

CROSS FERTILISATION THROUGH ALIGNMENT, SYNCHRONISATION AND EXCHANGES FOR IoT

H2020 – CREATE-IoT Project

Deliverable 06.08

Interoperability Framework Workshop

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PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Summary			
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DoW	This deliverable summarizes a part of the work carried out in task T06.01 (IoT Interoperability, standards approaches, validation and gap analysis) and includes a short summary of the “IoT Interoperability Framework” workshop carried out on November 7 th , 2018 in Brussels. This workshop was a common event where the IoT LSPs have discussed the most recent progress regarding the definition of an IoT Interoperability Framework that can apply to the IoT large-scale pilots and potentially beyond, together with an evaluation of potential dissemination strategies, in particular towards standardisation.		
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1. EXECUTIVE SUMMARY

1.1 Publishable summary

The “IoT Interoperability Framework” workshop was carried out on November 7th, 2018 in Avenue Beaulieu 25, Brussels. This workshop was a common event where the IoT LSPs have discussed the most recent progress regarding the definition of an IoT platforms Interoperability Framework that can apply to all the LSPs and potentially beyond, together with an evaluation of potential dissemination strategies, in particular towards standardisation.

The IoT interoperability framework is considering the evolving IoT architecture, heterogenous IoT platforms, communication standards and specifications used by the LSPs and aims to propose a common three-dimensional IoT architectural model that captures the existing IoT architectural layers, cross-cutting functions and the system properties for IoT implementations.

1.2 Non-publishable information

None, the document is public.

2. INTRODUCTION

2.1 Purpose and target group

This workshop was a common event where the IoT LSPs have discussed the most recent progress regarding the definition of an IoT platforms Interoperability Framework that can be applied to all the LSPs, and potentially beyond, together with an evaluation of potential dissemination strategies, in particular towards standardisation. The work to prepare the workshop focused on identifying the main types of IoT platforms used across the LSPs, the functionality IoT platforms include, the standards employed by the LSPs in different pilot implementations and mapped to the different use cases.

2.2 Contributions of partners

ETSI contributed to the organization of the event, the content of the document and two presentations during the event.

SINTEF has contributed to the organization of the event and provided inputs to section 4.

NUIG contributed with a presentation during the event.

TL contributed with a presentation during the event.

AS contributed to the discussion during the event.

MI contributed to the discussion during the event.

2.3 Relations to other activities in the project

This event has been organized within the framework of activities of CREATE-IoT WP06 (IoT Interoperability and Standardization). It has also benefited from contributions stemming from ongoing work in the IoT LSPs and the IoT Activity Group AG02 (IoT standardisation, architecture and interoperability).

3. WORKSHOP SUMMARY

This section presents a short summary of the IoT “Interoperability Framework” workshop which took place in Avenue Beaulieu 25, Brussels on November 7th, 2018.

The slides of the presentations, with all the details, are available in the e-Room of CREATE-IoT and of the IoT European Large-Scale Pilots (LSP) Programme.

3.1 Objectives

This workshop was the fourth one organised by the IoT LSPs Activity Group AG02. The first three workshops have taken place between January and June 2018. Their main objectives have been:

- To identify the commonalities and differences across the LSP regarding interoperability and standards, in particular with an overall approach based on the analysis of the LSP Use Cases (that has been consolidated by Activity Group AG01);
- To outline the main elements of an Interoperability Framework for the LSPs involving:
 - Reference architectures, interoperability criteria, platforms, components;
 - The identification of the existing standards adopted by the LSPs and of the gaps that they have to address with solutions that may be towards standardisation;
- To propose a synthesis regarding in particular a Reference architecture model.

The main objectives of Workshop #4 were to:

- Discuss the consolidated Interoperability Framework proposed by CREATE-IoT WP6 regarding Reference architecture, interoperability mechanisms, IoT platforms;
- Consolidate the results for the preparation of the CREATE-IoT WP06 Deliverable D06.08;
- Outline a strategy for the dissemination of results (e.g., White Paper, etc.).

At the opening of the workshop, the European Commission (EC) insisted on the overall objective of contributing to the acceleration of the take-off of IoT and pointed to diverse channels for this, e.g., the impact on public procurement or the work of AIOTI.

3.2 The components and the usage of the Interoperability Framework

The discussion was structured by a presentation based on the Interoperability Framework developed in CREATE-IoT Deliverable 06.02 (“Recommendations for commonalities and interoperability profiles of IoT platforms”). The focus was on the main elements regarding reference architecture (common layers; various views); Interoperability Framework (Points and Mechanisms), IoT platforms and software. The presentation has introduced a proposed three-dimensional reference architecture and how it could be used.

For the analysis of a given use case, different views are possible (that can be considered as projections of the three-dimensional reference architecture model on three different planes) that will allow different stakeholders to participate to the description of the IoT system from different perspectives:

- The “*Layers*” perspective will outline the different functional components that the IoT system will encompass at the different layers, showing a set of functional components. It will be used in particular by the designers (and developers) of the IoT system;
- The “*Cross-cutting functions*” perspective will also outline functional components in support of some of specialised aspects of the IoT system such as Security or Privacy. It will be used in particular for allowing specialists of the cross-cutting function (e.g., security experts) to share with designers and developers involved in the “Layers” view;

- The “*Property*” perspective supports the description of expected characteristics of the system from a non-functional point of view (such as Integrability or Manageability) thus allowing contractors or end-users to express their requirements. The elements that will be outlined in this perspective may be more diverse, such as API, information model, certification schemes, etc.

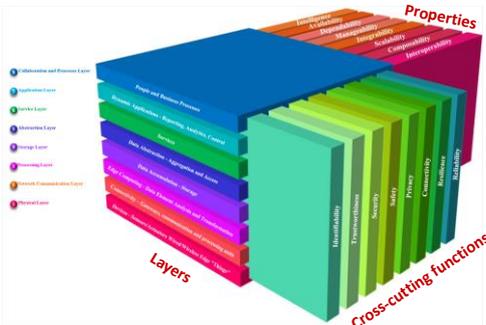
Proposed Reference Architecture for LSPs and possibly beyond



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- Objectives:
 - Ensure that the model deals with
 - All the functional aspects, in particular “cross layers”
 - More than the functional aspects
 - Explain how it can be mapped on other reference architectures
- Main aspects
 - A three dimensional model
 - Layers
 - Cross-cutting functions
 - Properties
 - Addressing more explicitly some expected properties of the system




The suggested way to use the proposed approach is described in the following figure:

Three complementary views

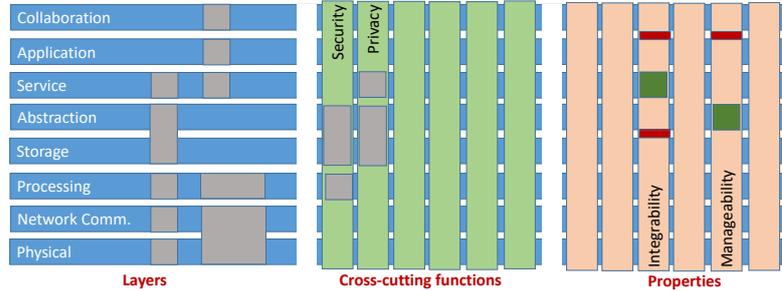


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Identification and positioning of the “elements” supporting a Use Case

- Functions, Interoperability Points & Mechanisms, APIs, standards, etc.




Some remarks and suggestions made during the discussion:

- Life-cycle and governance must be considered (more than currently in the LSPs);
- “Safety” – seen as a cross-domain function – has been considered diversely across the LSPs. AUTOPILOT has requirements and will consider this aspect;
- The proposed framework can benefit from (and integrate with) the activities on Semantic Interoperability (such as those of AIOTI or IERC), Market Places (with a reference to the workshop held in Berlin) or Reference Implementations in support of cities that have no baselines (as done in OASC);
- The approach proposed can be used for the analysis of a use case in the context of a single LSP as well as for use cases spanning across several LSPs;
- The question of spectrum was seen as a potentially blocking factor and should be visible in the model;
- Regarding the “mappings”, it was suggested to work more on outlining the similarities;
- Guidelines for those who want to develop a new IoT system should refer to the main key features in order to be able to make better choices between different providers scenarios.

3.3 The validation and promotion of the Interoperability Framework

3.3.1 Feedback from LSPs and CREATE-IoT participants

The feedback from the LSPs was captured through presentations or in-meeting statements from the LSPs represented:

- The MONICA presentation has addressed the issue of low-latency wireless and suggested the possibility of a possible submission to standardisation (ETSI was mentioned).
- The ACTIVAGE presentation referred to the interoperability profiles of the IoT-EPI and how they can be used in the context of reference implementations. He also refers to the lack of common vocabularies and the need to extend and align the available ontologies (e.g., AHA and SAREF).
- SynchroniCity has mentioned that a first standard on Open API (developed in ITU-T SG 20) will be available at the beginning of 2019. This could be an important basis for a joint effort for dissemination amongst AG02, AIOTI WG03 and other potential partners.

3.3.2 Privacy-by-Design and Ecosystems

The CREATE-IoT presentation on privacy by design and ecosystems has outlined the need, when dealing with privacy-by-design practices, to address the ecosystems (e.g. Smart Cities, IoT or Big Data) and their impact on governance. Several examples are mentioned. In the case of an intelligent home assistant involving search engine and AI ecosystem, the organisations that design and operate smart home device control and conversation capabilities based on cloud based natural language processing and AI capabilities should collaborate in order to ensure the same level of privacy-by-design.

3.3.3 Dissemination of Results

Regarding the dissemination of the AG02 results, and in particular of the IoT Interoperability Framework, the main elements of the Framework and how it can be used will be presented in a chapter of the Cluster Book.

In this context, a concrete example from all LSPs explaining how they can use the IoT Interoperability Framework is needed. This approach would bring a clarification regarding, amongst others, the list of “cross-domain functions” and “properties” that the LSP would actually use.

4. CONCLUSIONS

4.1 Contribution to overall picture

The aim of the IoT Interoperability Framework that is under discussion in the IoT LSP Activity Group AG02 is to provide a common set of approaches and a methodological support that can be applied across IoT projects and IoT large-scale pilot implementations.

It should be noted that several elements that are included in the Interoperability Framework (such as interoperability points and mechanisms, APIs) are emerging innovative evolutions and can bring a significant contribution to the IoT community at-large. From this standpoint, the work on the IoT Interoperability Framework will also bring clarification not only on the Reference Architecture but also on the new and innovative elements brought to the IoT Interoperability Framework and on the way the approach proposed can fit (and even be aligned) with other approaches and reference models.

Indeed, beyond the usage of the IoT Interoperability Framework in the context of different projects, assessing and enabling the possibility of its usage in a wider range of IoT systems is one of the main objectives of the work. The positioning of the IF vis-à-vis other Reference Architectures (e.g. AIOTI, ISO or Industry 4.0) – outlining the similarities – will be an important step towards its dissemination in the overall IoT community.

4.2 Summary and next steps

The most concrete outcome of the workshop was the confirmation by the participants of the validity and usefulness of the approach taken for the definition of the IoT Interoperability Framework. The discussion has identified a number of areas in which the IoT Interoperability Framework can be clarified (e.g., the respective roles of the “cross-domain functions” and “properties”). It has also outlined the need to use the IoT Interoperability Framework in the in-depth analysis of concrete LSPs use cases in order to clarify its benefits towards the largest possible number of stakeholders involved in the development of IoT systems: contractors, designers, developers, integrators as well as end-users.

In the short-term, each LSP will prepare a feedback on the IoT Interoperability Framework based on a concrete use case example by mapping the selected use case to the three-dimensional IoT architectural model. Once this material is available, a global consolidation of the results will be made available for presentation and discussion in several forthcoming workshops and events such as:

- The AG02 workshop #5 to be organised in February 2019;
- An AG02 event to be organised during the IoT Week 2019;
- A final AG02 workshop to be organised in October 2019.