SYNCHRONICITY

Cross-domain Interoperability Points and Interoperability Mechanisms

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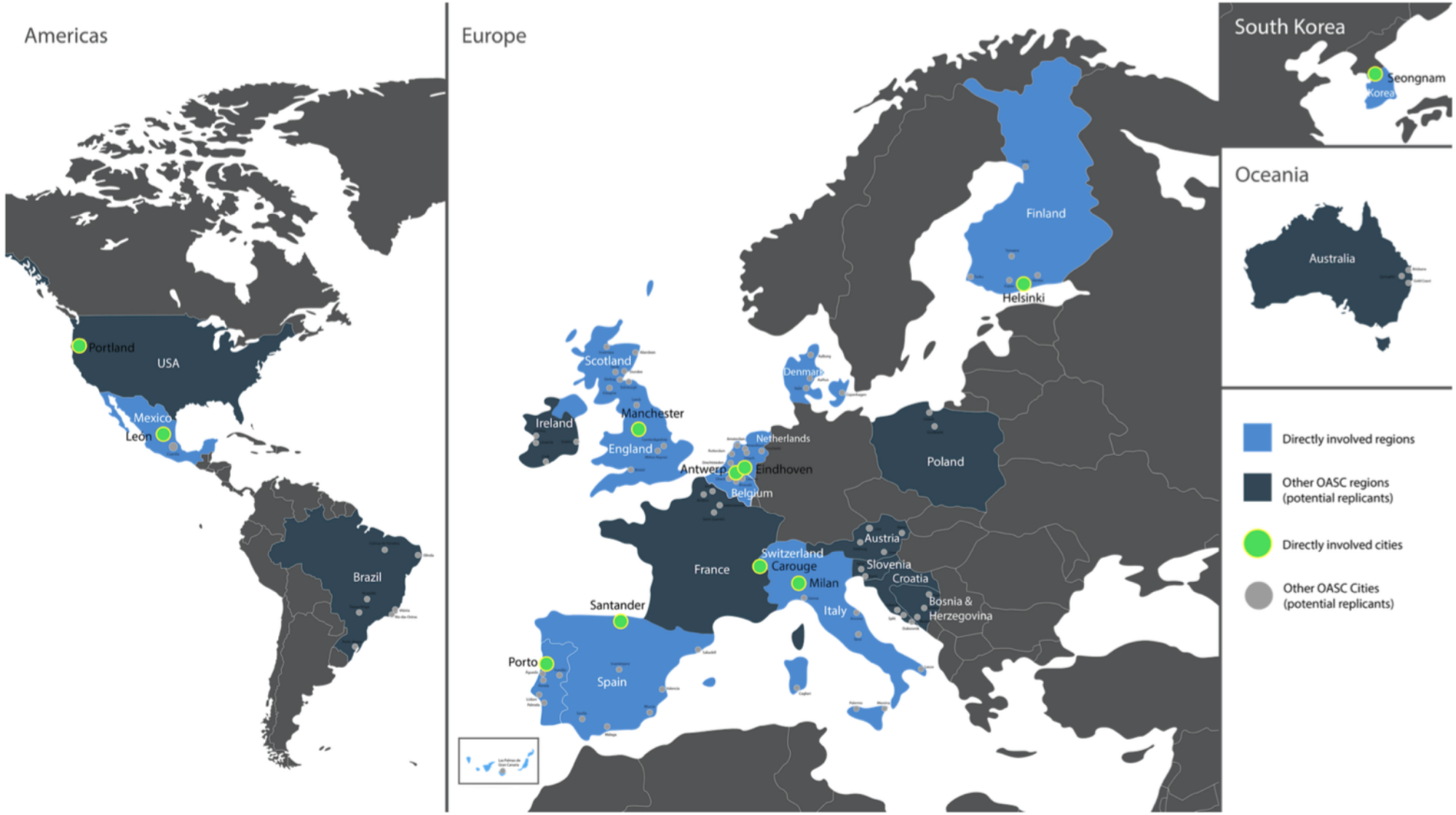
SynchroniCity

SynchroniCity aims at delivering a **Single Digital City Market** for Europe by piloting its foundations at scale in reference zones across 8 European cities, involving also other cities globally.

It addresses how to **incentivise and build trust** for companies and citizens to actively participate, in finding **common co-created IoT solutions** for cities that meet citizen needs and to create an environment of **evidence-based solutions** that can easily be replicated in other regions.

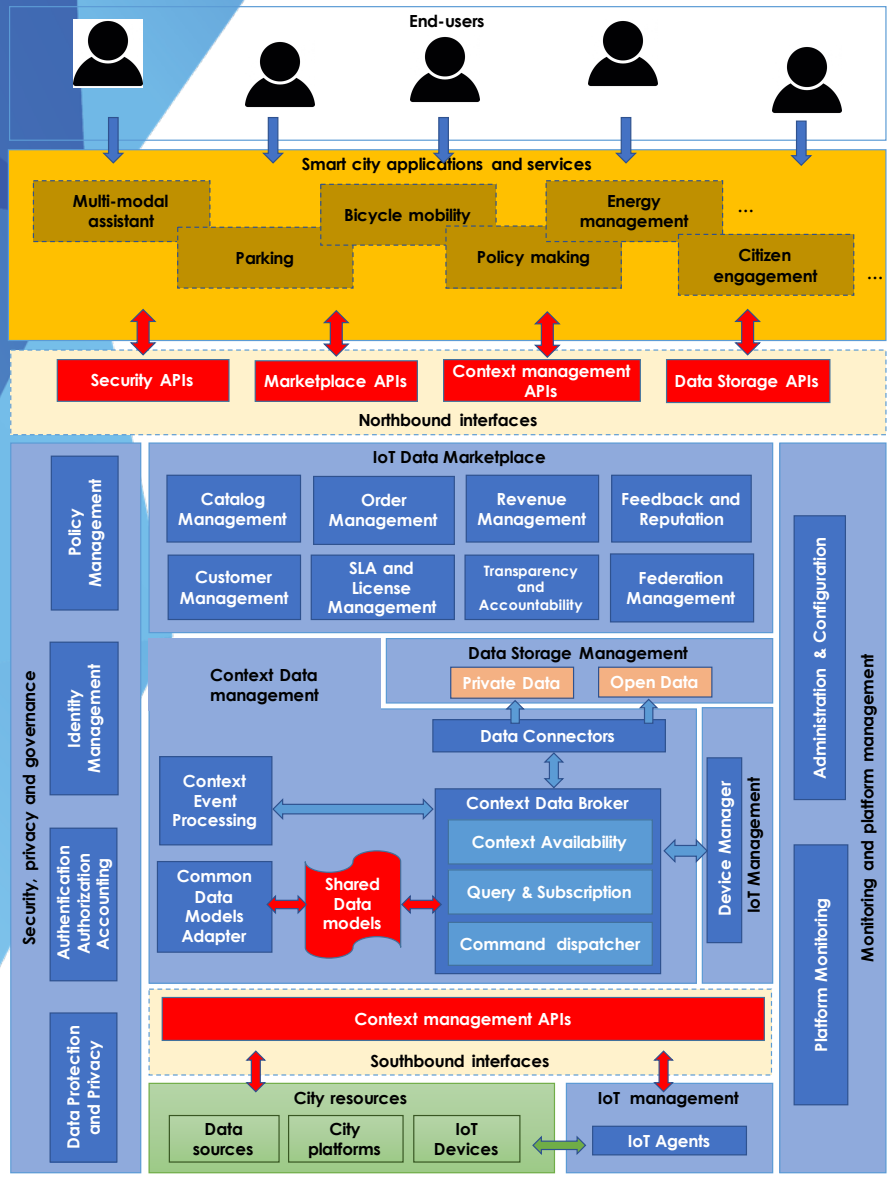
Core cities:
Antwerp (BE), Eindhoven (NL), Helsinki (FI), Manchester (UK)
Milan (IT), Porto (PT), Santander (ES), Carouge (CH)



Synchronicity Key Elements

- Cross-domain interoperability is a main barrier (e.g. ETSI STF 505)
- Interoperability vs. Replicability
- Architecture Model vs. Interoperability Points and Mechanisms
- (Pivotal) Interoperability Points (PPIs) – NIST/EIP-SCC
- (Minimal) Interoperability Mechanisms (MIMs) – OASC/EIP-SCC
- Existing standards and emerging specifications
- Validation through open calls
- **A joint LSP open call ”package” of MIMs**
- **LSP AG02, AG04, AG06, AG08 vs. SDOs vs. AIOTI vs. Market**

SynchroniCity Architecture



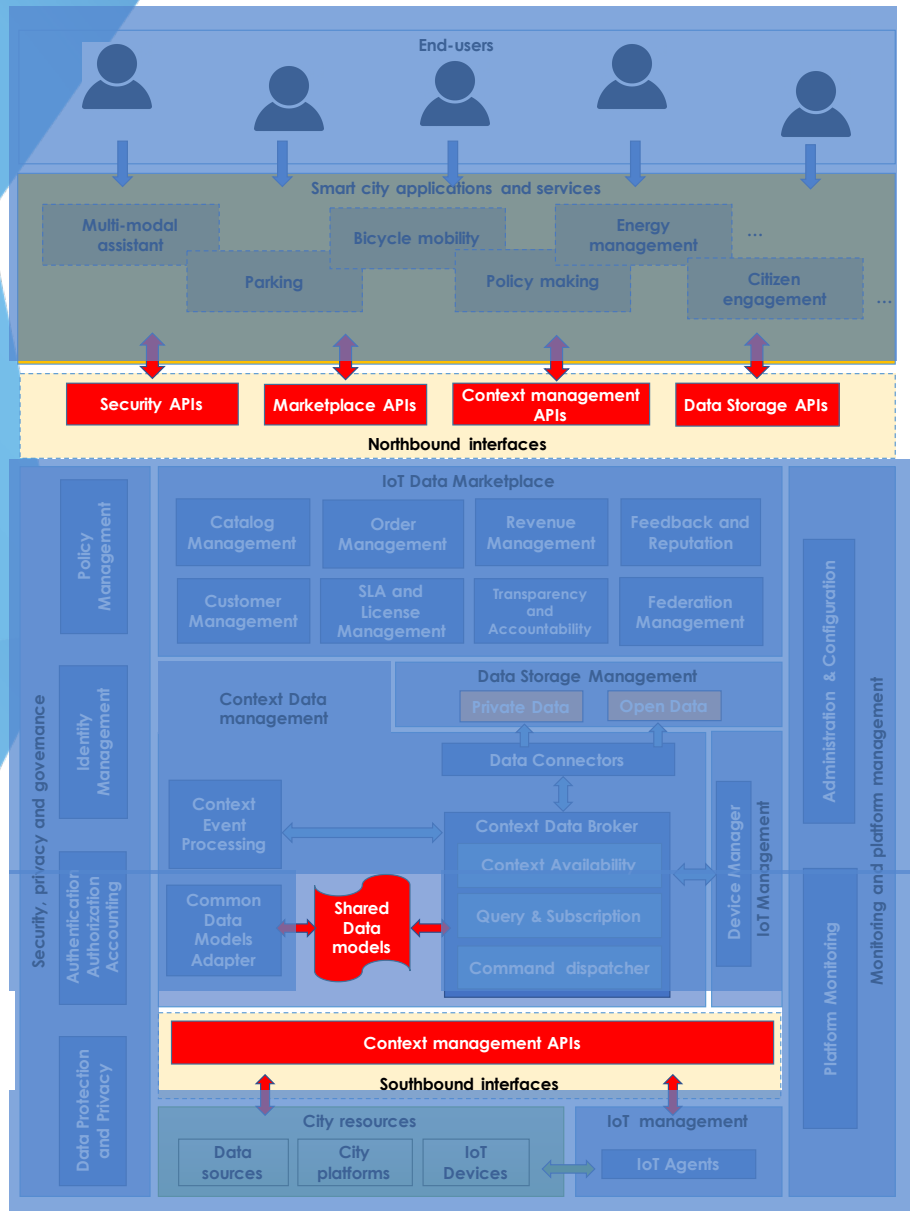
- **IoT Management:** to interact with the devices that use different standards or protocols making them compatible and available to the SynchroniCity platform.
- **Context Data Management:** to manage the context information coming from IoT devices and other public and private data sources.
- **Data Storage Management:** to provide functionalities related to the data storage and data quality interacting with heterogeneous sources.
- **Marketplace:** to implement a hub to enable digital data exchange for urban data and IoT capabilities providing features in order to manage asset catalogues, orders, revenue management.
- **Security**: to provide crucial security properties such as confidentiality, authentication, authorization, integrity, non-repudiation, access control, etc.
- **Monitoring and Platform management**: to provide functionalities to manage platform configuration and to monitor activities of the platform services.

Baseline: SynchroniCity Cities/Reference Zones, OASC, FIWARE, EIP-SCC, NIST IES-CF.

Related standards: ITU-T SG20*/FG-DPM* (*drafts), ISO TC268.

Spec. doc.: Reference Architecture for IoT Enabled Smart Cities (D2.10)
http://synchronicity-iot/about

Interoperability Points



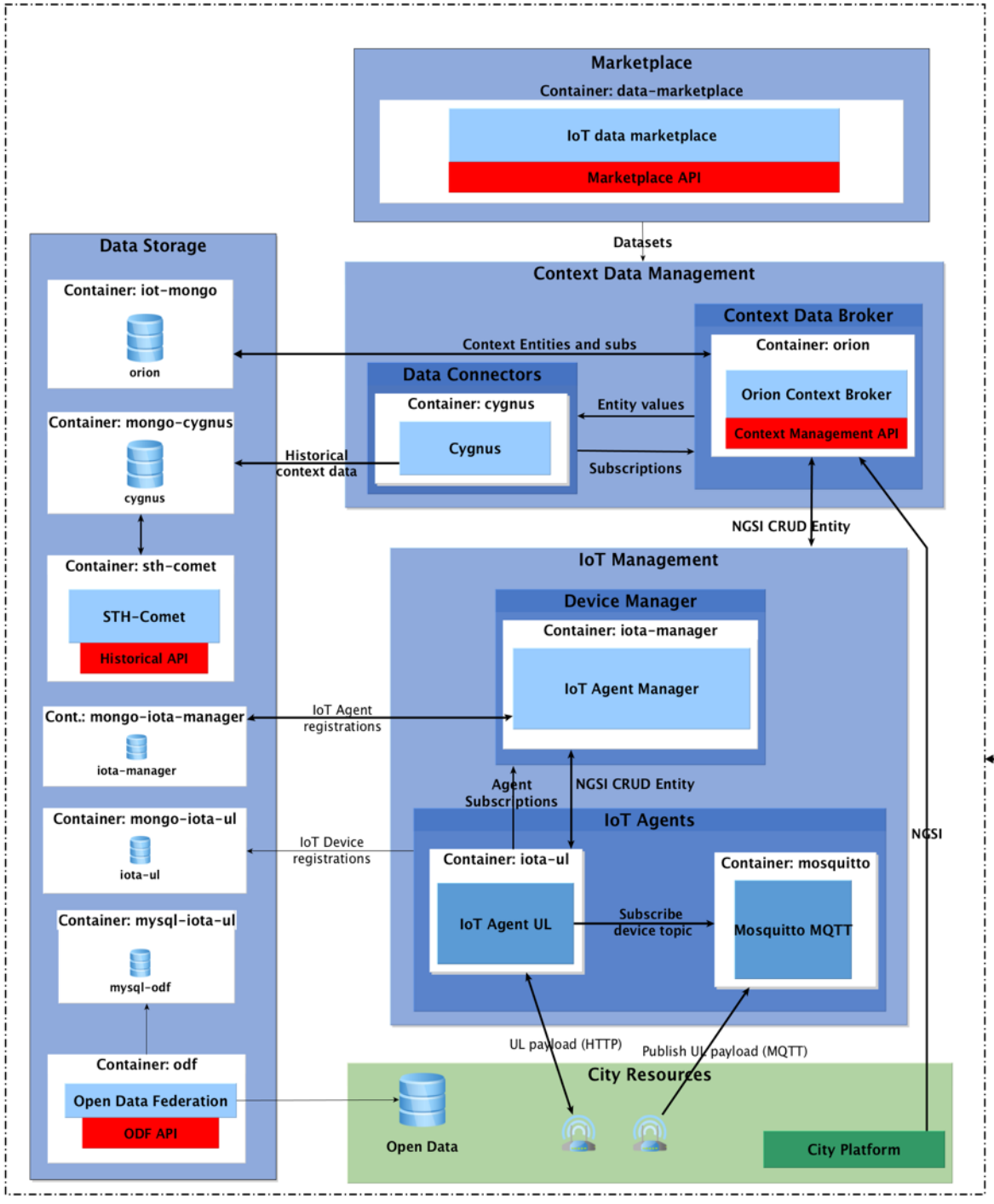
- **Interoperability Points** represent the main interfaces that allow a cities and applications to interact with SynchroniCity platform
- Interoperability points are independent from the specific software components that realize them and can be implemented by cities in different steps to reach different levels of compliance
- **Interoperability Mechanisms** are the actual specifications of the interfaces at the Interoperability points: they are standard API and guidelines that have to be implemented by a city in order to be compliant with the SynchroniCity framework

Interoperability and integration approach

- The principles that drive the implementation and integration of the Synchronicity architecture in the cities are the following:
- Cities should ”enter” in Synchronicity ecosystem with the **minimum possible effort**
- Cities can access to Synchronicity with **different level of maturity** and compliance
- Cities are not obliged to change their existent system/services, integration **has to be modular and decoupled**
- Cities are **not obliged to adopt specific technologies**. The focus is on API interfaces rather then concrete implementation

Interoperability Mechanisms

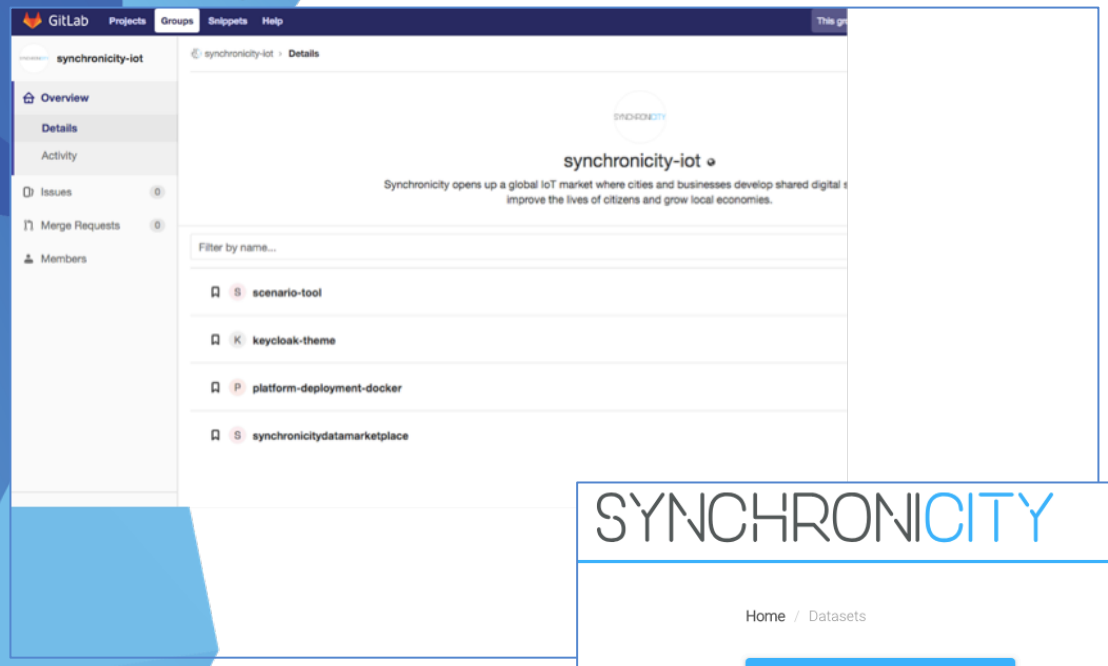
	Description	Specification document (http://synchronicity-iot.eu/docs/)	Related Standards [and Baselines]
Context Management API	This API allow to access to real-time context information from the different cities.	https://synchronicityiot.docs.apiary.io/#reference/context-management-api Reference Architecture for IoT Enabled Smart Cities (D2.10)	ETSI NGSI-LD prelim API, OMA NGSI, ITU-T SG20*/FG-DPM*
Shared data models	Guidelines and catalogue of common data models in different verticals to enable interoperability for applications and systems among different cities	Guidelines for the definition of OASC Shared Data Models (D2.2)	[FIWARE + SynchroniCity RZ data models]
Marketplace API	It exposes functionalities such as catalog management, ordering management, revenue management, SLA, license management etc.	Basic Data Marketplace Enablers (D2.4) https://synchronicityiot.docs.apiary.io/#reference/marketplace-api	[TM Forum API]
Security API	API to register and authenticate user and applications in order to access to the SynchroniCity-enabled services.	https://synchronicityiot.docs.apiary.io/#reference/security-api	OAUTH2
Data Storage API	This API allows to access to historical data and open data of the reference zones.	https://synchronicityiot.docs.apiary.io/#reference/data-storage-api-historical https://synchronicityiot.docs.apiary.io/#reference/data-storage-api-opendata	ETSI NGSI-LD, DCAT-AP [CKAN]

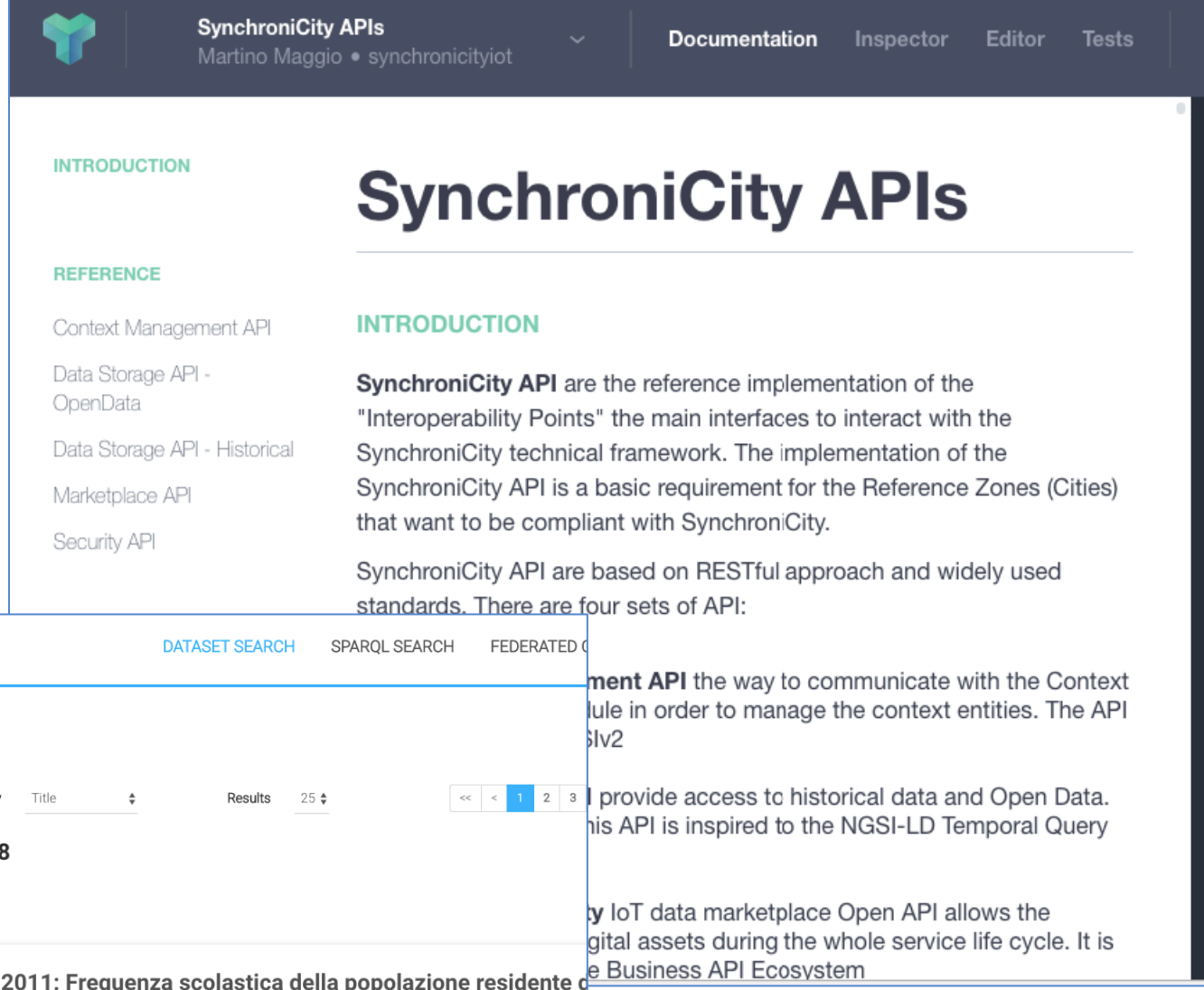


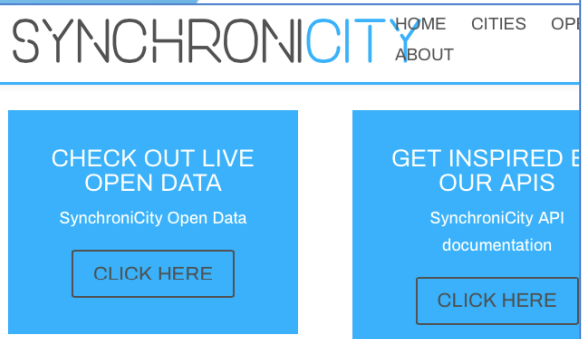
Reference Implementation

- SynchroniCity provides reference implementation components ready to be used by a city
- Some of the proposed reference components are based on FIWARE ecosystem but this doesn't preclude the integration of the city through any other technology
- The integration is API based implementing lightweight adapters among the existing platform interfaces and the SynchroniCity ones.
- Cities are able to choose to install some of the proposed components in their local premises or to use them in “as-a-service” mode using specific cloud instances

Project Resources







http://synchronicity-iot.eu/
https://synchronicityiot.docs.apiary.io/
https://gitlab.com/synchronicity-iot
https://opendata.synchronicity-iot.eu/
https://iot-data-marketplace.synchronicity-iot.eu/

SynchroniCity compliance steps

Identify assets

- First, a city needs to **identify the assets** that can and should be integrated with the SynchroniCity framework. These can include, e.g., data, (micro)services and IoT devices

Implement access API

- Second, the **access API** can be implemented progressively, in different steps, depending on the technical infrastructure of the city. Security and Context Management API are the basic ones.

Harmonise data models

- Third, SynchroniCity curates a set of **standard data models** for different sectors/application domains, and supports a city in the adaptation of their own data models to the SynchroniCity ones with guidelines and dedicated tools

Be part of a market

- Finally, SynchroniCity offers a fundamental asset access and management framework, partly to ensure proper handling of ownership, terms and licenses, which is an essential element, partly because SynchroniCity has the aim to foster a market for IoT-Enabled urban services, including data. Towards these two objectives, SynchroniCity provides a **common "marketplace"** in which digital assets can be offered to public and private stakeholders, with or without monetisation.

SYNCHRONICITY

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