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Session Title: IoT architectures as crucial element in the Future Internet

Session organiser(s):

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Purpose & Audience

This session had the following main objectives:

(a) To present the state-of-the-art on Internet of Things Architectures (and their implementation), including efforts undertaken in the European Research Cluster on the Internet of Things (IERC cluster), the standardization bodies and the open source community.

(b) To explore the practicality and the merit of holistic integrated IoT architectures and to compare their potential with the wide range of ad-hoc silo architectures that are currently developed to serve specific applications.

(c) To identify the next steps in the development of IoT architectures, with emphasis on solutions that will facilitate the development of Internet-of-Things solutions useful and their integration to the emerging Future Internet Architecture(s).

This session addressed researchers, engineering and project/programme managers working on IoT systems and solutions, along with services developers, integrators and solutions providers of both IoT applications and web-based applications.

Key message(s):

- For IoT to go mainstream, the IoT community should provide the means (i.e. technologies, techniques, tools) for the large community of web developers to program/develop sensors and IoT applications. In short “make IoT accessible and programmable to the large community of web developers”.
- A few general reference architectures may exist (such as the IOT-A architecture), but a large number of applications specific IoT architectures (i.e. IoT applications silos) are likely to co-exist as well.

- Breaking the technological and organizational IoT silos is a key to maximizing the ROI (return-on-investment) associated with the significant investments on IoT infrastructures.

Summary

The IoT architectures session at FIA Dublin was organised in a dynamic and interactive form with the participants. The main topics were divided in sessions by presenting expert visions with the objective to start open discussions in this session. The focused areas were 1) IoT Solutions and Open Source vision: To introduce the IoT Architectures Open Source concept to people working on other parts of the Future Internet. 2) Standardisation and Working Groups Interconnection: To identify interconnections between Standardisation Activities and specialized working groups and with other parts of the Future Internet community and its stakeholders. 3) IoT architecture-realization and next steps: IoT architectures and technologies for planning of next steps and input preparation for designing the Future Internet.

Some relevant quotes from this session are:
There is no single Internet of Things, which means that although main IoT principles could be common, there are some specific needs to be tackled. More and more the smart objects are being just a small part of the whole picture and the relevance will be on the services and applications.

Much of the work on IoT has been centred on sensors and the networking or connectivity, named the infrastructure but several new areas are emerging like the Identity, Naming and Discovery of the things, also any object is being able to be a source of information enabling the IoT, but an Internet of Services, where research attention is also needed.

Smart phone mobility is becoming more the catalyst for the growing of the IoT and that means that it is being seen as an extension of the paradigm of E2E services of the initial Internet.

This session gave to academic participants, IoT stakeholders and the general audience the opportunity to express their views and solicit from the experts their opinion on these and other related IoT issues.

The global landscape of IoT applications includes already a wide range of IoT architectures and technology platforms, which have been developed independently. Therefore, despite the emergence of solid reference architectures and standards-based architectures, the number of IoT applications silos is likely to proliferate. The integration and interoperability of these silos is a key to enhancing the added value of IoT applications, while at the same time maximizing existing and future investments on the (usually costly) IoT infrastructures. Existing standards and techniques for semantic interoperability could serve as a basis for integrating these silos. At the same time they could provide the means to access and program non-trivial IoT applications over the web, which could allow the large community of web developers to develop innovative IoT applications. The opening of IoT application development to the large pool of web developers, could give a significant boost to IoT-based innovation, since it will enable wider communities to engage with IoT development and accordingly to generate and implement novel ideas.

Recommendations

The research trends and activities that would deserve attention in the future EU policy and research programme(s), include:

- Semantic interoperability of different IoT systems, platforms and applications.
- Easy to use (Do-it-yourself) tools for building and deploying IoT applications.

- Platforms for IoT/Cloud integration and Big data analytics over IoT.
- Integrated smart city applications using IoT technologies.