

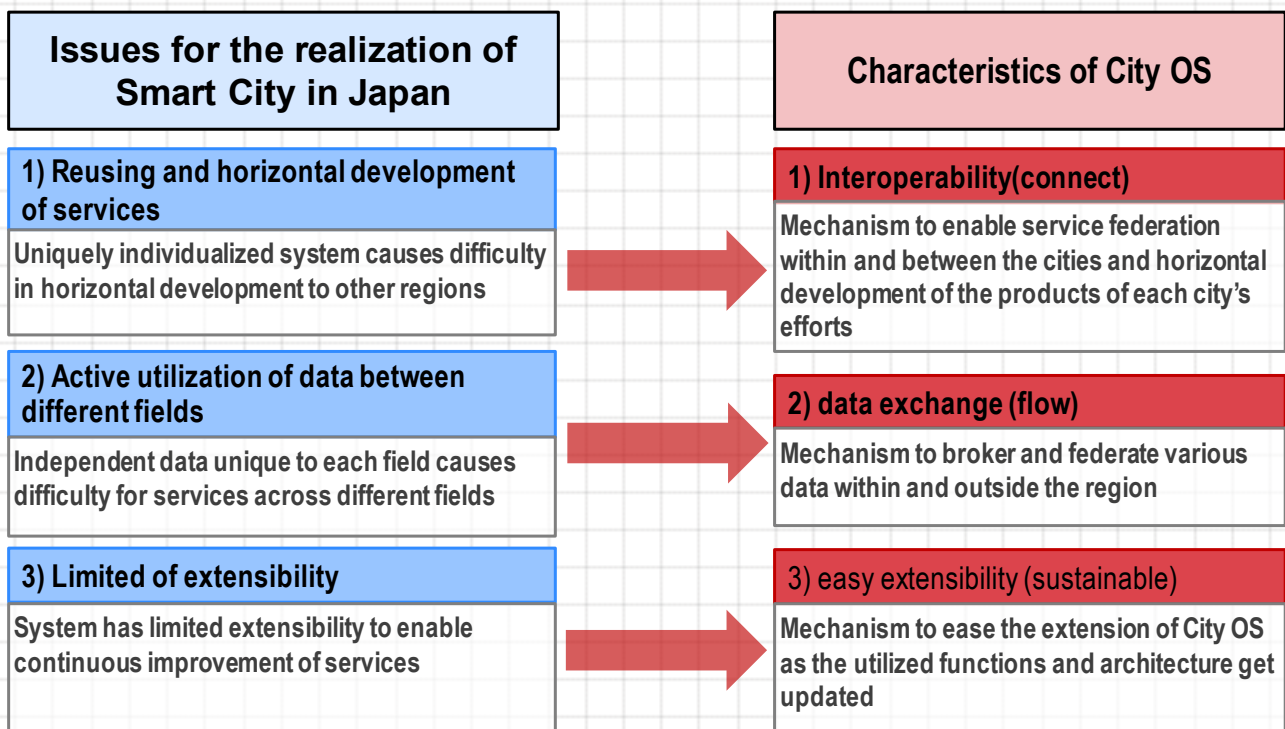
Prepare City OS (data and API)

What kind of requirements are necessary for IT systems?

The region will be implementing City OS which is an IT system meeting the following requirements.

As shown in Chapter 1, in order to initiate innovations in regional development by the power of digital, it is important to pay attention to the federation between services, between cities, and between sectors.

The IT system which realizes the above is City OS with the requirements of **interoperability (connect)**, **data exchange (flow)**, and **easy extensibility (sustainable)**.

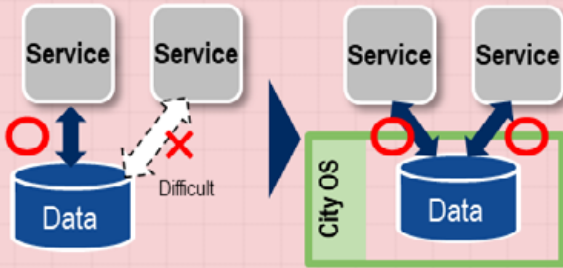


* For details on Characteristics of City OS, please refer to "Chapter 7" of the White Paper.

Components and characteristics of City OS

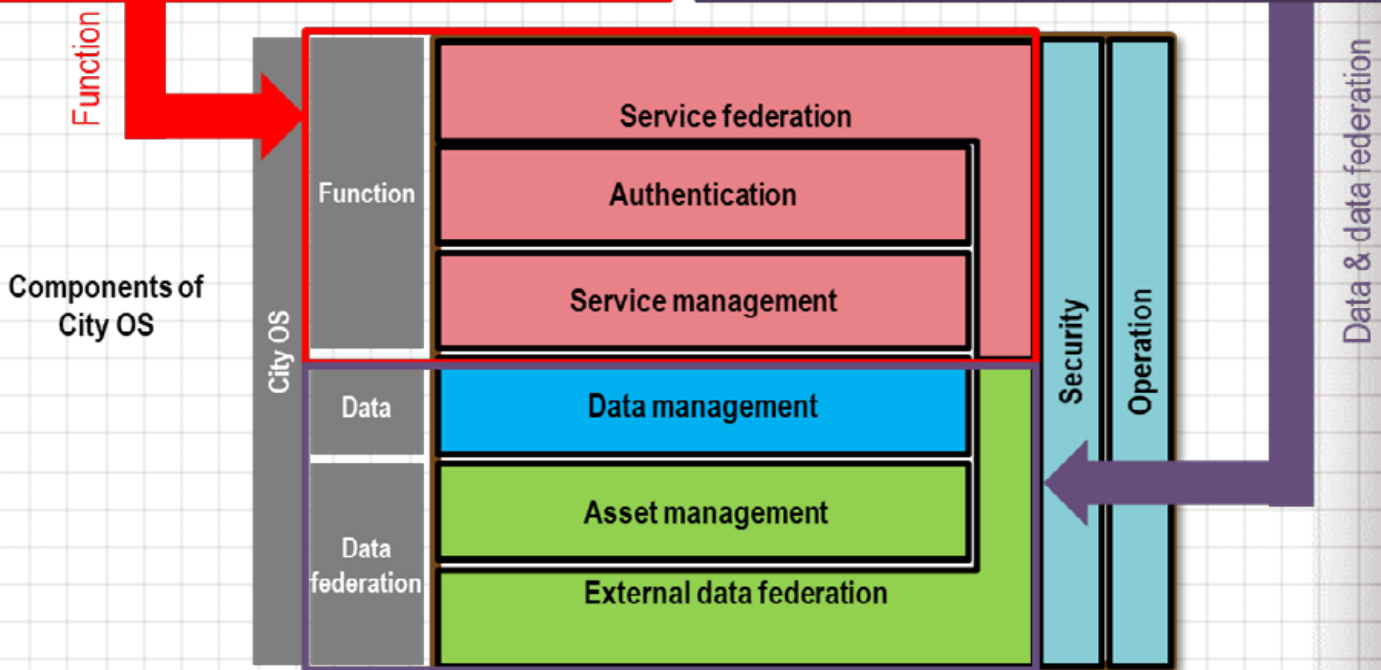
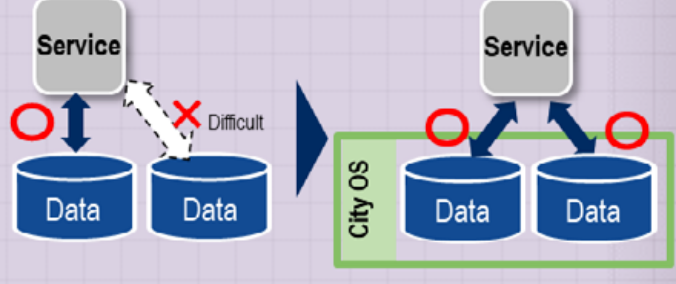
“Connect: Interoperability”

Manage services (applications, etc.) and users, control usage authorization, etc. of data & services for each user, and realize safe and efficient “connect”. In addition, realize safe and efficient “connect” with other City OSs.



“Flow: Data exchange”

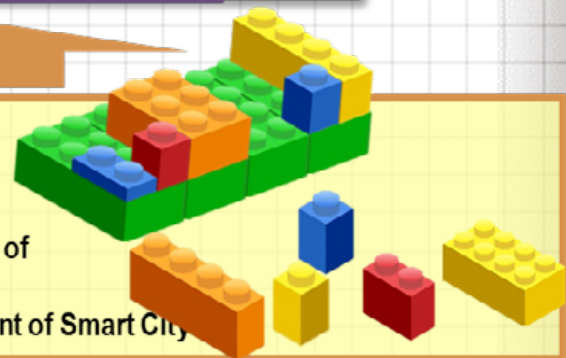
Realize “flow” by absorbing the systemic differences (data model) with external systems (IoT, public administration systems, etc.) federated to by conversion functions, etc., and by executing data acquisition, storage, accumulation, etc.



The whole system

“Sustainable: Easy extensibility”

Realize “sustainable” by enabling the operation with minimal implementation by the minimum function unit and the addition of functions by the minimum function unit, for the purpose of the step-by-step extensions of City OS in step with the development of Smart City

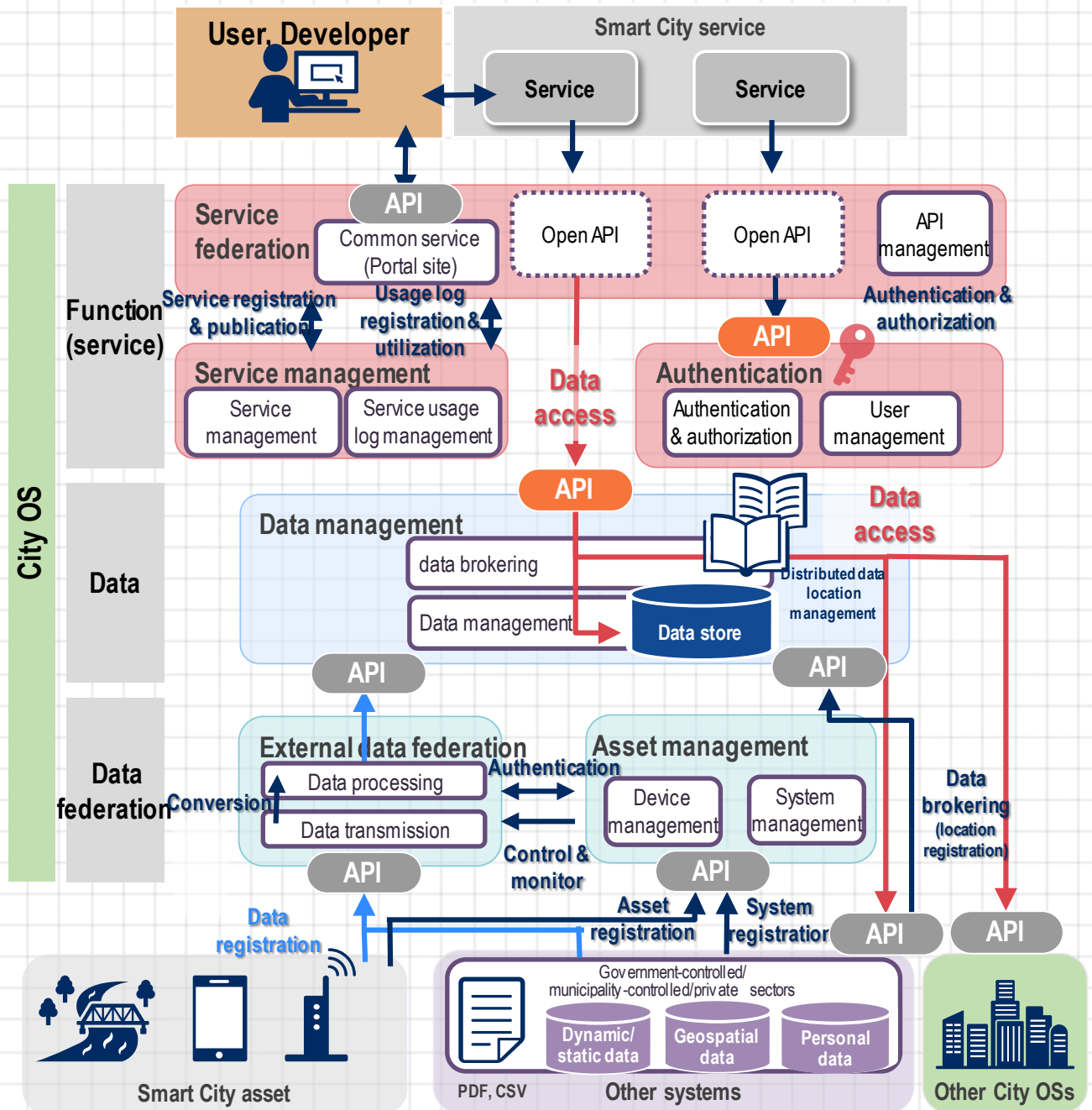


Components of City OS

Service federation	<p><u>Set of functions to enable federation with services (applications, etc.) and other City OSs</u></p> <p>It enables federation by way of a set of APIs to allow easy data usage, API management such as controlling whether API can be made public or not, and common services across sectors (citizens' portal, etc.)</p>
Authentication	<p><u>Set of functions to manage the data usage rights and service usage limits of the users</u></p> <p>It enables the secure and easy-to-use usages of services by the centralized management of user's ID, attributes, password, etc. and of data and services usage limits, etc. for each user.</p>
Service management	<p><u>Set of functions to provide management functions for services (applications, etc.)</u></p> <p>It manages registration, release, etc. of services (applications, etc.) as well as service usage logs.</p>
Data management	<p><u>Set of functions to store, accumulate, and efficiently use the data</u></p> <p>It manages various kinds of data and enables standardized and efficient uses of data by services (applications, etc.)</p>
Asset management	<p><u>Set of functions to manage data acquisition from IoT, public administration systems, etc.</u></p> <p>It enables data acquisition by managing information (authentication information, etc.) and status (interface status, etc.) of data sources.</p>
External data federation	<p><u>Set of functions to enable data federation with IoT, public administration systems, etc.</u></p> <p>It enables data federation by absorbing system differences (data model, protocol, etc.) from data sources and federated entities by way of conversion, etc.</p>
Security	<p><u>Set of functions to protect against threats from outside and within City OS</u></p> <p>It enables the secure operation of City OS by authentication, encryption, illegal access prevention, illegal access detection & rejection, etc.</p>
Operation	<p><u>Set of functions to provide functions for the normal operations and extensions of City OS</u></p> <p>It enables the maintenance and further development of City OS by monitoring the normal operations, and managing the structure for future extensions, of City OS.</p>

Understanding City OS

The following figure shows the components of City OS and their relationships. By using APIs which interface with each one of the components, Smart City services can freely access any data and functions (services).



Service federation, Open API

Authentication ✓ Authentication & authorization
 -related API ✓ Acquiring attributes
 ...

OAuth/
OpenIDConnect

Data management ✓ Data access
 -related API ✓ Data brokering
 ...

JSON

REST

HTTPS

Service federation, Common services

Developers
portal site



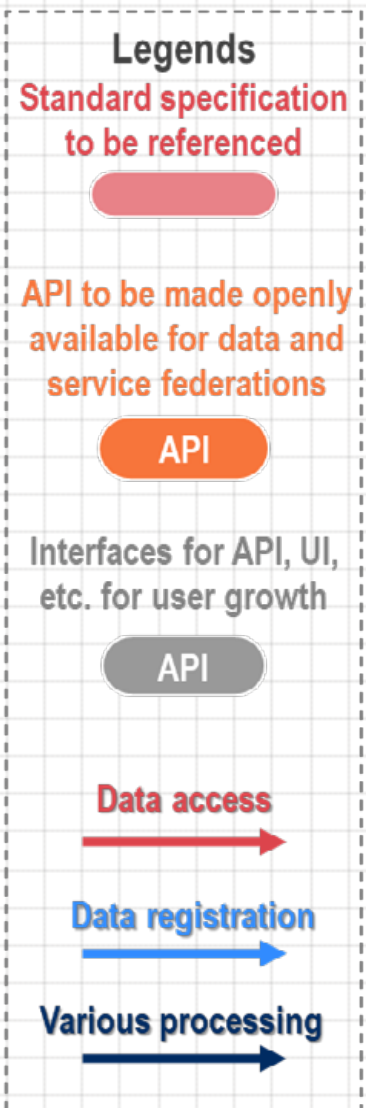
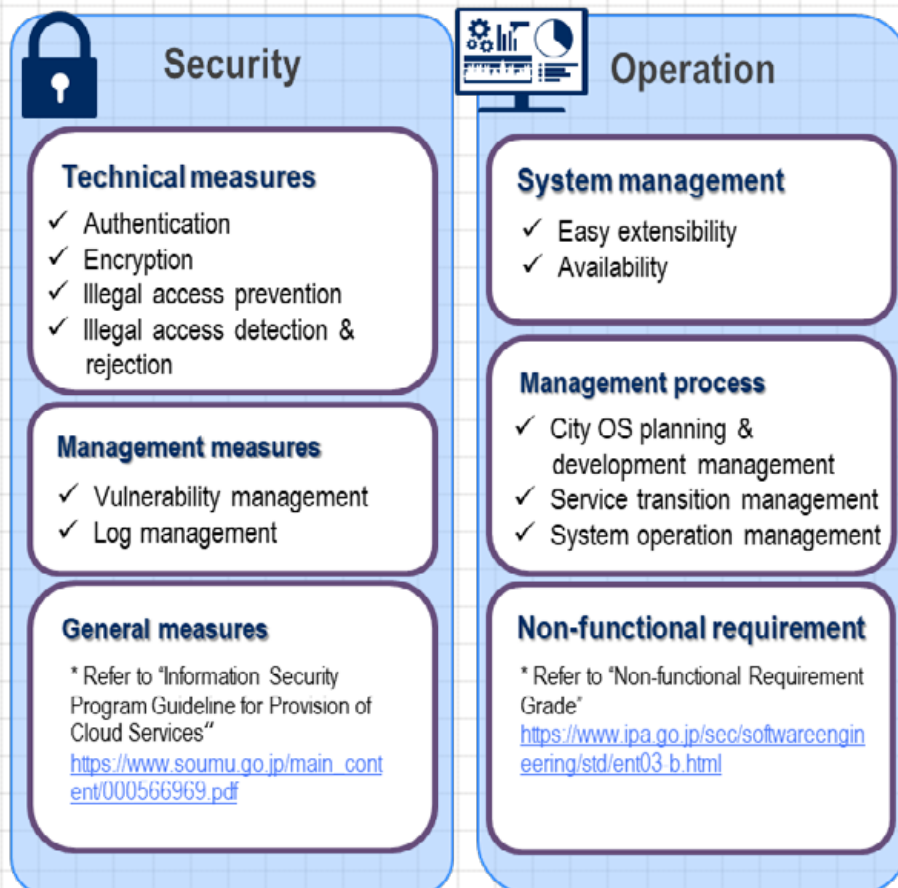
Bidirectional
communication
portal site



Personalize



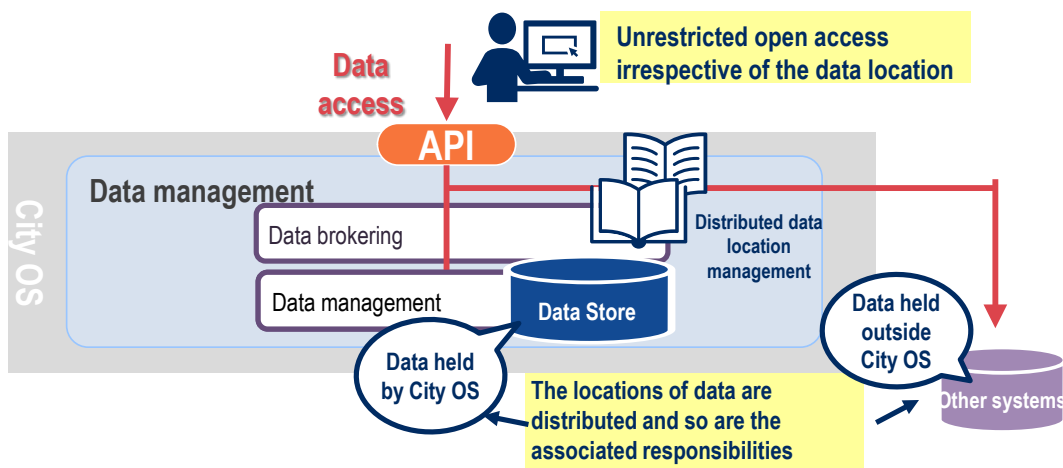
Visualization &
analysis
dashboard



Column

Gather data on City OS

The key to successful promotion of Smart City is how to utilize data effectively. By gathering data from all sectors onto City OS and allowing them to be utilized by Smart City services across the sectors, it is expected to improve the user conveniences and lead to sustainable services. However, prior to utilizing the data on City OS, there is an indispensable issue that, even if open data are accumulated on City OS, other valuable data from private sectors tend to be rather difficult to be gathered. One of the functions to be implemented to resolve the issue is a "data brokering function" (one of the data management functions).



The data brokering function supports two types of methods, namely distributed and accumulated, in order to allow access to data managed by other City OSs and systems. Specifically, in the case of the distributed method, it does not own and hold the data themselves managed by other City OSs and systems but mediates to enable provision of these data on demand from the data users. For example, the municipality that manages City OS may only manage the public data, and deliver the data managed by private sectors directly to the data users by way of the data brokering function (distributed method) of City OS resulting in the promotion of usages while maintaining the data sovereignty. As an added note, in either method, the data users are not required to discriminate the access method.

Prepare City OS according to the uses

It is not necessary to implement all of the components of City OS right from the beginning. Making a reference to the list of characteristics and requirements of City OS, you can begin to prepare City OS in accordance with the regional issues to be resolved and the ideal forms of the region in the future. As a next step, in order to enable interoperability in Smart City, actively making various data of the city openly available as APIs should be considered.

Prepare data, and organize data models

As the “Basic Act on the Advancement of Public and Private Sector Data Utilization” was promulgated and enforced on December 14, 2016, the active promotion of public and private sector data utilization is to be expected.

It is important to actively prepare data not only in the Smart City initiatives but also for utilizations by various services.

Gather data on City OS, and realize various services

Examples of data utilized

Device (IoT, etc.)

Traffic data, Location information of automobiles and smartphones, Image data of crime prevention cameras, data acquired by various sensors, etc. such as water level sensors, etc.

Government-controlled, Municipality-controlled, Private sector systems

Public events, Geospatial information, Public facilities information, Disaster prevention information, Traffic information, Weather information, Various statistical information, etc.

When handling personal data, etc., it is also important to set rules for the handling of data based on relevant laws and regulations (Act on the Protection of Personal Information, ordinance, etc.).

Also, when preparing data, it is important to standardize the data models as much as possible. It is recommended to actively adopt data formats, etc. which comply to the specifications set by the standard organizations and/or the recommendations of the Government.

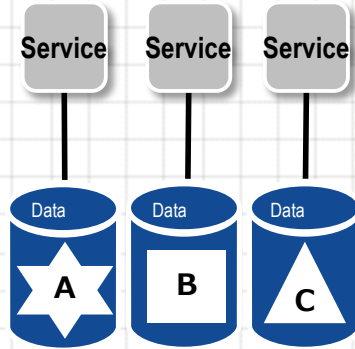
Non-standardized data model

Examples)

Some dates in Anno Domini and others in Japanese era calendar

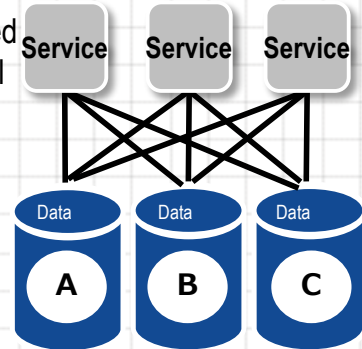
Some units in meters and others in inches

Code is a unique code



Different data model for each service

Standardized data model



Standardized data model

Information on data models published by the Government

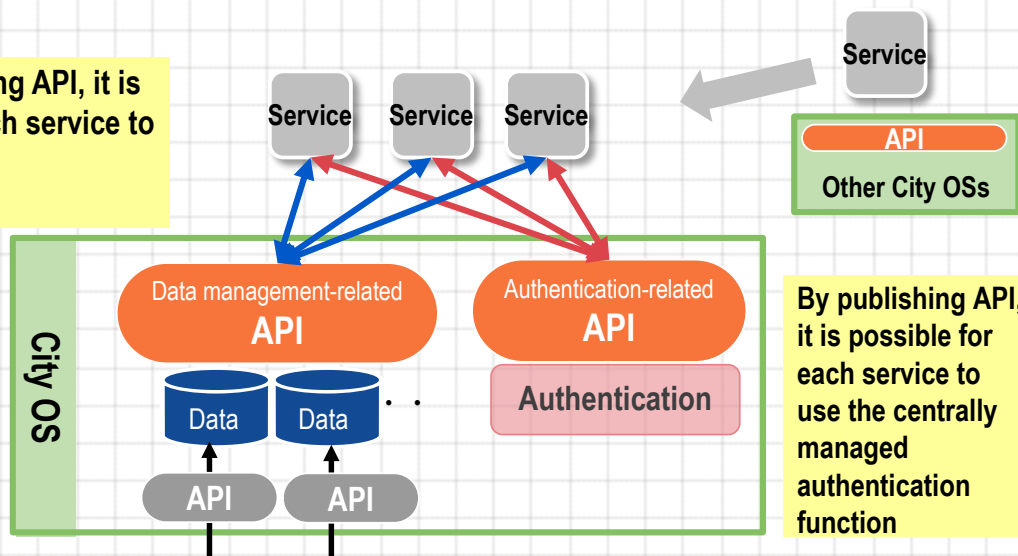
- Recommended data set promoted by National Strategy Office of Information and Communication Technology (IT), Cabinet Secretariat
<https://cio.go.jp/policy-opendata>
- A set of data standards and a code list found in the Infrastructure for Multi-layer Interoperability Vocabulary and Digital Government Standard Guidelines.
<https://cio.go.jp/guides>

Actively publish API

Enhance interoperability on Smart City by publishing API

By making the data of each region available by API, it is possible to promote data utilization and centrally manage authentication. Active publishing of API should be considered.

By publishing API, it is easy for each service to utilize data



By publishing API, it is possible for each service to use the centrally managed authentication function

Device, Municipality systems, etc.

■ APIs recommended to be published

The followings are the minimum set of APIs required to enable interoperability between cities, between services, and between sectors in Smart City.

Authentication-related API

Item	API
1	Authentication & authorization
2	Attributes acquisition

Data management-related API

Item	API
1	Data access

The White Paper includes the descriptions of the APIs other than those shown above. For details, please refer to “Chapter 7” of the White Paper.

Check the whole picture with a bird's-eye view

■ Smart City Strategy

- Are the major goals & KGI set based on the regional issues?
- Are the sub goals & KPI set as indexes based on the major goals & KGI?
- Are the specific measures defined to achieve the goals?
- Are the KPIs measurable and quantitative?

■ Smart City Rules

- Have the relevant laws and regulations been organized?
- Have the rules and guidelines to be considered been examined?
- For deregulation and special zones proposals, have the current restrictive conditions been clarified?

■ Smart City Promotion Organization

- Is it clear who the primary promoter is, what the promotional system of Smart City is, and what role each player plays?
- Is it clear who the operators of City OS are and what roles they play?
- Is it clear who the service providers are?

■ Smart City Business

- Have the sustainable business models been considered?
- Is it clear what method is used to examine if services are based on users' needs?

■ Smart City Service

- Do the services reflect the strategy?
- Is it clear who the users of the provided services and primary service providers are?

■ City OS

- Have the components of City OS been selected ensuring "interoperability", "data exchange", and "easy extensibility" described in the White Paper?
- Is it clear who owns the data required for the construction of services and in what form they are provided?

memo

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