



Smart City Data Hub for Data-centric Smart Cities

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Smart City Data Hub for Data-centric Smart Cities

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Smart City Data Hub for Data-centric Smart Cities

Smart City and Data

- _Smart City Concepts and Perspectives
- _Data-centric Smart City
- _National Strategic Smart City Program



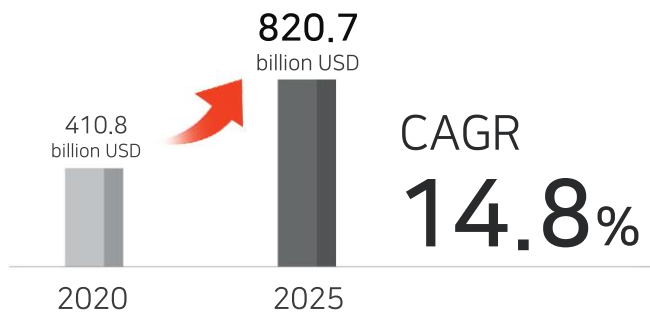
Smart City Concepts and Perspectives

✔ Definition of Smart City

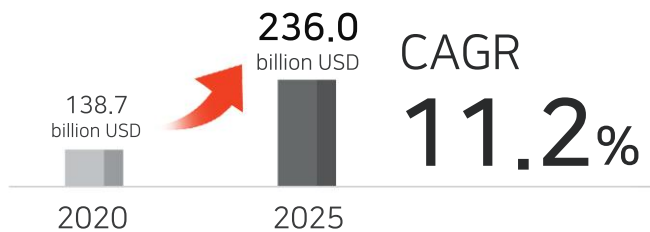
- ▶ Digital network cities pursuing bi-directional data flows on city infrastructures (e.g. transport, water, energy) with ICT technologies to enhance urban administration and citizen life qualities

[Source: National Strategic Smart City Program]

Smart City Market Growth



Platform Market Growth



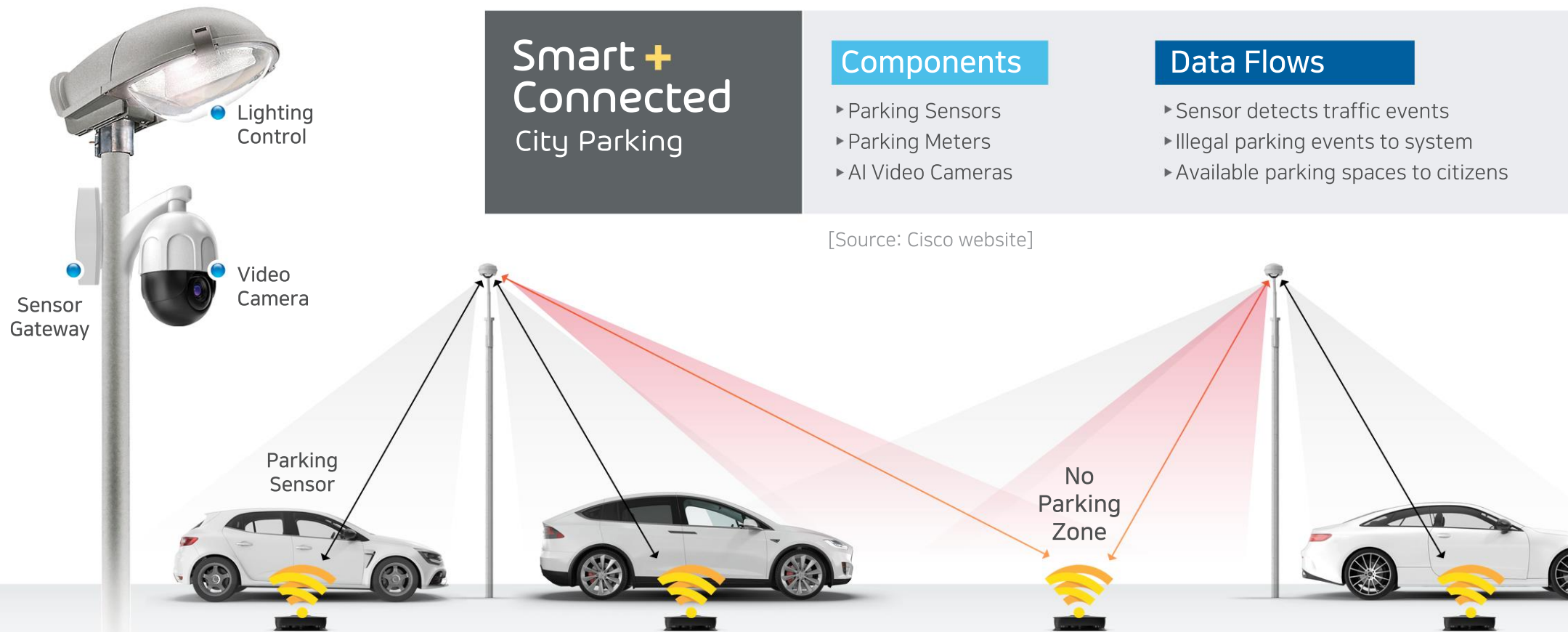
[Source: Markets and Markets, '19]





Data-centric Smart City

- ✓ Data all around the city needs to be utilized to solve different and complex city problems
- ✓ Parking sensor and camera data has been used by Smart+Connected City Parking in Barcelona
 - * Real-time parking information to citizens significantly eased illegal parking and lowered traffic congestion



National Strategic Smart City Program

- ✓ Data-centric smart city implementation and verification in Daegu and Siheung with smart city data hub core technologies



Smart City Data Hub for Data-centric Smart Cities

Smart City Data Hub

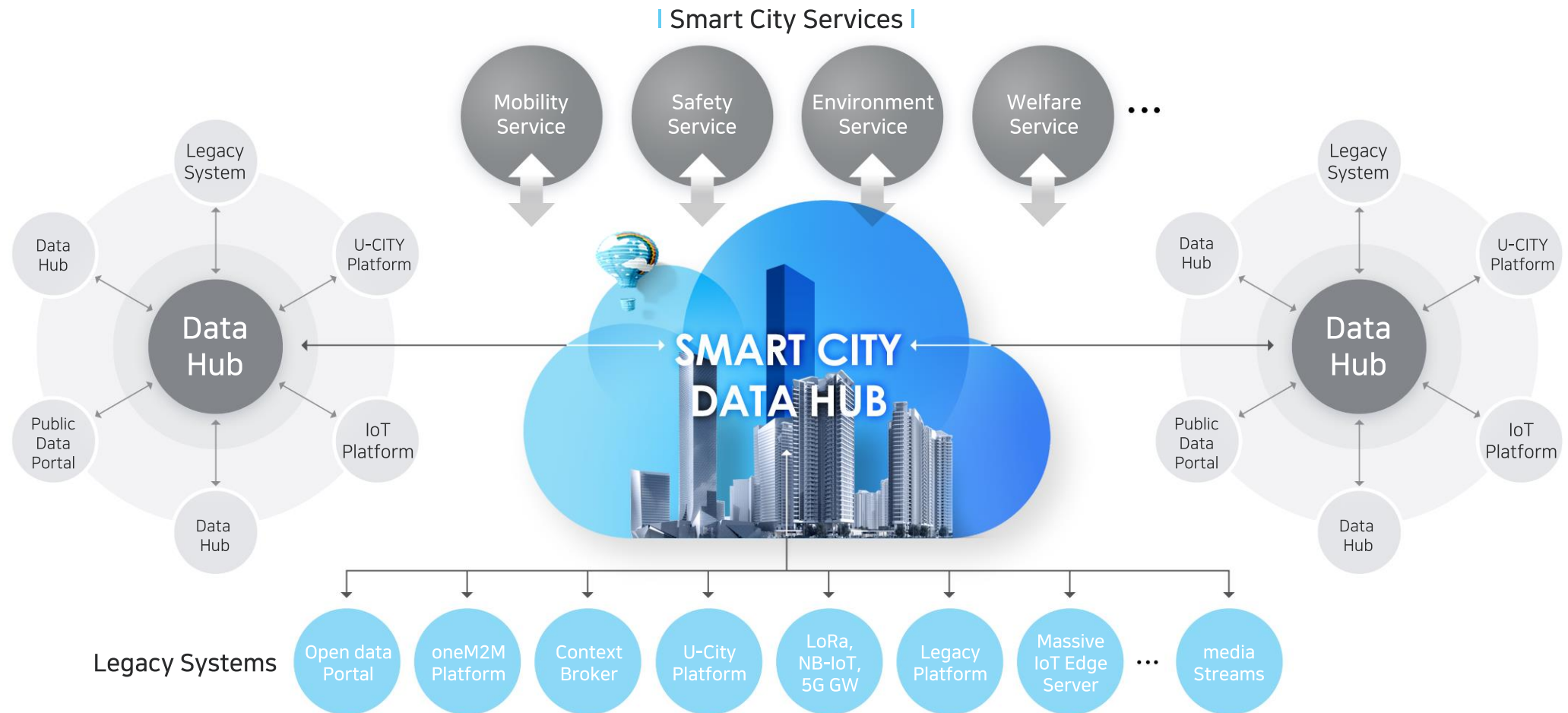
- _Concept
- _City Data Utilization
- _Data Hub Features
- _Data Hub Architecture



Concept

✓ Smart City Data Hub

- ▶ A data platform that manages large volume of heterogeneous city data for data-centric smart cities
- ▶ Create new business and services to sustain city growth and life quality enhancement

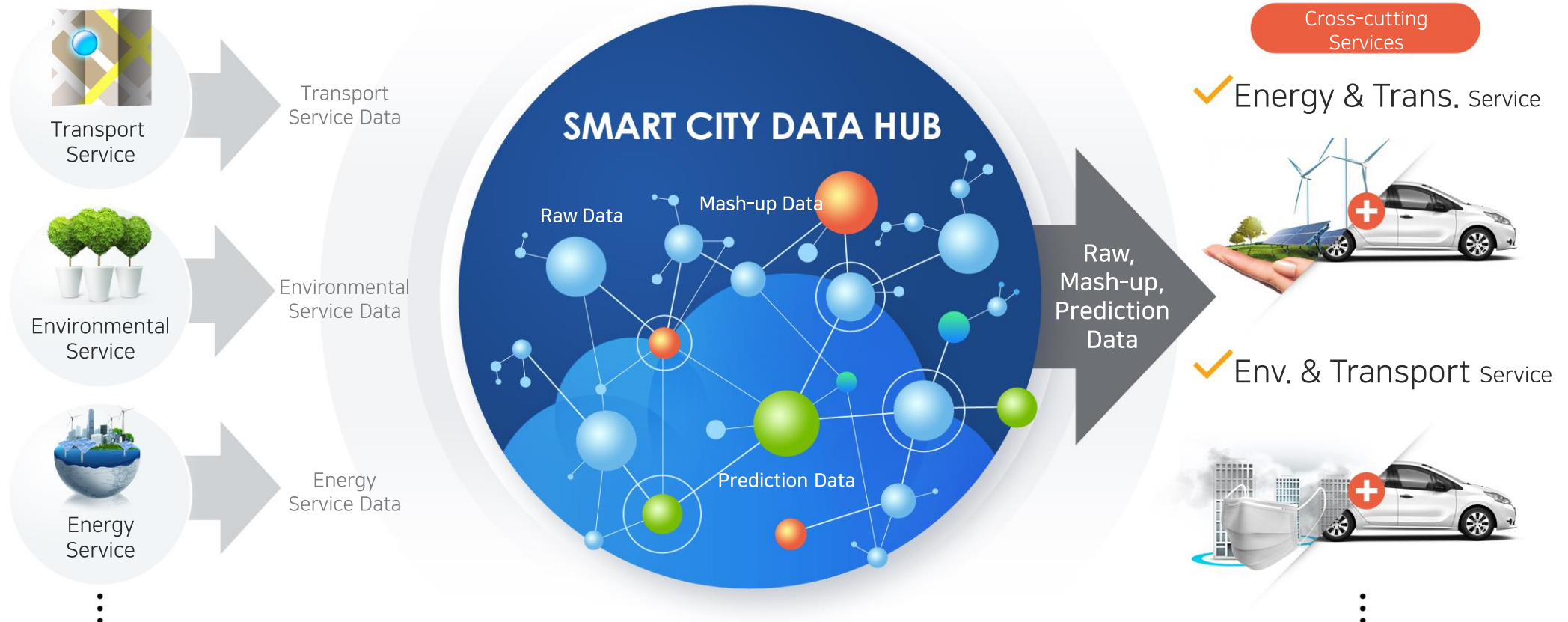


City Data Utilization

✓ Data interoperability with ETSI NGSI-LD standard APIs and common data models

✓ Serving smart city applications raw, mash-up and prediction data with AI

* Manage linked data from distributed and heterogeneous city data involving different domains



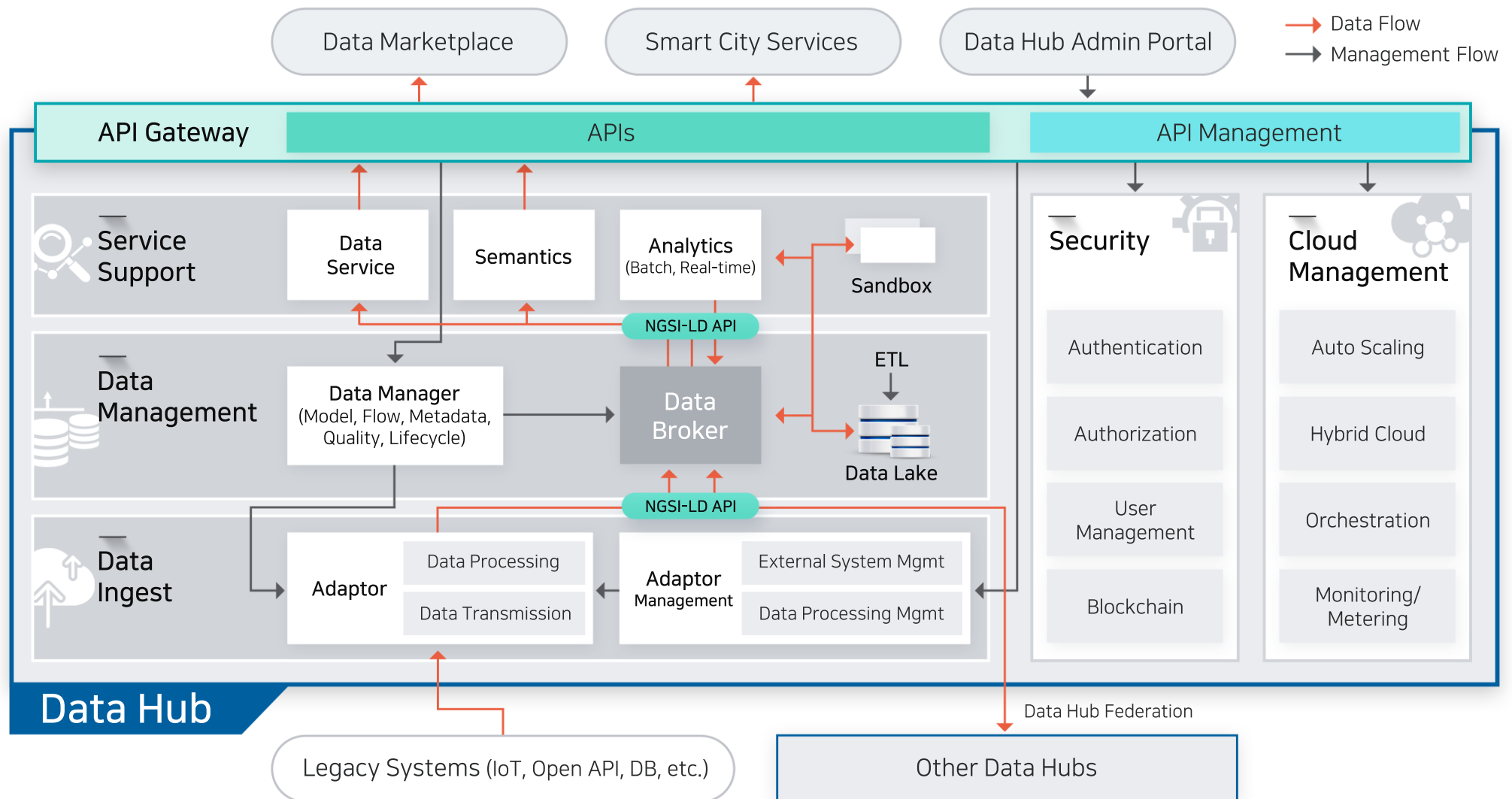
Data Hub Features

✓ Integration and utilization of distributed city data on hybrid cloud infrastructure



Data Hub Architecture

✓ Architecture and interfaces to collect, process, analyze, serve and manage data



Smart City Data Hub for Data-centric Smart Cities

City Data Hub

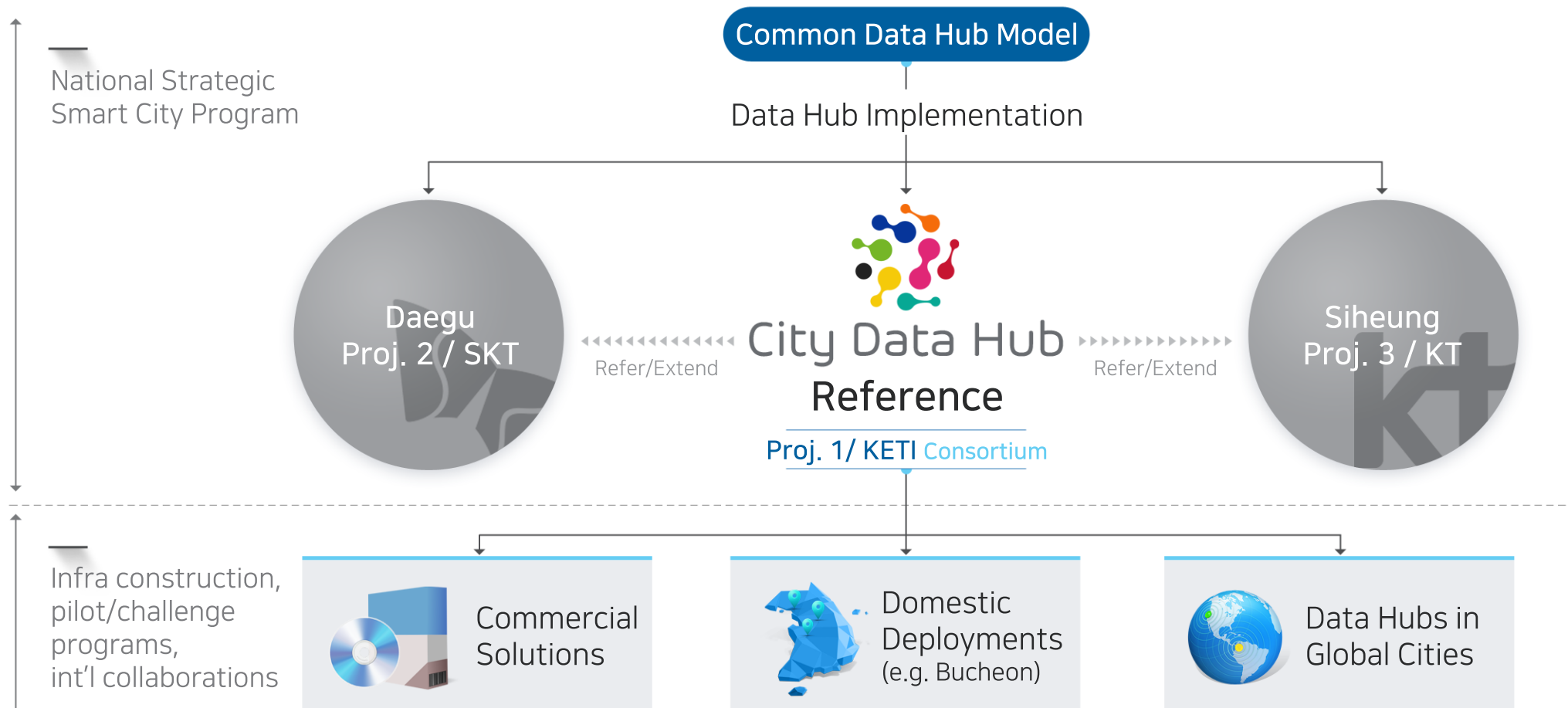
- _Concepts
- _Extended Features
- _Open Source Community



Concepts

City Data Hub

- ▶ Smart City Data Hub reference implementation from KETI consortium in the National Strategic Smart City Program
- ▶ Specifications of architecture, interfaces, protocols, data models and corresponding open source S/W



Extended Features

- ✓ Extension from Smart City Data Hub for usability and extensibility

External Data Integration

- Web-based data management tools to easily import legacy data and integrate data streams



Data Storage Extension

- Addition of new big data storages made easy thanks to the architecture and interfaces



Visualization and Tools

- Data dashboard for users and data monitoring tools for S/W developers



AI Data Analytics

- Embedded data analytics processes, train data and analytics results from ML models are provided to smart city services

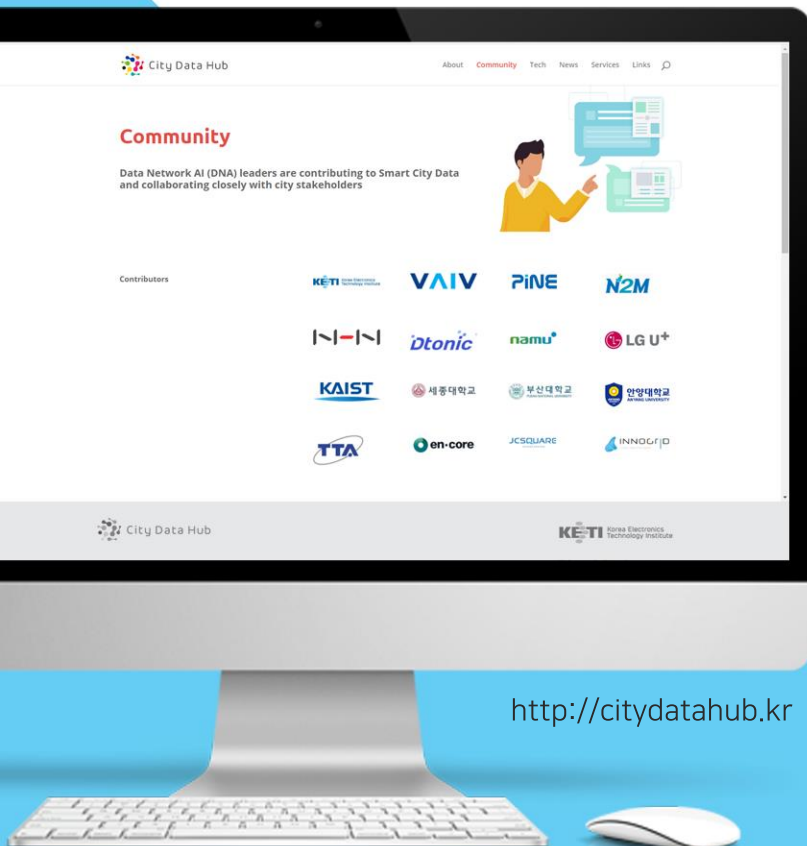


Open Source Community

Developer community website for sustainability of Smart City Data Hub

* KETI has been leading OCEAN open source community contributing standard-based open source IoT platform since 2015 ('Over 1,000 organizations/users until 2021)

City Data Hub specifications and open source S/W



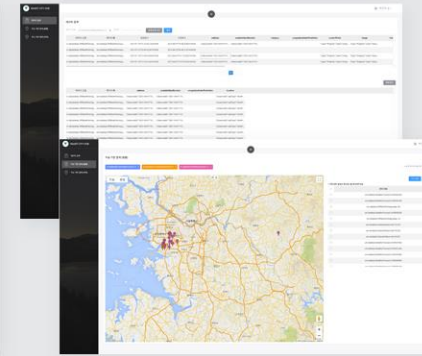
<http://citydatahub.kr>

Open Sources

```
1 package kr.re.keti.sc.dataservicebroker.datamodel.service;
2
3 import java.io.IOException;
4 import java.text.SimpleDateFormat;
5 import java.util.Iterator;
6 import java.util.List;
7 import java.util.regex.Matcher;
8 import java.util.regex.Pattern;
9
10 import org.slf4j.Logger;
11 import org.slf4j.LoggerFactory;
12 import org.springframework.beans.factory.annotation.Autowired;
13 import org.springframework.stereotype.Service;
14
15 import com.fasterxml.jackson.annotation.JsonInclude.Include;
16 import com.fasterxml.jackson.databind.ObjectMapper;
17
18 import kr.re.keti.sc.dataservicebroker.common.code.Constants;
19 import kr.re.keti.sc.dataservicebroker.common.code.DataServiceBrokerCode.AttributeType;
20 import kr.re.keti.sc.dataservicebroker.common.code.DataServiceBrokerCode.AttributeValueType;
21 import kr.re.keti.sc.dataservicebroker.common.code.DataServiceBrokerCode.ErrorCode;
22 import kr.re.keti.sc.dataservicebroker.common.exception.BadRequestException;
23 import kr.re.keti.sc.dataservicebroker.common.exception.BaseException;
24 import kr.re.keti.sc.dataservicebroker.datamodel.OutcomeManager;
25 import kr.re.keti.sc.dataservicebroker.datamodel.dao.DataModelDao;
26 import kr.re.keti.sc.dataservicebroker.datamodel.vo.DataModelBaseVO;
27 import kr.re.keti.sc.dataservicebroker.datamodel.vo.DataModelVO;
```



Monitoring Tools



S/W Demos



Collaborations



Smart City Data Hub for Data-centric Smart Cities

Dissemination

- _Case Study 1: COVID-19 EISS
- _Case Study 2: Parking Congestion Prediction
- _Sustainability Plans

Case Study 1: COVID-19 EISS Epidemiological Investigation Support System 1 | 2 | 3 | 4 Dissemination

✓ COVID-19 EISS is built upon City Data Hub and provides data-driven tracking of confirmed cases since April of 2020

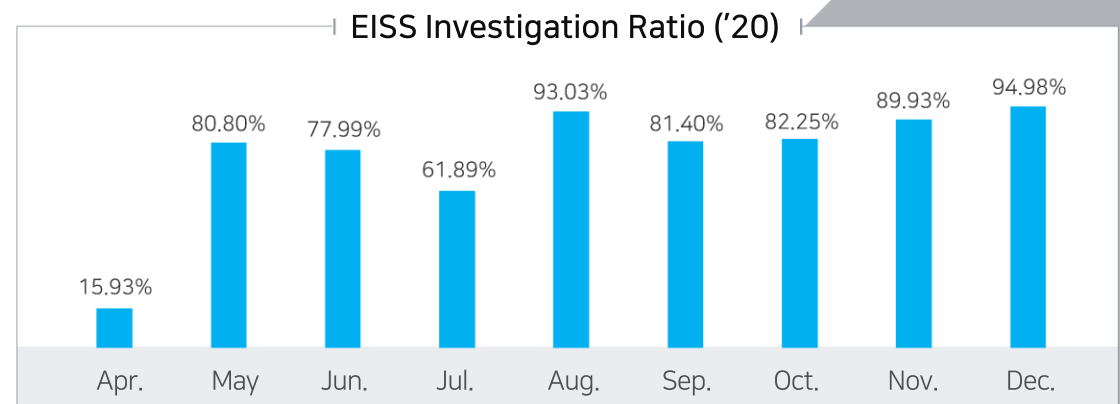
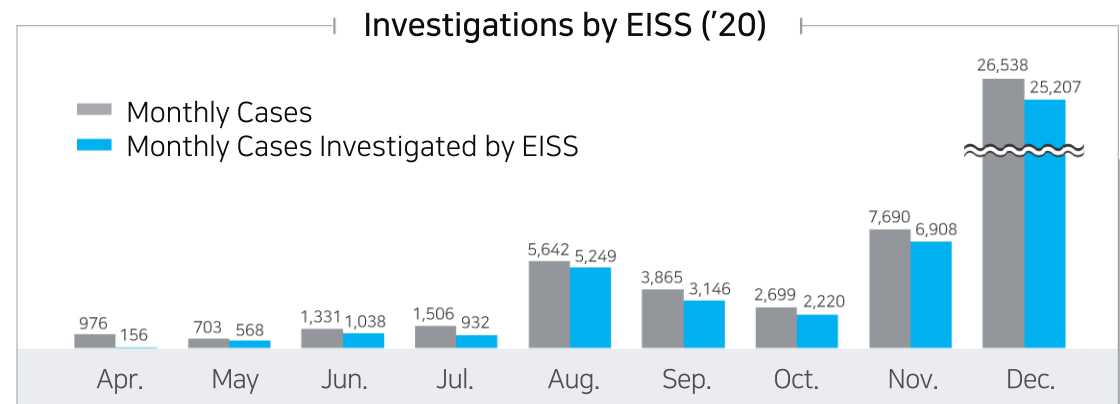
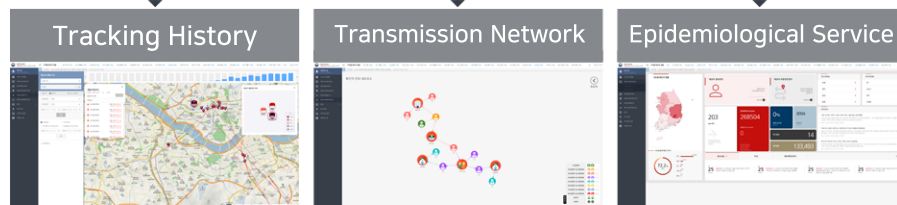
- ▶ Used by epidemiological investigators in KDCD and 254 community health centers
- ▶ Investigation data collection from 22 credit card company, 3 mobile network operators and QR check-in systems



City Data Hub

Collect, Process and Analysis

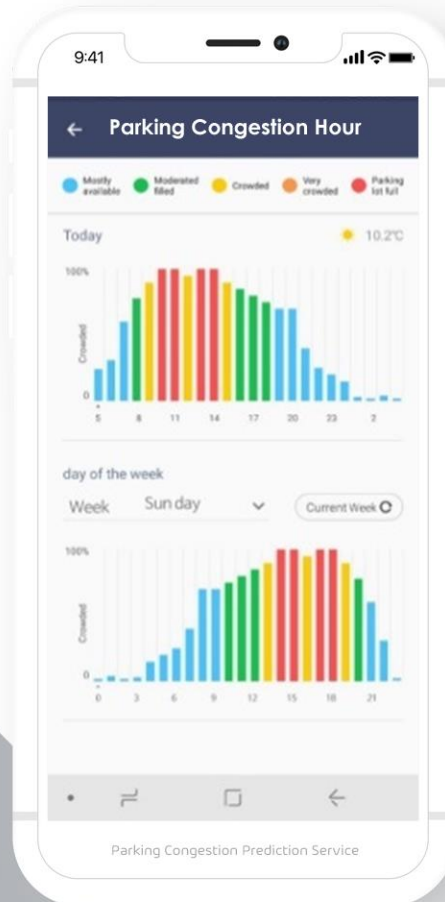
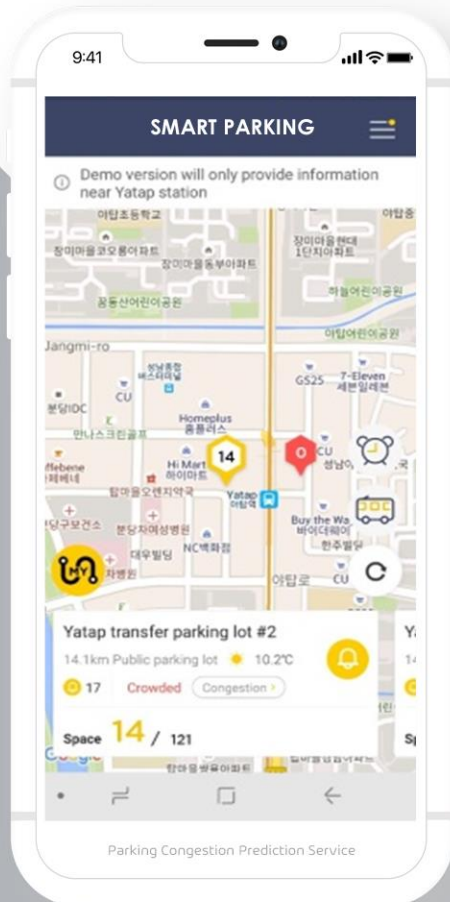
Data-driven Epidemiological System



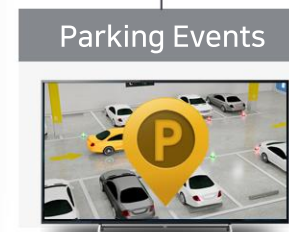
Case Study 2: Parking Congestion Prediction

1 | 2 | 3 | 4 Dissemination

- ✓ Collect, process and learn public parking data from IoT platform and weather, fine dust data from public data portal to predict parking lot congestion level
- ✓ PoC service leveraging data analytics of City Data Hub with cross-domain data



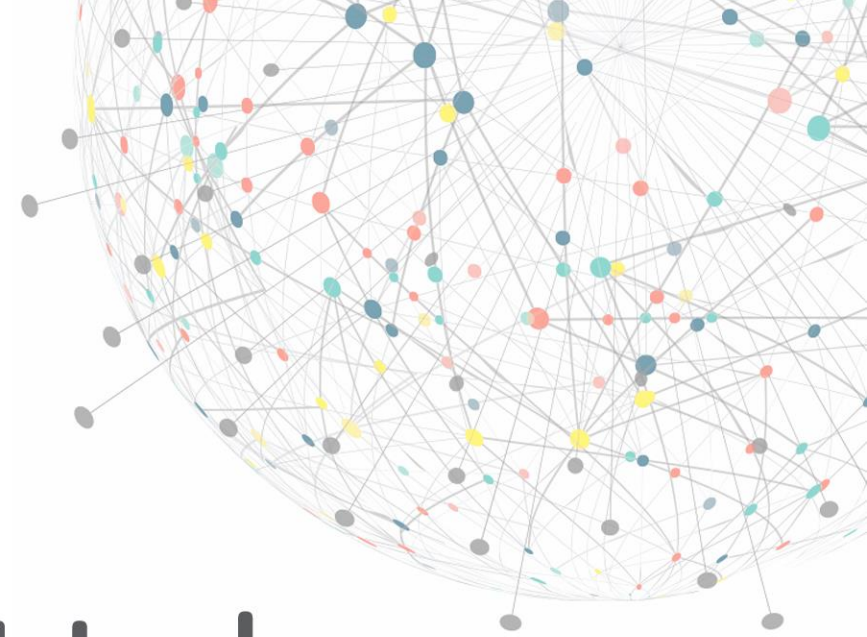
City Data Hub
Data Analysis and Prediction



Sustainability Plans

✔ Strategic plans for sustainable growth and expansion of City Data Hub after 2022





City Data Hub

Data-centric Smart City Ready Solution

Leader of smart city data platform for
sustainable smart cities and citizen life quality improvement