

U4SSC deliverable on Data and API Requirements for Centralized Smart City Platforms

U4SSC deliverables

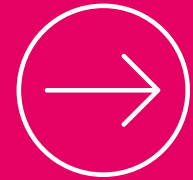
Presented by:

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City Platforms

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The need for centralized smart city platforms



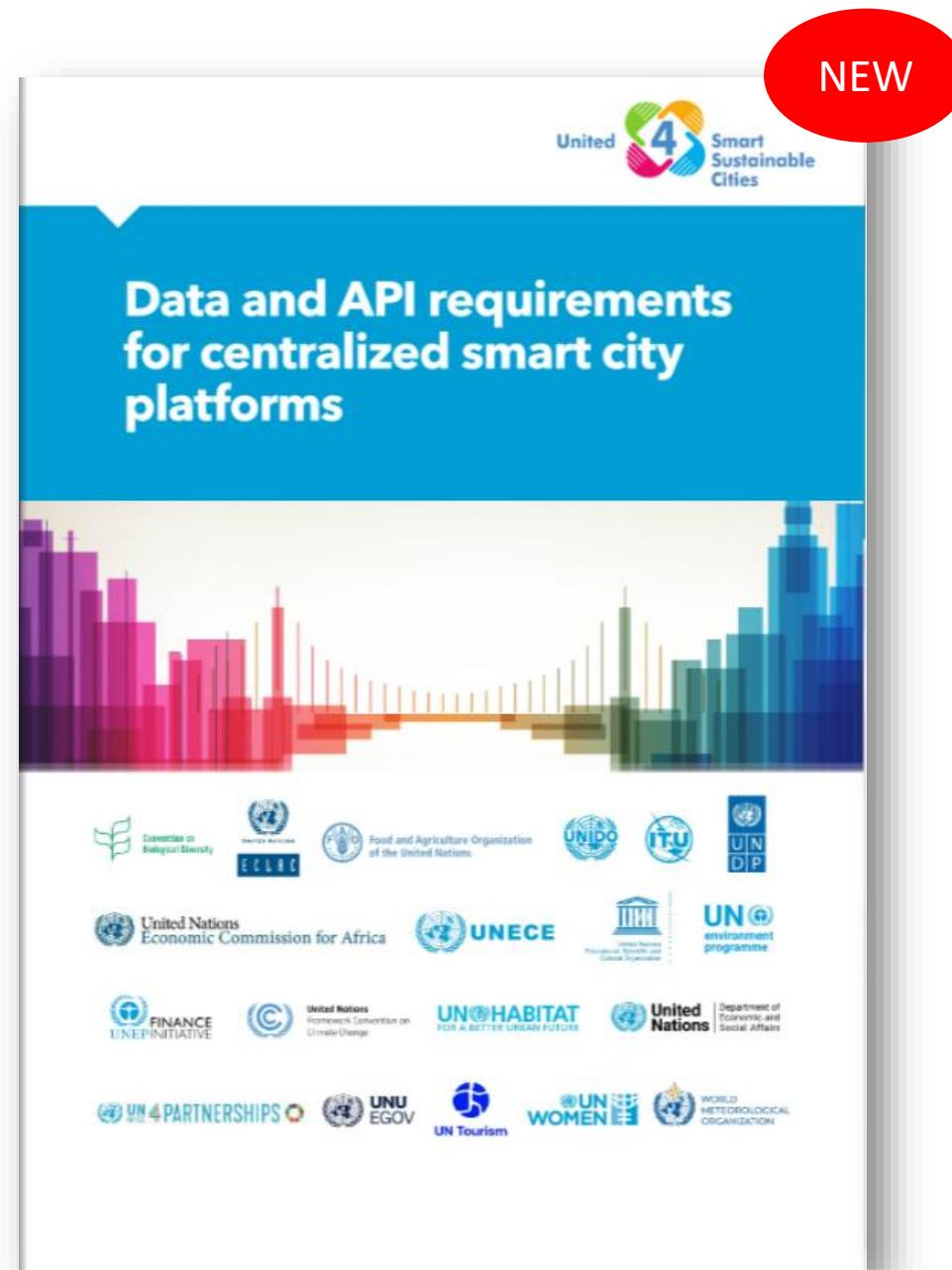
The transformation of smart cities into comprehensive, interconnected systems requires robust and standardized data management frameworks



It is important to identify key issues related to the standardization of data flows and APIs, critical for achieving seamless integration and interoperability across various smart city platforms.



Requirements for centralized smart city platforms



This Report on "Data and API Requirements for Centralized Smart City Platforms," explores the evolving role of smart city platforms as central hubs, analyzing the current landscape and outlining the necessary requirements for integrating and standardizing data flows and APIs to enhance urban innovation and efficiency.

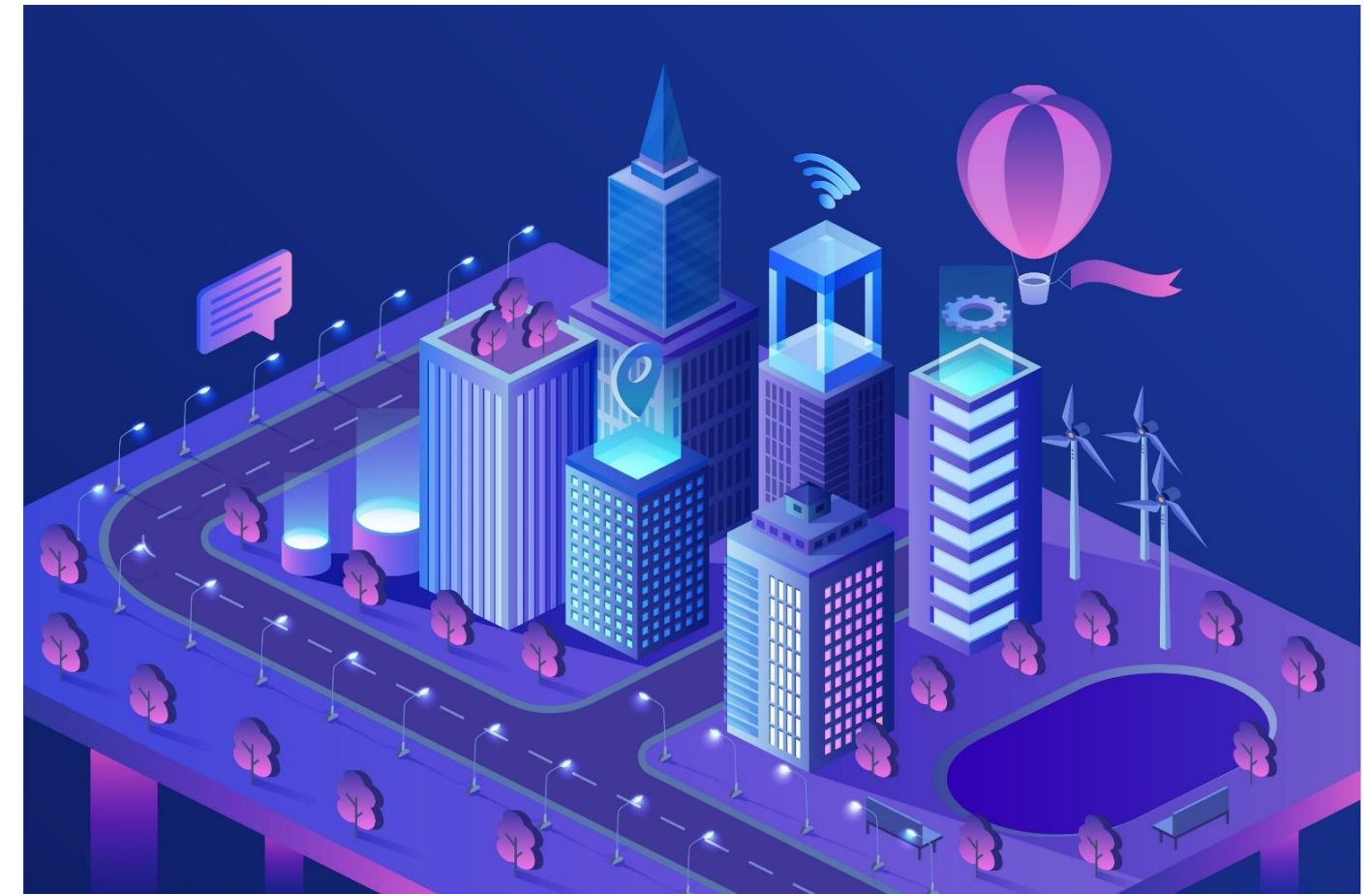
The challenges with smart city platforms

This document deals with the following problem:

The scope of smart city (SC) ranges significantly after more than 20 years of appearance in literature, and after an emerging industrial growth.

Practice shows that the full scope of SC has a limited adoption, since

- it is mostly being capitalized for utility upgrades or for urban renovation,
- Internet-of-Things (IoT)-readiness enables real-time city monitoring and the effective management for all city systems and services.



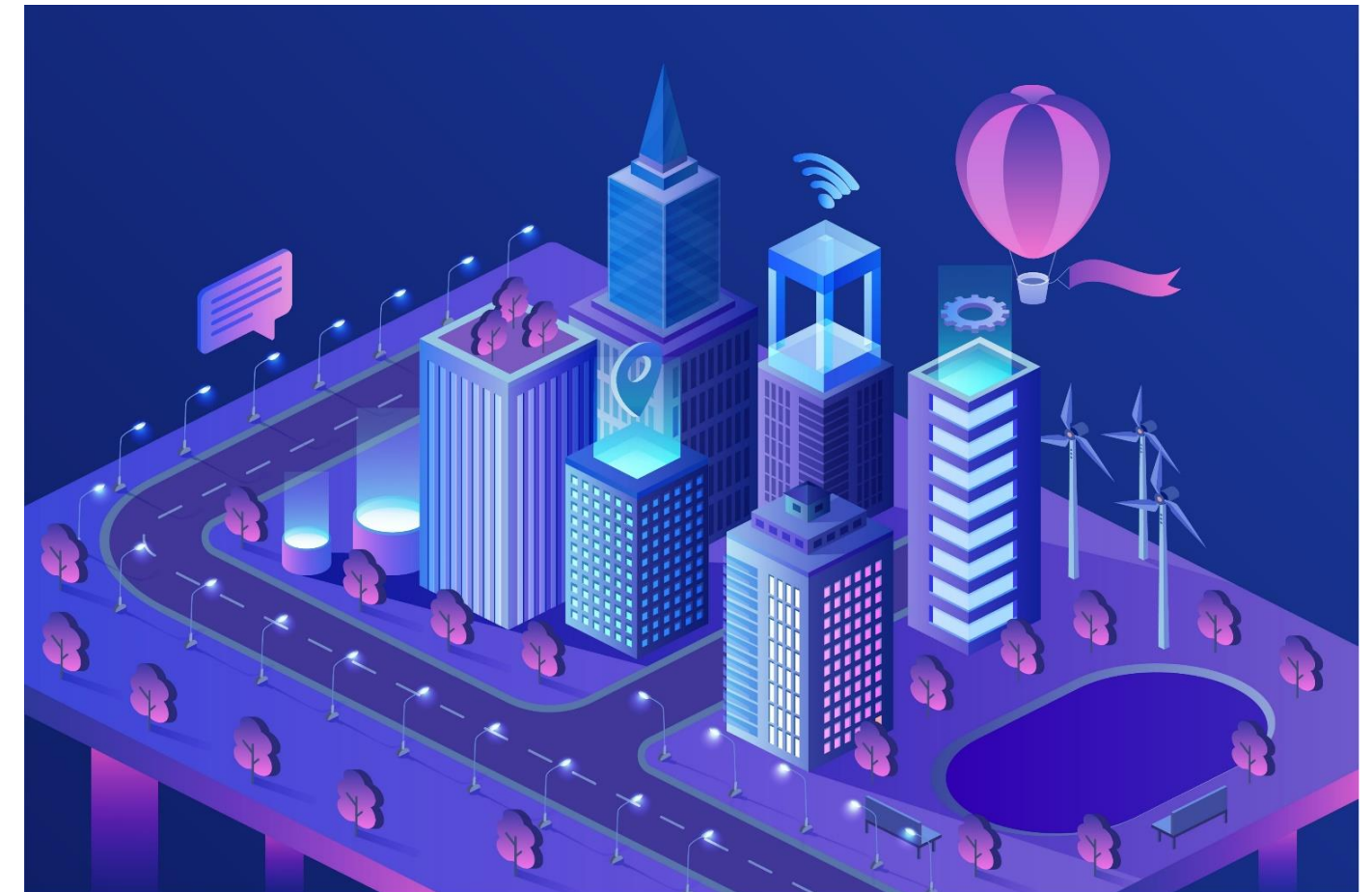
The challenges with smart city platforms

The SC infrastructure plays the role of an “open innovation platform”, where several players can

- deploy their facilities
- launch their applications
- develop new products, services and business models.

This SC “open innovation platform” transforms the city into a “connected space”, where data, information, services, materials, things and people flow, and utilize innovation and technology to monitor, manage and enhance this flow.

The SC in such a situation is analogous to a “hub”, whereby anyone and anything can connect and gain access to the above flows.



This Deliverable aims to answer the following key questions



How is the SC open innovation platform being transformed to a hub (SCHub)?

How can this SCHub become an “umbrella platform” able to integrate SC platforms and give control back to cities?

What are the requirements and the architecture of the SCHub?

A path to more centralized city platforms

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Introduction to smart city platforms

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Background on smart cities platforms

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Gap analysis on data flow
standardization

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The centralized concept of “smart city as
a hub”

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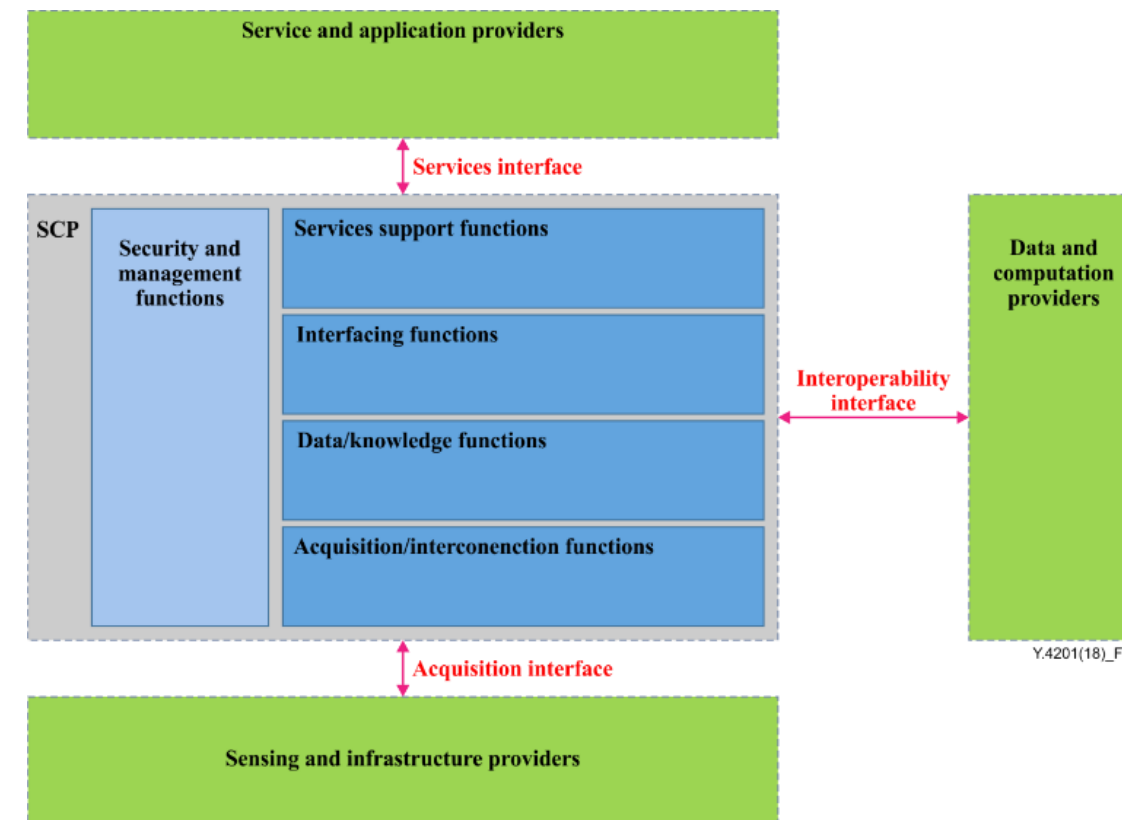
Integration with the SSC platform

Smart city platforms (SCP): Introduction and Background

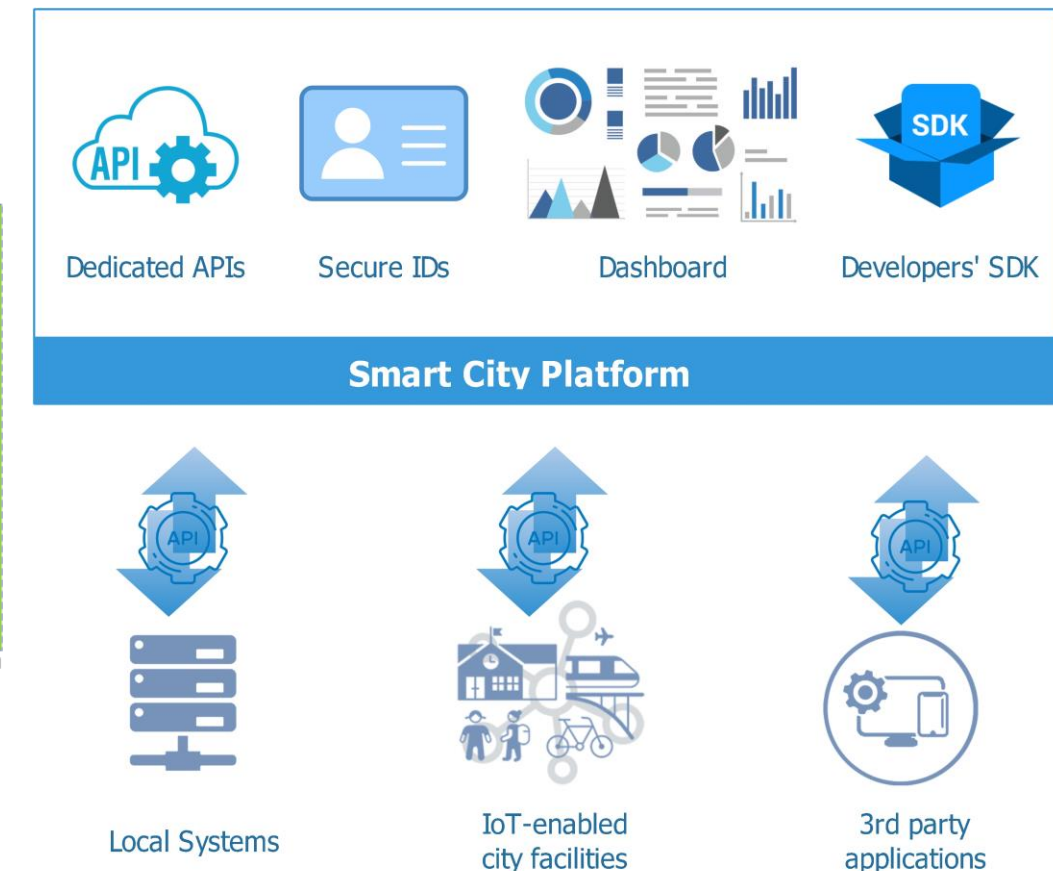
“IoT” and “platform” are crucial for SC development

City platform product	Source
Thinking City	Telefonica (2011)
Indra Sofia2 Smart Platform	Sofia2 (2013)
FAMA Smart City	Cuatroochenta (2014)
Intel City Manager	Intel (2016)
Cisco Kinetic	Cisco (2020; 2017)
Wonderware/AVEVA System Platform	AVEVA (2018)/Schneider Elctric (2014)
Siemens Mindsphere	Siemens (2018)
Microsoft Citynext; Microsoft Azure Digital Twin	Microsoft (2020;2019;2013)
IBM Intelligent Operations Center	IBM (2020), Bhowmick et al. (2012)
SAP Future Cities Software	SAP (2020)
HUAWEI Intelligent Operation Center Solution	Huawei (2020; 2018; 2013)
Hitachi Visualization Suite	Hitachi (2020; 2019)
CA	CA Technologies (2019)
Invipo Smart City Platform	Invipo (2020)
Telenavis	Telenavis (2020)

Representative commercial products for SC platform (January 2020)



Overview of an SCP and external systems/platforms



generic SCP logical architecture

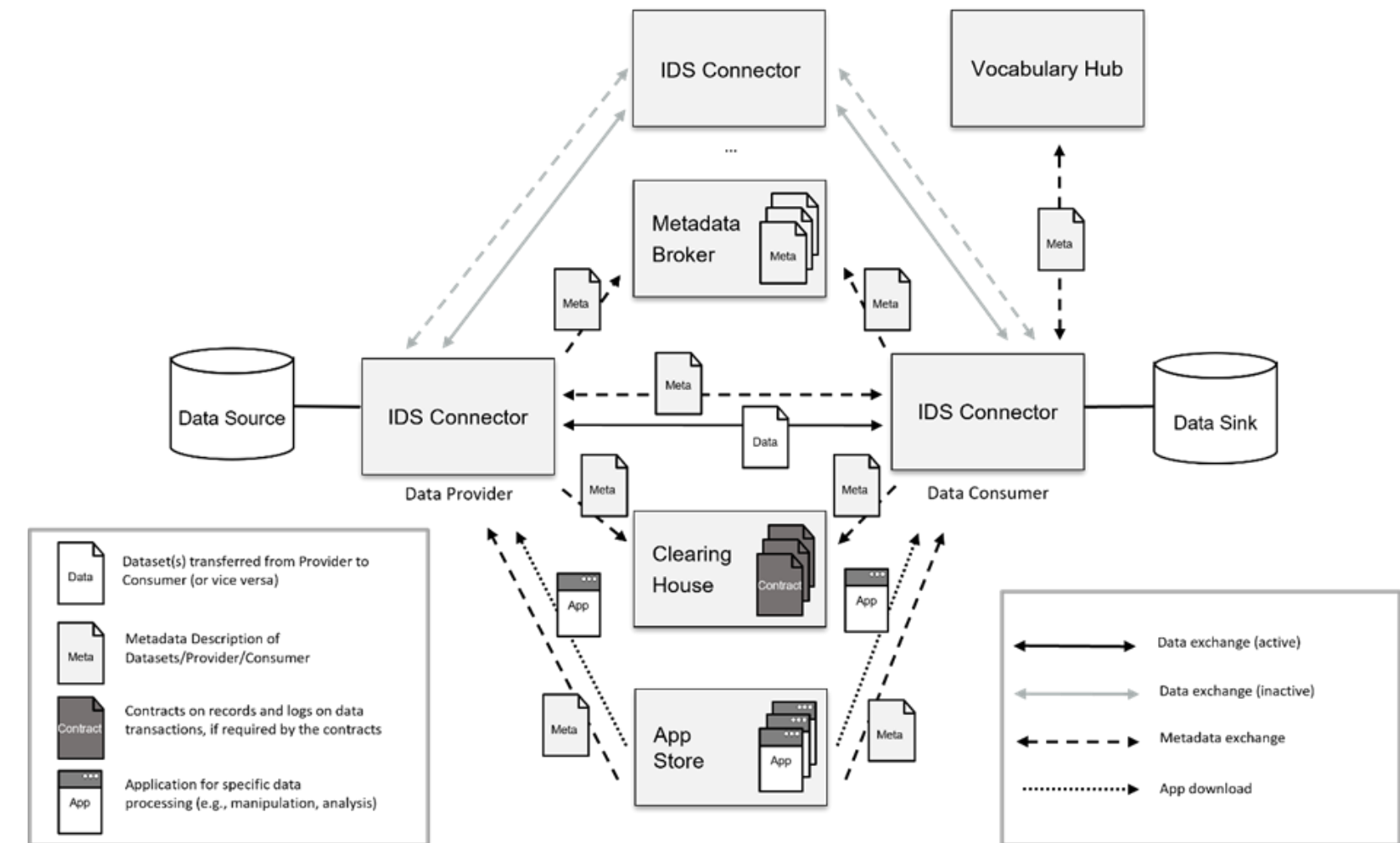
Gap analysis on data flow standardization

International Data spaces (IDS): initiative to enable the seamless exchange of information among independent data providers in a secure, self-sovereign and standardized way

Gaia-X: federated secure data infrastructure based on the values of transparency, openness, data protection, and security, which can be applied to cloud technologies to obtain transparency and controllability across data and services

FIWARE Foundation: key open standards that enable the development of portable and interoperable smart solutions

SAREF: a shared model of consensus that facilitates the matching of existing assets in the smart applications domain



IDS System Layer (IDS RAM, 2023)

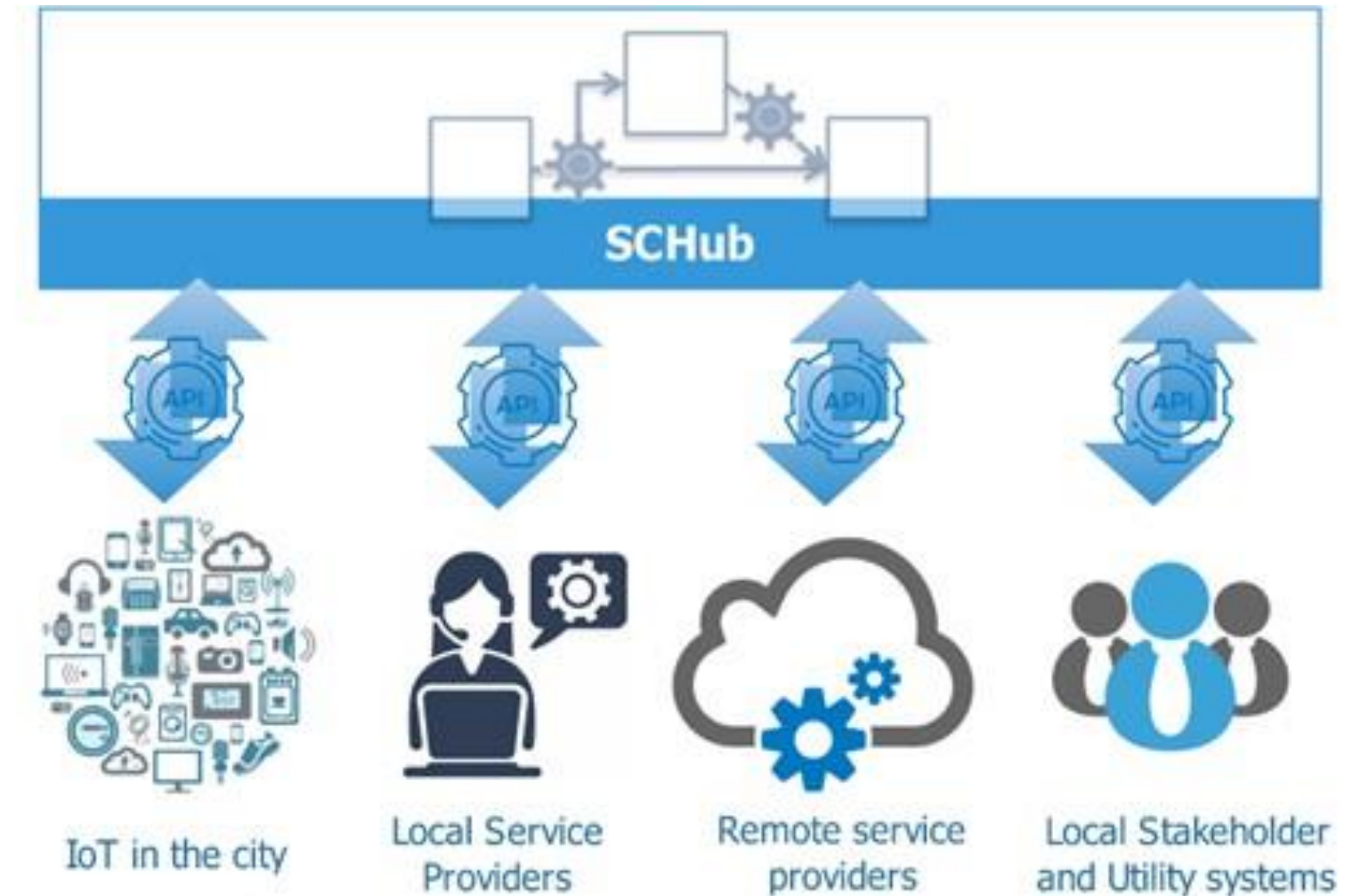
The centralized concept of “smart city as a hub” (SCHub)

The most important role of the SCHub is to offer standardized interfaces (APIs) to the data consumers that want to gain access to the data that are available within the SC.

Standardized APIs enable data flow management and interworking with SCP (e.g., in an analogous manner like network slots in a network hub) to:

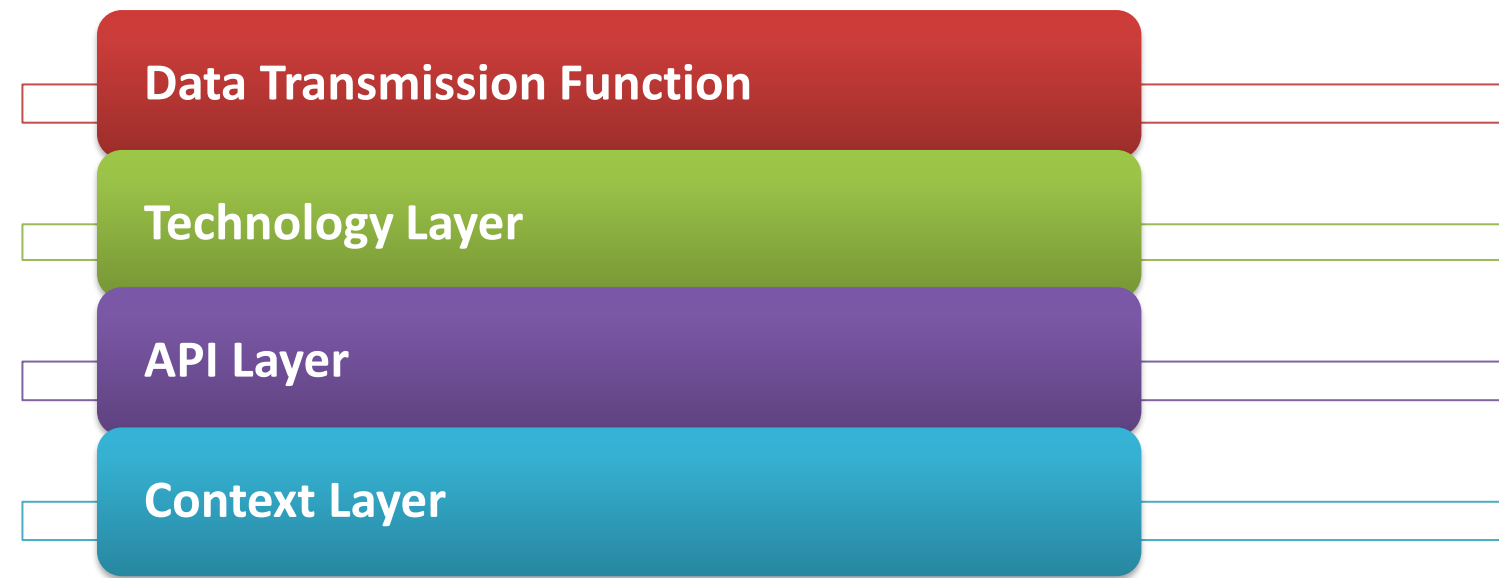
- the IoT local owners;
- the local public and private service providers;
- the remote service providers (e.g., distant cloud-based services);
- the local stakeholders and utility systems

The SC Hub will not necessarily perform data operations (processing, storage, and wrangling), but only transmits data.

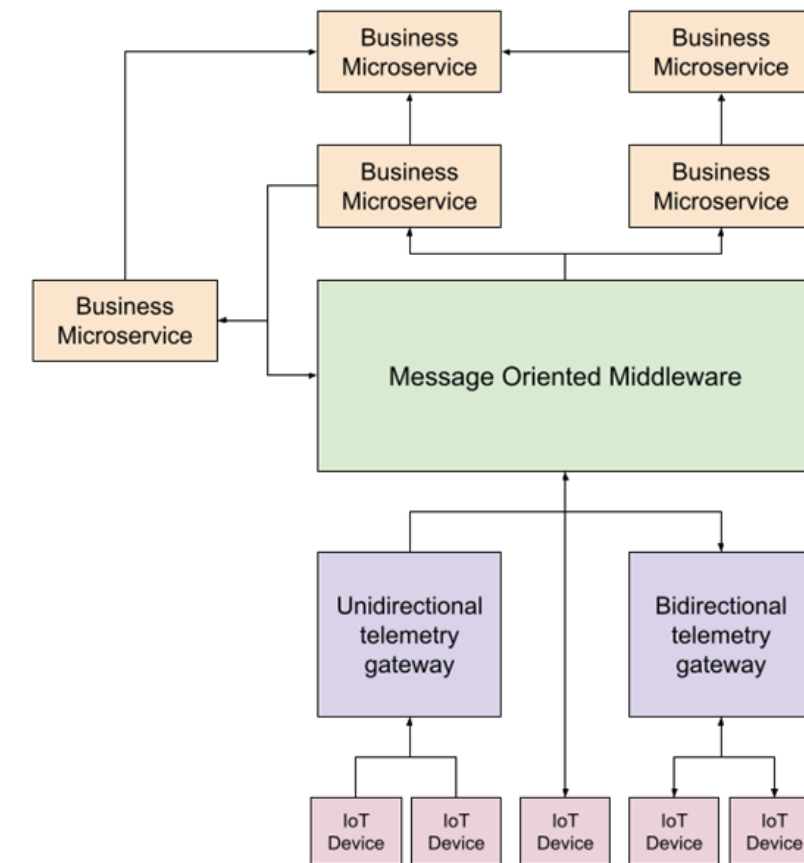


The concept of the SC Hub

The centralized concept of “smart city as a hub” (SCHub)



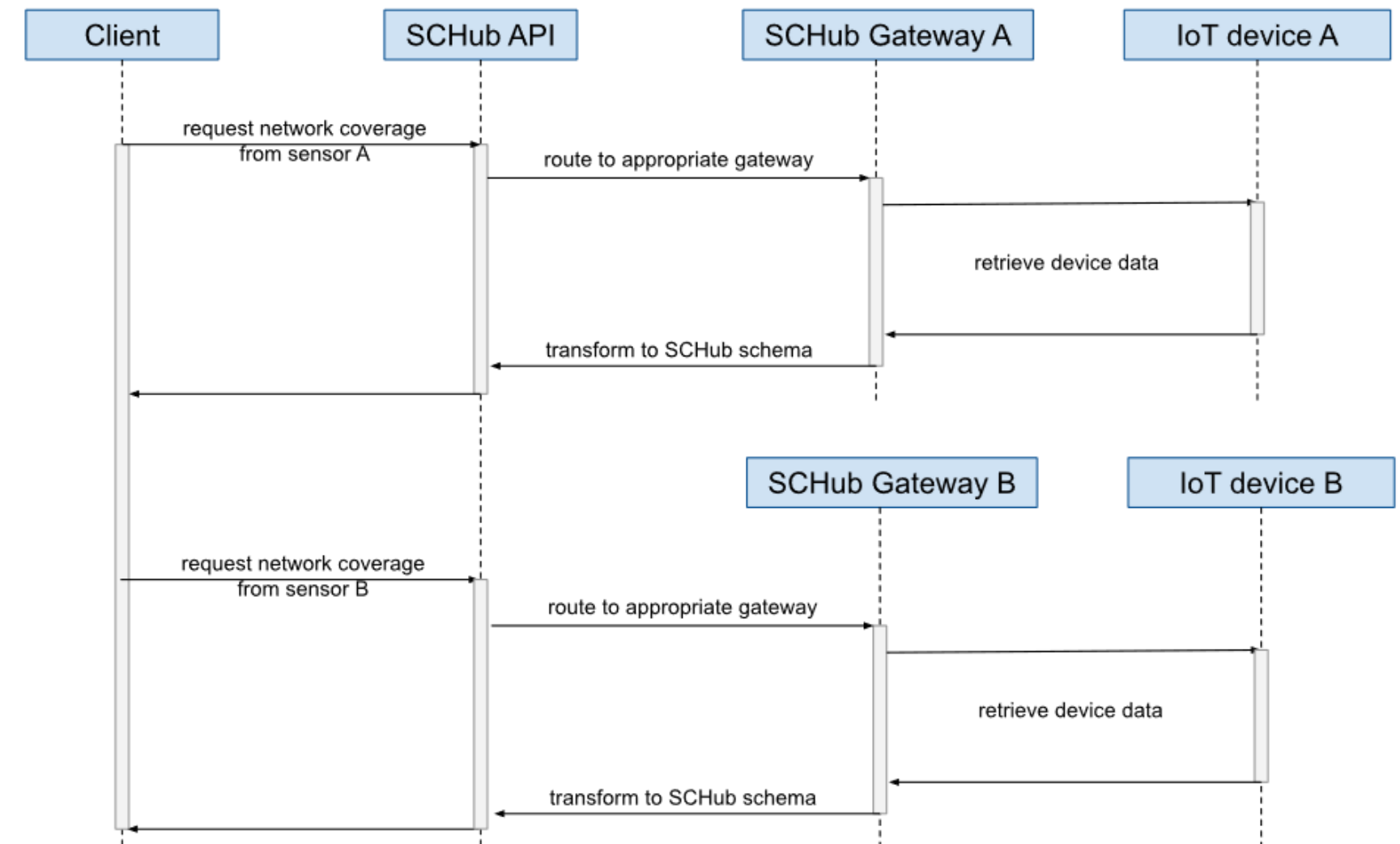
The SCHub Architecture



The SC Hub system overview

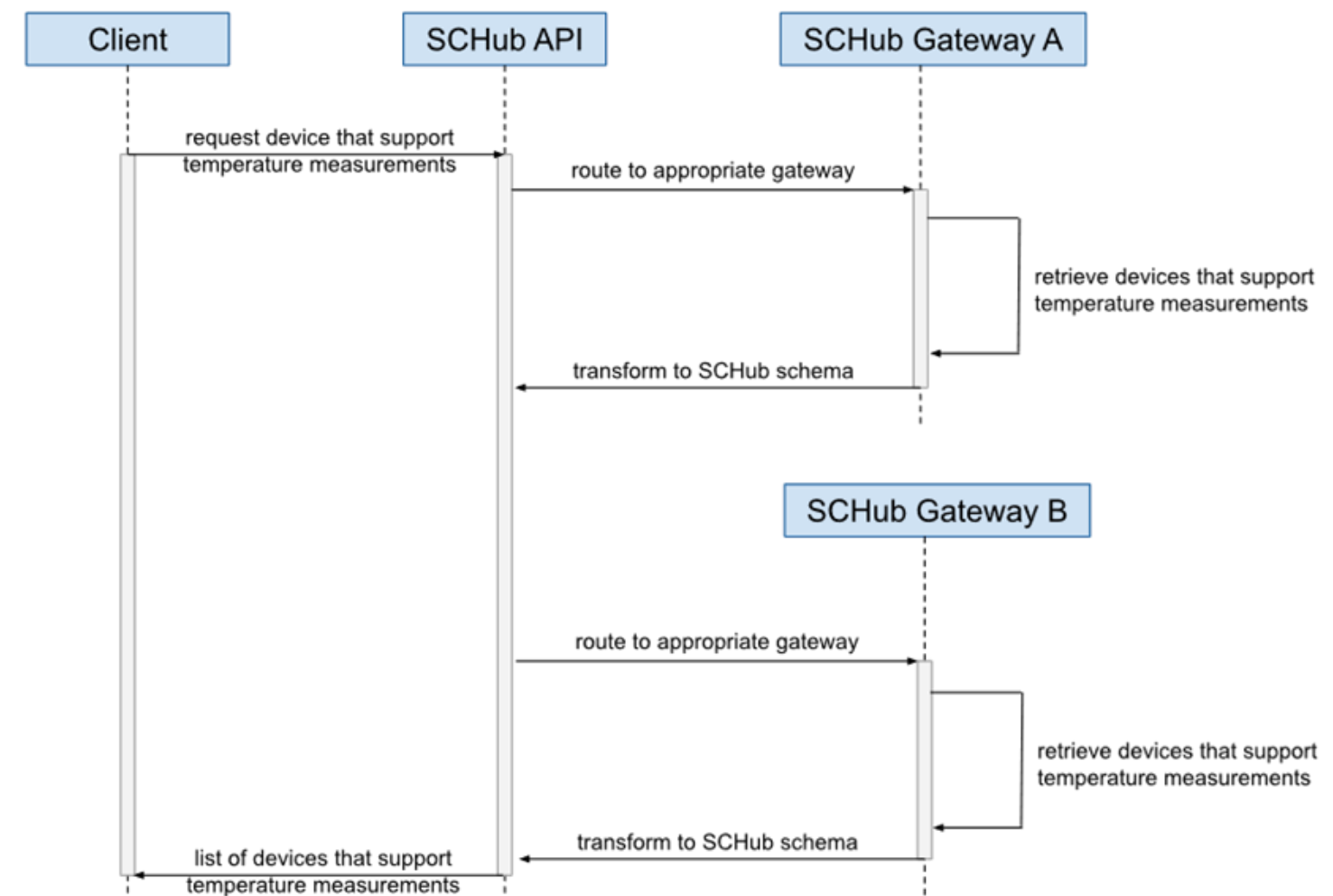
Use Case 1: Data collection of common property measurements

Sensors that are deployed in a SC can measure similar properties/variables (i.e., temperature, network coverage, battery capacity, etc.) regardless their types, manufacturers, and uses (e.g., parking, electricity consumption, environmental conditions). The SCHub unified API will enable access to the common measurement properties of any device in a unified way.



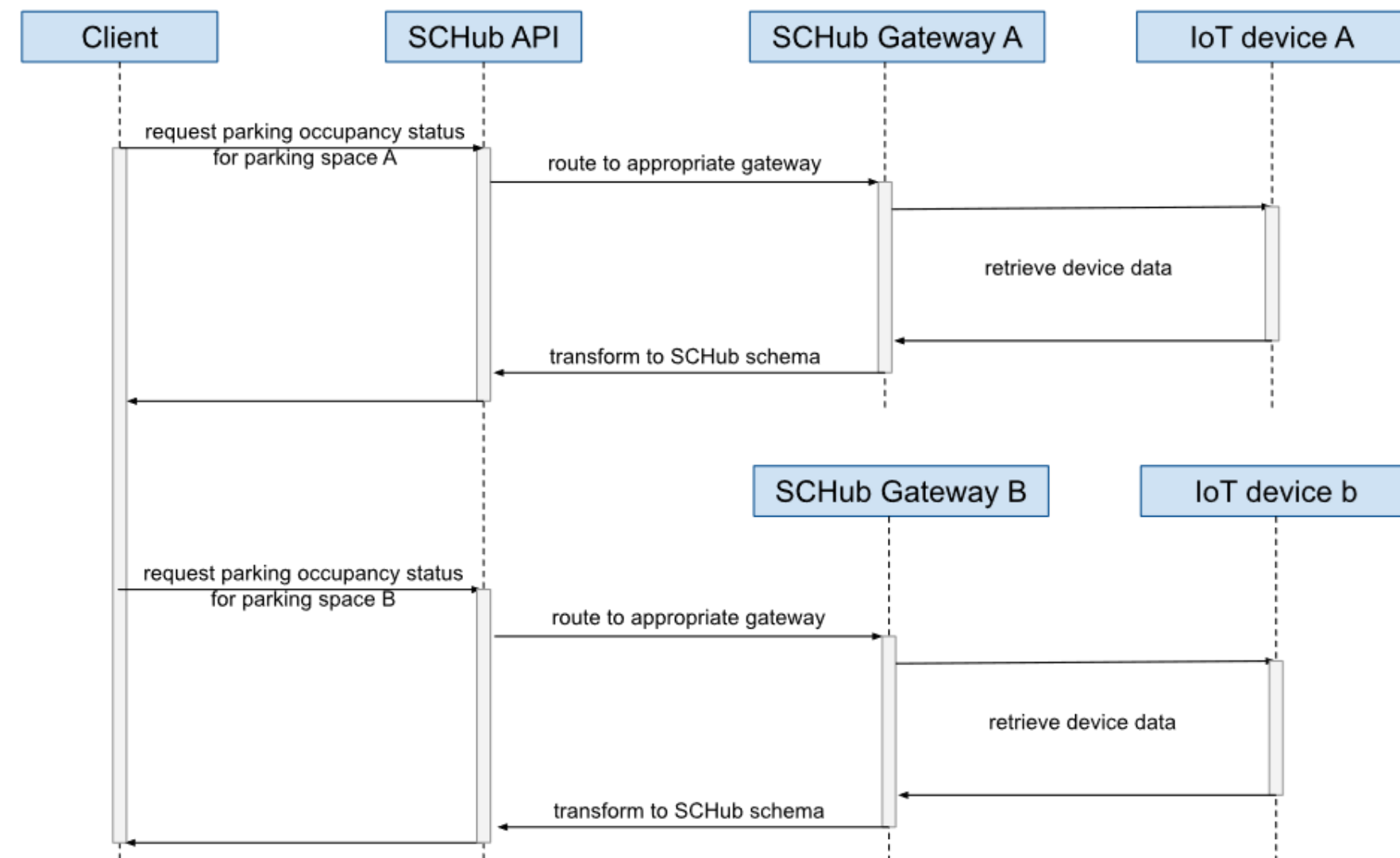
Use Case 2: Sensor measurement data discovery

The sensors deployed in a SC can be of different types and manufacturers, while they measure physical properties in a fragmented and incomparable way, regardless the measurements concern the same property/variable (i.e., temperature, humidity). The SCHub will enable the unified discovery of sensors that provide data about requested specific properties, and the collection of the corresponding data.

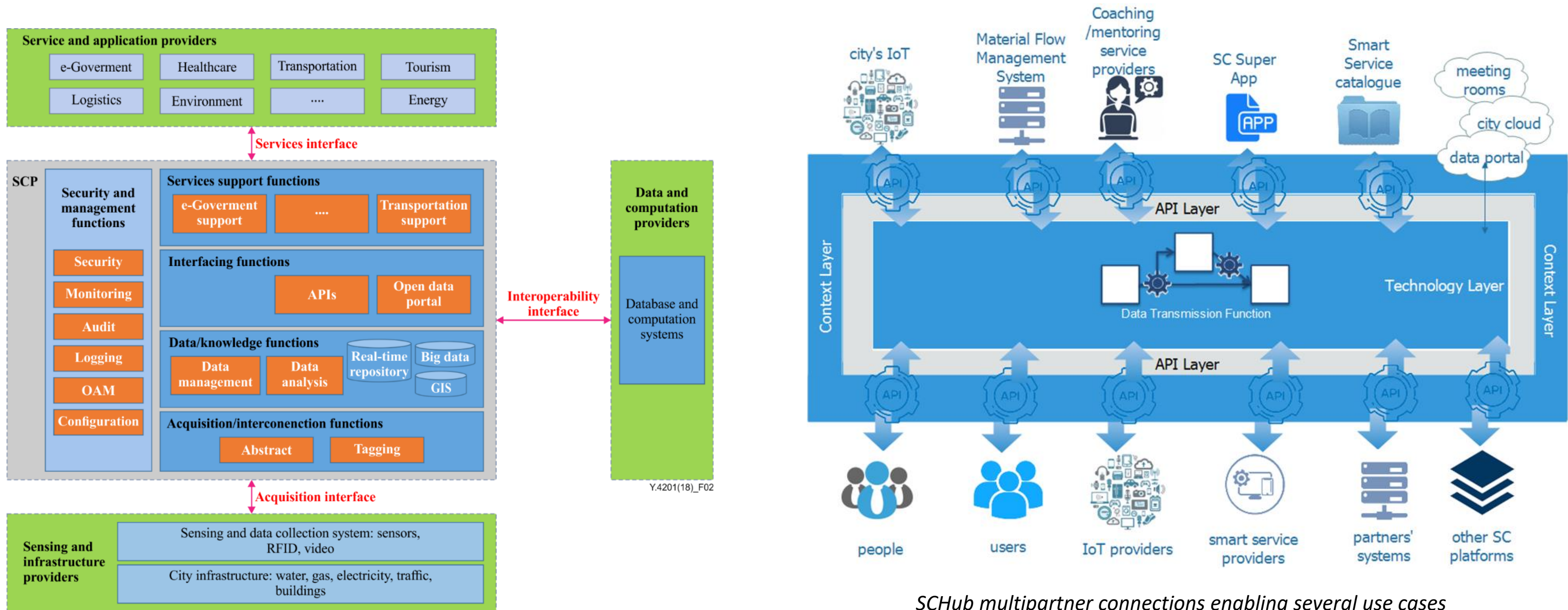


Use Case 3: Retrieval of sensor measurements using a unified API

The sensors deployed in a SC are using various technologies and schemas to describe the data they measure. The unified SCHub API will make the access to these data easier.



The SCHub must be integrated with the SCP



SCHub multipartner connections enabling several use cases

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Thank you!

