EUROPEAN COMMISSION
Directorate-General for Communications Networks, Content and Technology
Directorate-General for Energy
Directorate-General for Mobility and Transport

SMART CITIES AND COMMUNITIES

Accompanying Document to topic:

SCC3 – 2015 Development of sytem standards for smart cities and communities.

1. Full text of the call

Scope: Today the standards are developed for specific components or areas such as smart meters, smart grids, ICT etc. With the development of integrated solutions of Smart Cities and Communities a system approach is needed. Furthermore through standardisation the solutions identified by smart cities and communities can envisage costs reductions. It is expected that this work is carried out by the industries cities and communities contributing to the Smart Cities and Communities European Innovation Partnership in cooperation with the European Standardisation Organisations (CEN, CENELEC, ETSI) as well as other Standard Developing Organisations (SDOs) responsible for technical specifications in the area of Smart Cities. Social acceptance of developed solutions might be considered.

The process for developing smart cities and communities standards should ensure

- interoperability of solutions, i.e. adaptability of solutions to new user requirements and technological change as well as avoidance of entry barriers or vendor lock-in through promoting common meta-data structures and interoperable (open) interfaces instead of proprietary ones;
- open and consistent data, i.e. making relevant data as widely available as possible – including to third parties for the purpose of applications development – whilst using common, transparent measurement and data collection standards to ensure meaningfulness and comparability of performance/outcome measurements.

This action will cross-fertilise and cooperate with actions under topic SCC 1 – 2014/2015.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 to 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The project should lead to

- accelerating the deployment of Smart Cities and Communities solutions by ensuring the up-scaling of the process and lowering their costs,
- enabling the opening of market for multiple actors,
- ensuring the front run position for European smart cities solutions, at forefront worldwide.

Type of action: Coordination and Support Actions

2. Accompanying information

This text is intended as a help tool to the interested proposers, presenting on a high-level, the vision of the Commission on the area of the call.

2.1.   Recommendations to proposers

Standards should be based on a minimum set of to-be-defined requirements in terms of interoperability potential, openness and reference implementation validation. Existing initiatives from standardisation bodies should be leveraged, and existing work should be used as much as possible in order to reduce delivery time.

Section 2.4 of this document gives examples of essential standards that could be included, though this should be decided/validated with the wider community of cities in the context of the proposals.

Proposals should include cooperation activities with the priority area "standards" of the European Innovation Partnership on Smart Cities and Communities.

Moreover proposals have to envisage cooperation with the projects selected under SCC1 in order to ensure rapid marked take-up of the proposed standards.

Proposals may include schemes for certification.

2.2.   General description of the concept

The basic assumption is that Cities will, in all probability, use a city platform on which most city applications and services will run. These platforms will integrate many existing sectorial systems (e.g. Energy Efficient Buildings, Smart Grid, and Intelligent Transport Systems).
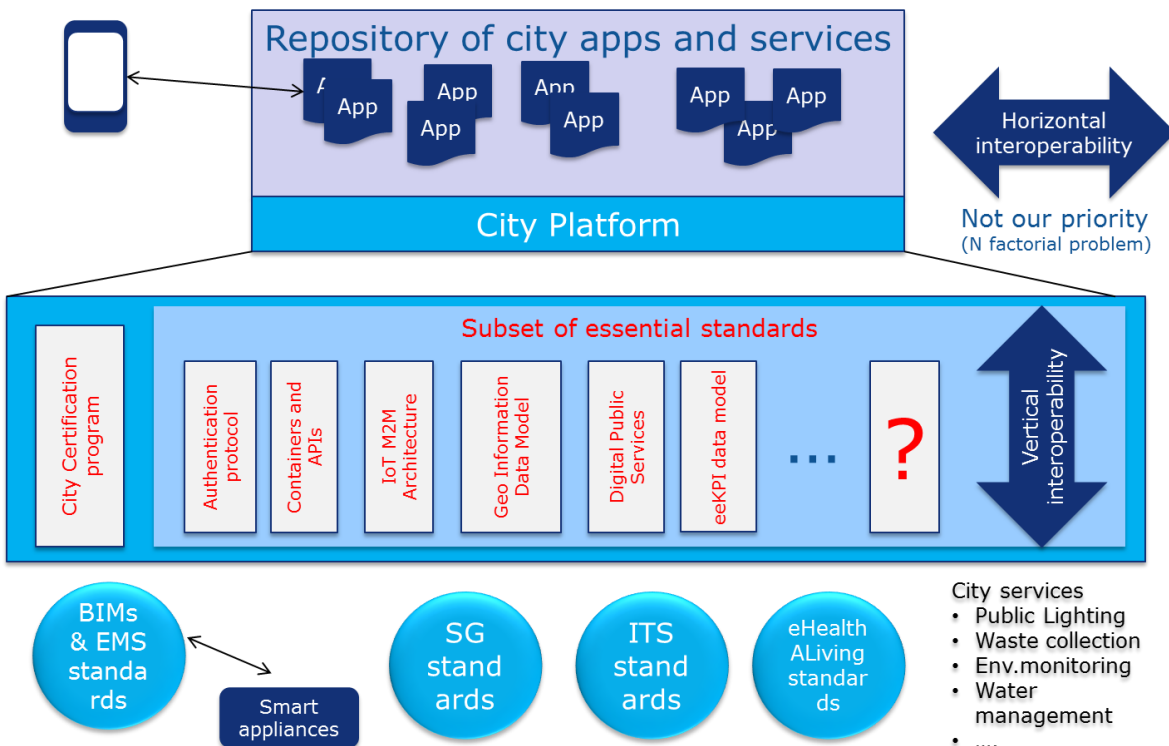
To achieve vertical interoperability, in order to adapt the solutions to new user requirements and technological change as well as to avoid of entry barriers or vendor lock-in, the basic principles for this standardisation exercise are:

- Use the current existing **standardisation** as a baseline. **Do not revise ongoing standardisation** at the sectorial level. What is already available today provides most of what is required.
- **Horizontal interoperability of applications and services running on top of city platforms is not practical at this first stage and is** out of the scope of this standardisation exercise.

The focus of this standardisation exercise is to identify, in case of need develop, a subset of open standards (those in the diagram are some examples) that are considered to be essential for any City Platform, so that:

A) the vertical interoperability requirements towards (i) sectorial systems and (ii) city applications and services with the platform are well defined
B) the adaptation of city applications and services from city platform to city platform is minimised

This subset of essential open standards could form the basis of a "soft" certification programme via special **conformity testing labs or other ways of certification (e.g. manufacturer declaration of conformity)**.

2.3.   Sectorial Systems

As a guide to proposers, examples of some of the standardisation efforts in several sectors are listed below. The list is by far not exhaustive.

2.3.1. Energy Efficient Buildings

BIM (Building Information Modelling) and BEMS (Building Energy Management Systems) is still an active area open to innovation. But there has already been much progress on interoperability. The Industry Foundation Classes (IFC)[1] standard of buildingSMART International , has been well established in the last years as the main OpenBIM standard reference. There is ongoing work under EU projects SEMANCO[2] and Ready4SmartCities[3] aiming at expanding these models to the level of smart cities.

2.3.2. Smart Appliances

The European Commission formally assigned ETSI to lead and organize the development of a standard on a Smart Appliances Ontology, and assure that it is fully ETSI M2M architecture conformant and recognized as an asset of the M2M community. The ETSI technical specification is expected by July 2015. Very advanced Open Source solutions exist like LinkSmart[4].

---

[1] http://www.buildingsmart.org/standards/ifc
[2] http://www.semanco-project.eu/
[3] http://www.ready4smartcities.eu/
[4] http://www.hydramiddleware.eu/news.php

2.3.3. Smart Grid

On 1 March 2011 the European Commission issued Mandate 490 - Standardization Mandate[5] to European Standardisation Organisations (ESOs) to support European Smart Grid deployment. With this mandate CEN, CENELEC, and ETSI were requested to develop a framework to enable European Standardisation Organisations to perform continuous standard enhancement and development in the field of Smart Grids. The work done can be divided in phase 1 (from 2011 to 2012) of the mandate and the issuing of the first set of standards followed up by the iteration (2013-2014) stage that focused on the methodology and putting in place a systematic process, along with a consistent set of standards addressing also security and interoperability. [6]

2.3.4. Intelligent Transport Systems (ITS)

In Europe ITS is addressed mainly by two major standardisation bodies: ETSI, namely through its technical Committee on ITS (ETSI TC ITS), and CEN, through its Technical Committee on ITS (CEN TC 278 WG16). Under Mandate /453 both organsisations delivered a commonly developed first set of standards on Cooperative ITS in February 2014.

Internationally, standardisation activities are taken up by ISO TC 204, with strong cooperation with CEN TC 278 through the Vienna agreement, but also by CEN TC 22. In addition standardisation relevant to ITS is done by other standardisation bodies like ITU, SAE, IEEE or ARIB. The supports global harmonisation of ITS standards. The ITS standardisation Coordination Group[7] and the Standardisation Harmonisation working group under the EU-US cooperation on ICT for transport research play an important role on the coordination of this activities.

2.4.   City Platform Essential Standards

The portability of the applications and services running on top of city platforms will substantially improve if a set of essential open standards is recognised as common requirements for all platforms.

The standards mentioned below are provided as examples.

2.4.1. Platform Architecture

An agreement about the basic platform architecture for Smart City Platforms would be highly beneficial. The objective is not to impose a specific platform on any City (it is recommended however to use open APIs and data models). Reusing or building on what is already available is preferred over starting from scratch. For example the FI-WARE Architecture[8] provides a description of the Reference Architecture and Generic Enablers (GEs), including the high-level description of the APIs that each FI-WARE Generic Enabler (GE) exposes to application developers or uses to connect to another FI-WARE GEs.

---

[5] http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/2011_03_01_mandate_m490_en.pdf
[6] http://ec.europa.eu/energy/gas_electricity/smartgrids/taskforce_en.htm
[7] http://www.imobilitysupport.eu/
[8] https://forge.fi-ware.org/plugins/mediawiki/wiki/fiware/index.php/FI-WARE_Architecture

2.4.2. Social

Open Authentication

OAuth[9] (OAuth 2.0) is an open standard for authorization. It is commonly used as a way for web surfers to log into third party web sites using their Google, Facebook or Twitter accounts, without worrying about their access credentials being compromised.

Open Social

OpenSocial is a public specification that defines a component hosting environment (container) and a set of common application programming interfaces (APIs) for web-based applications. It has become adopted as a general use runtime environment for allowing untrusted and partially trusted components from third parties to run in an existing web application. The OpenSocial Foundation[10] has also moved to integrate or support numerous other open web technologies. This includes OAuth and OAuth 2.0, Activity Streams, and Portable Contacts, among others.

2.4.3. Business

Most businesses Smart Cities' applications and services will need some basic data, related to basic information like geographical data or environmental data.

City GML

CityGML[11] is a common information model for the representation of 3D urban objects. It defines the classes and relations for the most relevant topographic objects in cities, and provides models with respect to their geometrical, topological, semantic and appearance properties. This thematic information goes beyond graphic exchange formats and makes it possible to employ virtual 3D city models for sophisticated analysis tasks like simulations, urban data mining, facility management, and thematic inquiries in different application domains. City eeBIM systems use CityGML.

Spatial and Environmental Data

The INSPIRE[12] directive aims to create a European Union (EU) spatial data infrastructure. This will enable the sharing of environmental spatial information among public sector organisations and better facilitate public access to spatial information across Europe.

IoT Architecture

IoT is a major component of smart city infrastructures. It is subject to the development of architectural models (e.g. ITU) and there are multiple approaches. One example is OpenIoT[13] (an open source middleware for getting information from sensor clouds, without worrying what exact sensors are used) which is a natural extension to cloud computing implementations.

---

[9] http://oauth.net/
[10] http://opensocial.org/
[11] http://www.opengeospatial.org/standards/citygml
[12] http://inspire.ec.europa.eu/
[13] http://www.openiot.eu/

2.4.4. eGovernment

The "Semantic Interoperability Centre Europe (SEMIC.EU[14])" is the pan-European service for semantic interoperability in eGovernment. It operates as a network of eGovernment projects. The platform www.semic.eu is built around a repository of real-life solutions referred to as "interoperability assets". They are provided by projects and organisations from all sectors. The objective is to facilitate the reuse of syntactic (e.g. XML schemas) and semantic assets (e.g. taxonomies, ontologies) needed for semantic interoperability.

2.4.5. Open Data

Directive 2003/98/EC on the re-use of public sector information (as amended by Directive 2013/37/EU) requests Member States to provide their data preferably in machine-readable formats and, amongst others, encourages the use of standard licences.

For the EU Open Data Portal (http://open-data.europa.eu/en/data/), certain (de facto) standards are recommended (although not prescribed), e.g. concerning data formats (such as the W3C Recommendation RDF), as well as the use of controlled vocabularies.

2.5.   Applications and Services Ecosystem and Delivery Framework

An agreement about the basic elements of the applications and delivery framework for Smart City Platforms would be highly beneficial. As in 2.4.1, FI-WARE is used as an example to stress the importance of re-using what it is already available. In FI-WARE the Generic Enablers (GEs) of the Applications/Services Ecosystem and Delivery Framework[15] together support managing services across the whole service lifecycle from creation and composition of services to monetization and revenue sharing. The term "service" refers to both front-end applications and back-end application services (typically exposed through an API). Some examples of elements in such framework are:

- A Store, which enables selling services to consumers as well as developers and is responsible for managing offerings and sales.
- A Marketplace, which allows consumers to find and compare service offerings published on different stores.
- A Revenue Sharing System (RSS Engine), which allows the calculation and distribution of revenues according to the agreed business models.

This set of self-contained GEs represents only an initial starting point for any future business framework.

---

[14] https://joinup.ec.europa.eu/community/semic/description
[15] https://forge.fi-ware.org/plugins/mediawiki/wiki/fiware/index.php/Architecture_of_Applications_and_Services_Ecosystem_and_Delivery_Framework