



Environmental Data Interoperability

Presentation

Environmental data

Avis du conseil
national du numérique
– juillet 2020

« *Faire des données
environnementales des
données d'intérêt général* »

En deuxième lieu, l'interopérabilité et la qualité des données, ainsi que leurs structure, authenticité et intégrité, sont essentielles pour le partage de données d'intérêt général. Dès lors, le régime d'ouverture des données d'intérêt général implique la prise en considération de la lisibilité et l'interopérabilité des formats et des données. Celles-ci peuvent effectivement être disponibles dans un format uniforme et directement lisible et interopérable ou présentées dans des formats hétérogènes peu lisibles et donc difficilement interopérables. Les auditions du Conseil national du numérique ont confirmé la nécessité d'élaborer des standards de données afin que chaque producteur de données puisse émettre une donnée (ré)utilisable facilement. En effet, l'absence de standards rend souvent les données inexploitable ou nécessite un traitement supplémentaire ralentissant leur usage. Néanmoins, l'interopérabilité représente un coût, ce qui implique l'allocation de moyens financiers substantiels.

Ainsi, les membres du Conseil estiment que les données environnementales d'intérêt général devraient être mises à disposition « *dans des formats qui sont ouverts, lisibles par machine, accessibles, traçables et réutilisables, en les accompagnant de leurs métadonnées* » en recourant à des interfaces de programmation (API) appropriées et, le cas échéant, sous la forme d'un téléchargement de masse. Cela permettrait de définir clairement le périmètre des données accessibles, les méthodes d'interrogation de la base de données, etc¹⁴⁶.

Interoperability and environmental data

Interoperability (Report CitiMeasure_D1.1):

The European Interoperability Framework identifies four layers of interoperability barriers with the aim of connecting public administrations, businesses, and citizens.

- Technical interoperability: Exchanging data between two existing systems.
- Organisational interoperability: Exchanging data between public administrations with compatible internal procedures for data sharing.
- Semantic interoperability: Exchanging data in the right format and overcome differences in terminology.
- Legal interoperability: Exchanging data between two systems whose legal frameworks fit together.

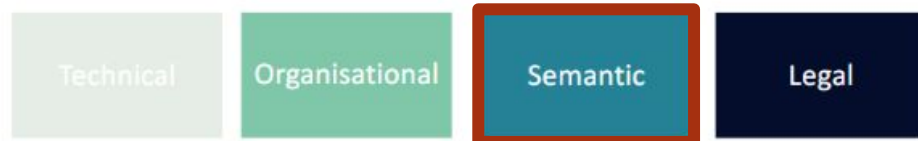


Figure 11: The conceptual framework on data interoperability followed in this review

Subject of study :

- Semantic level -> lack of simple and applicable standard
 - Inspire directive : complex
 - ISO 19156 - Observation and Measurement : reference
 - OGC standards : complex to implement

EIF4SCC

Recommendation #10

Use open standards and open technical specifications when developing local data platform and services, include multiple access and assistance channels to ensure that users can choose the option that best addresses their needs and/or preferences.

Recommendation #16

Establish, publish and maintain API design framework(s) to facilitate the automation of data sharing and data access for cities and communities to enable the development of (new) services and solutions.

Recommendation #24

Create more horizontal services towards local data platforms, to overcome silos within different domains, by encouraging collaboration and engagement among inhabitants, business, visitors, organisations and city/community administrators.

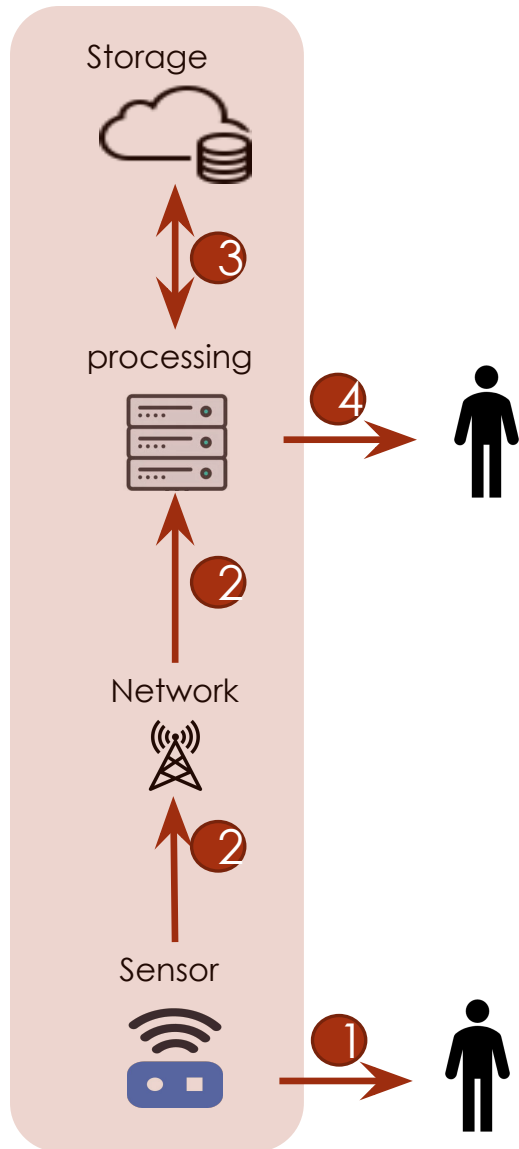
Recommendation #26

Use commonly agreed open standards and open technical specifications for achieving interoperability of data, systems, and services, to support cities/ communities and suppliers during the design, development and implementation phase of new services or reengineer existing ones (to avoid “reinventing the wheel”).

Recommendation #27

Use and raise awareness of the benefits of open standards and open technical specifications amongst SCC service providers, during the design, development and implementation phase.

Interoperability and environmental data

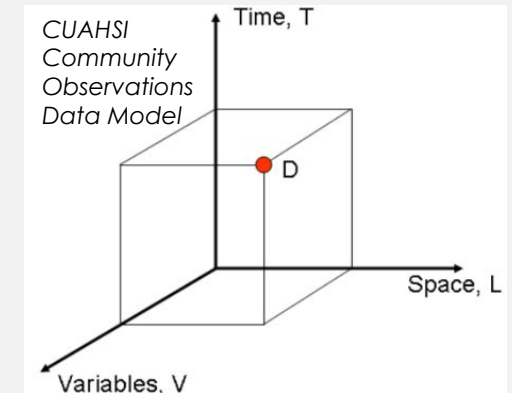
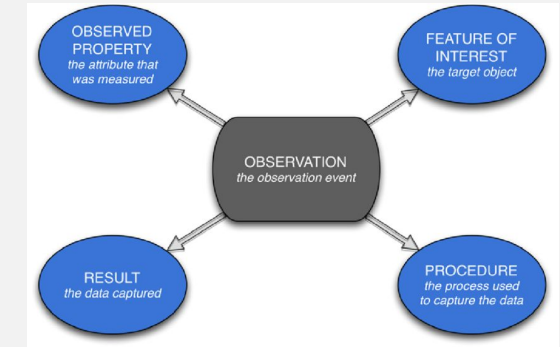


Data interoperability :

- Semantic interoperability to be define
- Technical interoperability available

Level :

- direct access to sensor data
 - e.g. BLE – Environmental sensing
- data transfer to server
 - network Codec (coder/decoder)
 - Binary (eg. payload LoRa)
 - text (eg. Json https requests)
- Data storage
 - NoSQL (document eg. json)
 - SQL (table)
- Data access
 - API (select, filter)
 - Format (e.g. Json, csv)



ISO 19156 - Observation and Measurement

how to tackle the subject ?

Level 1 - direct access to sensor data

- Standard BLE – environmental sensing (includes air pollutants since 2021- 09
 - Every BLE mobile can read data
- Easy to deploy (tested between the most basic microcontroller ESP32 and mobile)
- **Proposal : Deploy BLE sensor**

Level 2 – data transfer to server

- Two main networks : LPWAN (LoRa), LAN (TCP/IP)
- Two formats for the “payload” : binary (e.g. LoRa), string (e.g. json)
- **Proposal : define Json format and binary format**

Level 3 – data storage

- Three technologies : SQL database, NoSQL database, file
- The most suitable solution is NoSQL database (e.g. MongoDB) -> direct storage of Json format
- **Proposal : deploy a NoSQL database (with the defined json format)**

Level 4 – data access

- Two levels : raw data, global data
- Raw data : filter API on datation, location, property
- Global data : aggregation API
- **Proposal : deploy raw data and global data API**

Observation Data Model (transversal)

- i.e. ppsr-core
- Simple example :
 - *Result measurement* : 20
 - *Property* : PM2.5,
 - *location* : [2.4, 48.9],
 - *datation* : 2022-02-04T12:05
- Concept :
 - Measurement : everything
 - Property : catalog
 - Location :
 - WGS84 (lat/lon)
 - Point / polygons
 - Datation :
 - ISO 8601
 - Instant / intervals / slots
 - Metadata
 - TbD
- **Proposal : build an ODM for environmental data**

MAPPING DATA PORTABILITY INITIATIVES, OPPORTUNITIES AND CHALLENGES

OECD DIGITAL
ECONOMY
PAPERS

December 2021

Interoperable specifications including standards and APIs

Lack of common standards and interoperability is one of the most frequently cited barriers to the implementation of data portability and for effective re-use of the data. Users, in practice, may face difficulties porting their (personal) data because most information systems are not interoperable and standards are a condition for interoperability. These standards can exist at various levels corresponding to the aforementioned interoperability requirements for data, protocol, information systems and digital services. Even use of commonly used machine-readable formats may not guarantee data interoperability. As highlighted in OECD (2019^[10]), and noted in previous sections, common formats may enable *syntactic* interoperability, i.e. the transfer of “data from a source system to a target system using data formats that can be decoded on the target system” (and thus accessibility). However, common formats do not guarantee *semantic* interoperability, defined as “transferring data to a target such that the meaning of the data model is understood”. Both syntactic and semantic interoperability are needed for the re-use of data. Regarding this potential gap, the (former) Article 29 Data Protection Working Party (2017^[87]) guidelines on data portability complement the requirement of machine-readable format with the intent to achieve interoperability. They explain that “[t]he most appropriate format will differ across sectors and adequate formats may already exist, but should always be chosen to achieve the purpose of being interpretable.”³⁵

Responses³⁶ from the Online Platform Survey underline the lack of standards and technical inconsistencies as major challenges in importing data from other online platforms. In particular, a major challenge was to ensure compatibility between data models. In this context, respondents highlighted the challenge of identifying common standards for data while balancing the need for new and innovative (as well as an increasing variety of) data formats with data interoperable formats and standards. Another related challenge was to provide data that are both machine-readable and intelligible to end-users, while managing the growing variety of technological, business and legal requirements.

Respondents noted that data formats were often specific to use cases even within a single category of data. In this regard, building common, open-source data models and data format standards was highlighted as a possible solution. These common standards should also guarantee privacy protection in data