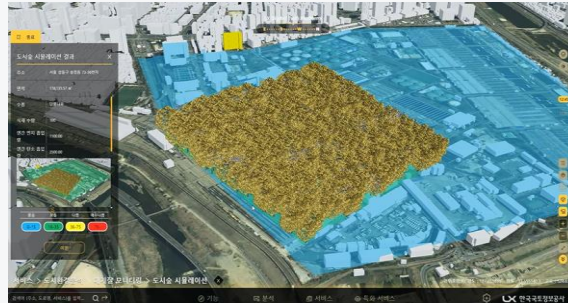
### Wind Simulation



3D-Based Urban Wind Analysis and Simulation

Analysis of Urban Air Flow through Wind Simulation

### Forest Creation Simulation



Analysis of the Impact of Urban Forest Creation

Policy Decision-Making to Improve Urban Air Environment

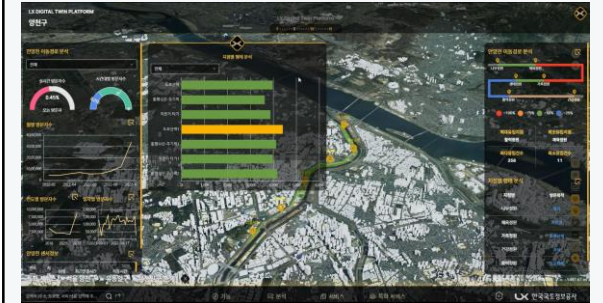
### Shade Analysis



Shading Analysis According to Terrain and Features

Residential Environment Impact Analysis According to Urban Planning

### Policy Formulation Support



Establish Policies Based on Real-Time Population Movement Information

Support for Data-Based Urban Economic Revitalization Policies

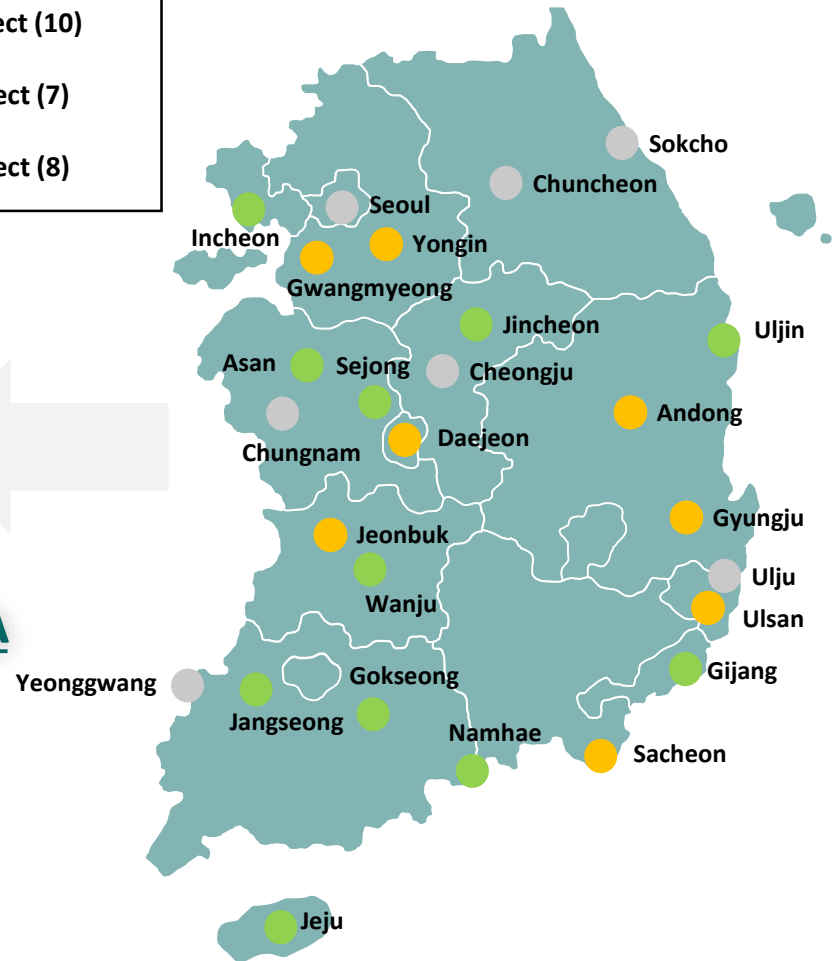
# Introduction to Digital Twin Services of LX Platform

## LX Platform has provided Digital Twin services in 25 Local Government in Korea since 2021

- `21~ Project (10)
- `22~ Project (7)
- `23~ Project (8)



**Kingdom of SAUDI ARABIA**



Local Government	Main Category
Asan	River Management
Jincheon	Administration Service
Ulju	Disaster management Service
Jeju	Environmental Impact Assessment Service
Gijang	Traffic Simulation
Wanju	Parking lot installation Simulation
Gokseong	Facility Management Service
Namhae	Floating population monitoring Service
Sejong	Integrated City planning information
Chungnam	Cultural Heritage Management Service
Jeonbuk	Improvement of Vacnt homes in rural areas
Andong	Drinking Water managing Service
Daejeon	Underground Facilities Management
...	...

## **V. LX Platform Demonstration**

**End of Document**