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### **Research and Innovation Action – FIRE Initiative**

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## **Dissemination and Activity Report V1**

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## TERMS AND ACRONYMS

FIRE	Future Internet Research and Experimentation
M2M	Machine-to-Machine
ETSI	European Telecommunications Standards Institute
W3C	World Wide Web Consortium
SME	Small and medium-sized enterprise

## **EXECUTIVE SUMMARY**

This document describes the dissemination and communication activities for the FIESTA-IoT project for the period M1 (February 2015) to M12 (January 2015). The dissemination plan is also presented, first describing how promotional material, FIESTA-IoT results, and FIESTA-IoT activities will be used to promote and engage with target communities in order to increase awareness of FIESTA-IoT results, and the FIESTA experimental facility. This document cover the started in M1 dissemination activities but will intensify from M12 onwards in preparation for open calls and engagement with IoT Communities of experimenters and testbeds.

The dissemination activities carried out in the first year are described and material generated during the first year is included; these already cover a broad range of activities and communities:

- Scientific publications.
- Participation (and presentation) at relevant (IoT) events, conferences, summer schools, workshops, meetings.
- Demos and exhibitions.
- Standards community events.

An initial plan for the second year of the project (February 2016 to January 2017) is presented to conclude the report. This outlines potential joint publications for research results, and target events where the FIESTA-IoT facility can be demonstrated, and the upcoming Open Calls can be advertised.

Finally, a mapping of the dissemination activities against the objective goals of the project is presented that also serves as self-evaluation for the progress in achievements of the FIESTA-IoT project.

# 1 INTRODUCTION

## 1.1 The Role of WP7 in FIESTA-IoT

The FIESTA-IoT project is creating a blueprint experimental infrastructure for the testing and evaluation of heterogeneous IoT technologies. For this purpose, FIESTA-IoT provides the tools, techniques, processes and best practices that will enable IoT testbed/platforms operators to interconnect their facilities in an interoperable way based upon cutting edge semantics-based solutions.

Work package 7 will ensure that FIESTA **engages** well with the community outside of the project to: i) increase public awareness of the FIESTA facility and its tools and services, ii) attract users (potential customers) to leverage the facility's offering, and iii) provide front-line support to the current users of FIESTA. This will be carried out in a **coordinated manner** such that a **consistent message** and **professional service** is maintained across the project activities. Figure 1 highlights how the activities of WP7 crosscut the activities of the other project work packages. WP7 will also explore how the technical and research results of the project can be **exploited**; and most importantly how the FIESTA facility can be **sustained in the long-term** (i.e. beyond the conclusion of the project).

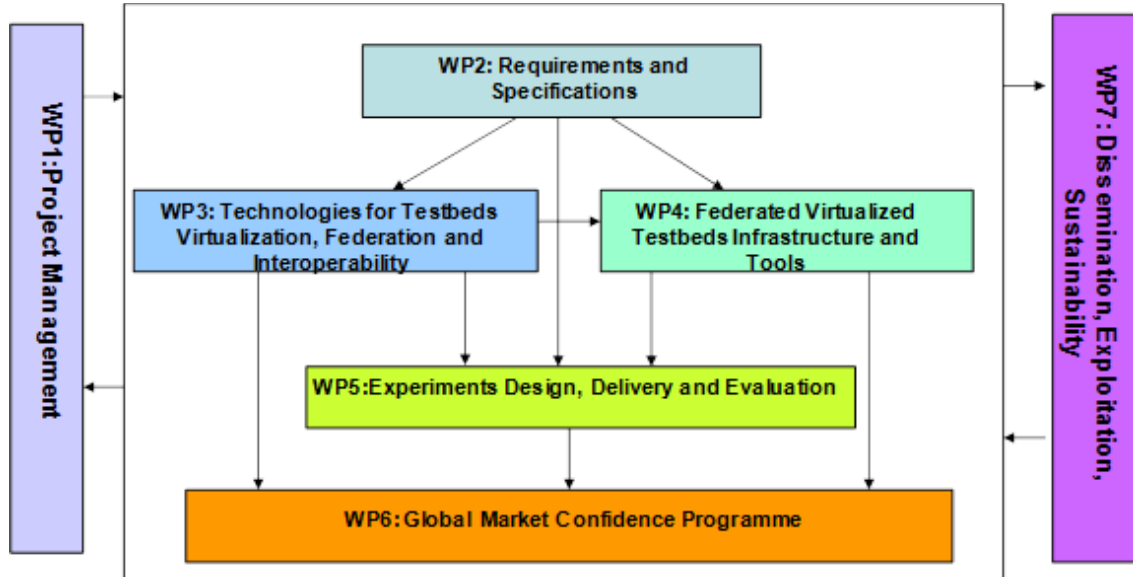


Figure 1: Relationships between the FIESTA-IoT project work packages.



Hence, the overall objectives of WP7 are:

- to create *significant awareness* of the project's offering, activities and exploitable results both within the Future Internet community and beyond, e.g., the general public, policy makers, and politicians;
- to create a *clear, simple, and attractive offering* for a key target stakeholder: SMEs, that is understandable in their terms;
- to *align with other initiatives* within the FIRE and wider Future Internet community through the participation at and organization of co-located workshops and events;
- to create and operate an ecosystem desk to act as a single point of first contact to support both experimental users and SMEs;
- to *exploit* key results in order to create a sustainable experimental IoT facility.

## 1.2 Dissemination, Communication and Global Outreach

This document reports on the activities of Task 7.1 (T7.1) as carried out in the first 12 months of the FIESTA-IoT project and proposes the future activities to be performed in year 2:

This task will focus on the planning and execution of dissemination activities which will increase the awareness of the FIESTA project, facility and the services that it offers. The task will create promotion material, i.e. the project website, poster, flyer and brochure (these will be subject to continuous improvement as the facility services evolve). The task will produce a newsletter for wide dissemination and will establish a social network strategy (e.g. involving twitter feeds, web blogs). This task will also organise project workshops and dissemination activities at relevant Future Internet events (e.g. FIA / Net Futures, IoT Forum's IoT Week, etc.)—this will enable project results to reach a wider community. Finally, the task will coordinate the interactions with standardization bodies, disseminating relevant project results.<sup>1</sup>

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<sup>1</sup> Taken from the FIESTA-IoT Description of Activities (DOA)

### *Dissemination Strategy*

We first present **FIESTA-IoT's dissemination plan**. The purpose of the plan is to devise a strategy to be followed by the project consortium (and participants in T7.1 dissemination activities) in order to maximise the impact of the outreach communication. The key features of the plan (described in Sections 2 and 3) are:

- *Target communities*: identifies the specific target communities who can benefit from knowing about FIESTA-IoT and its results, and may also provide potential users of the facility, or future proposers to the FIESTA-IoT open calls.
- *Materials*: describe the promotional material to be created and then distributed to communities via appropriate communication channels.
- *Promotion Strategy*: individual strategies that determine how specific materials and content generated by the project are utilised in a particular activity. For example: poster and demos utilised at a conference exhibition, scientific publication sent to an academic conference, etc.

### *Activity Reporting*

Subsequently, we describe the concrete activities that were carried out during the first year of the project. This includes: the dissemination of scientific publications, activities carried out by members of the FIESTA consortium to promote FIESTA at relevant events, FIESTA organised community events, and finally FIESTA demonstration activities at conference exhibitions and workshops.

### *Planning*

Finally, we describe our dissemination and communication plan for the second year of the project. With specific reference to publications in the pipeline, events we plan to organise, events we plan to exhibit at and also how we will liaise with external communities further.

## 2 PROMOTIONAL MATERIAL AND CHANNELS

In this section we describe the following promotional material that was created in the first year of the project; this material was designed in order to inform and increase understanding of the FIESTA-IoT project and its initial results by a broad audience:

- Web site content.
- Posters, Flyers and Leaflets.
- Common FIESTA presentation slides.

The initial communication channels were also identified (and where necessary configured); such channels will allow the promotional material to be disseminated to both the general public and target communities:

- FIESTA-IoT Project web site.
- FIESTA-IoT Twitter feed.

As the results of the project increase, particularly in terms of scientific presentations and demonstration videos, we plan to open:

- FIESTA-IoT Youtube Channel.
- FIESTA-IoT Slideshare Channel.

FIESTA also plans to utilise channels made available via other communities. As an example the FIRE programme offers the following channel opportunities:

- FIESTA-IoT material added to the FIRE web page ([www.ict-fire.eu](http://www.ict-fire.eu)).
- FIRE LinkedIn network (specifically the FIRE LinkedIn group)<sup>2</sup>.
- FIRE news mailing list ([news@ict-fire.eu](mailto:news@ict-fire.eu)).
- FIESTA-IoT articles in FIRE mailing lists.

### 2.1 Web Site

**The FIESTA consortium has created the first version of the FIESTA-IoT web page: [www.fiesta-iot.eu](http://www.fiesta-iot.eu) (see**

Figure 2). The web site content is the primary source of material for advertising FIESTA-IoT and its results. The content is organised to emphasize the FIESTA-IoT offering rather than listing the activities of the project.

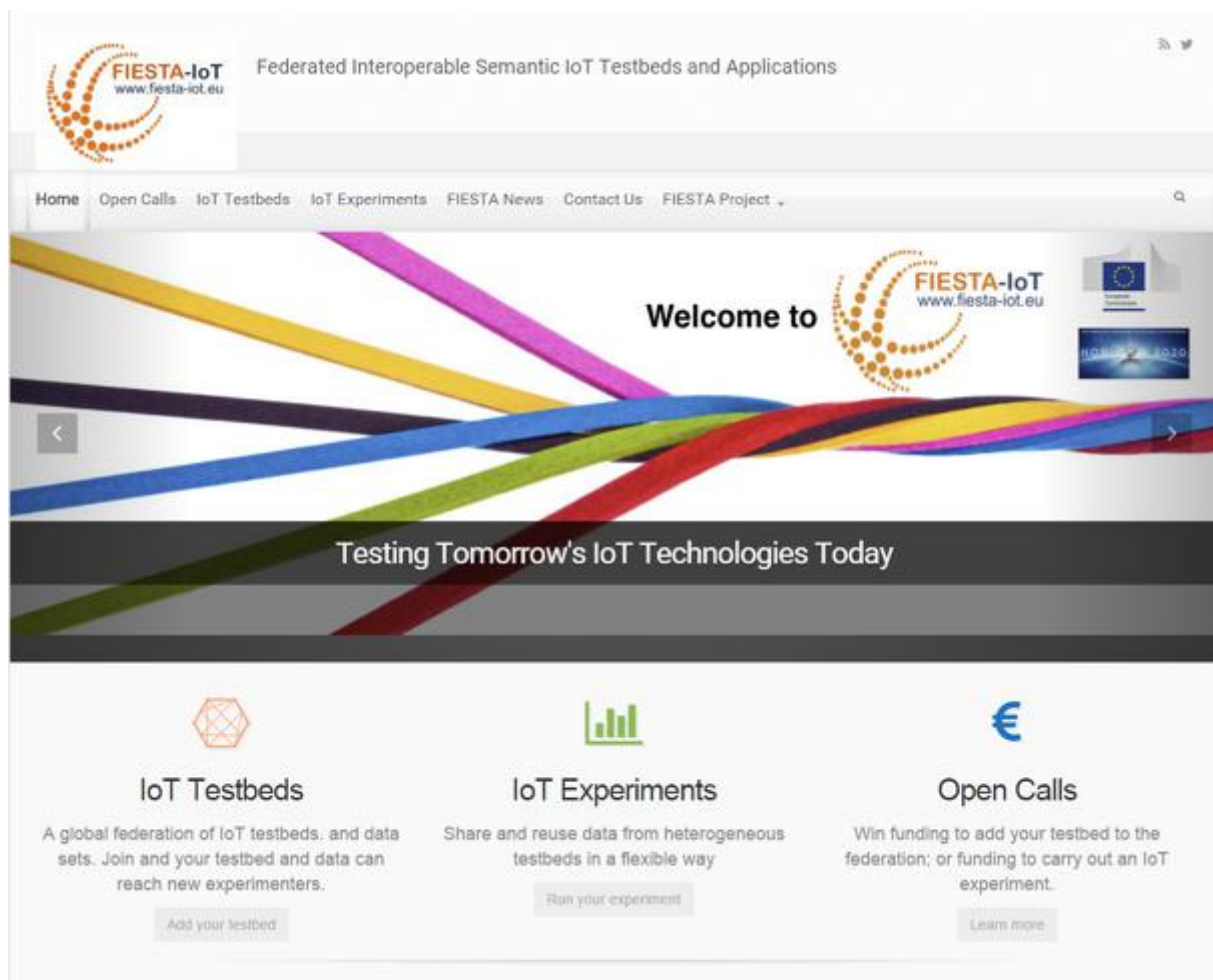
- The web pages emphasize *the FIESTA-IoT federation of testbeds*; what services and tools compose it; and importantly that new testbeds can join, and are encouraged to join—even at this early stage of the project we are making it clear that FIESTA-IoT will expand beyond the initial set of testbeds.

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<sup>2</sup> <https://www.linkedin.com/groups/3361373>

- The web page is focused on *experimenters (users)* — i.e. what FIESTA-IoT can provide to them. As the research progresses and new tools are created, the web page will advertise how these can be used to create and execute IoT experiments.
- The *open calls*; that funding is available for both experimenters and testbed to join and contribute to FIESTA-IoT advances.
- *General FIESTA-IoT news* describing new FIESTA-based technologies, new services and tools, new papers, new opportunities, and new consortium activities.

The web pages also contain the traditional information to describe the project activities, e.g. describing the project's goals, the consortium members, and the research results (publications, etc.). Such material is included as a sub menu of the web page's content.



**Figure 2: FIESTA-IoT Web Page**

In the second year of the project, the web pages and content will be changed to reflect the new FIESTA advances and available FIESTA tools and services. One important addition will be the FIESTA market confidence programme and certification.

## 2.2 Posters, Leaflet and Flyers

Promotion material reflecting the image / identity of the FIESTA-IoT project and to be utilised at conferences, workshops and exhibitions was created in order to support the public awareness activities. The marketing material includes: project flyers, leaflets and posters. These are found in this section's sub-sections; the FIESTA-IoT brochure is found in the appendix. It can be seen that these present a broad overview of the FIESTA-IoT concept and objectives, the FIESTA-IoT testbeds and experimentation, and the current project activities. These materials will be updated in both the second and third years of the project in order to ensure that the latest important information is distributed during the FIESTA promotion activities.



Figure 3: FIESTA-IoT Poster




## 2.3 FIESTA-IoT Banners


The banner is a vertical roll-up style advertisement for the FIESTA-IoT project. At the top left is the FIESTA-IoT logo with the website www.fiesta-iot.eu. To the right, it says 'Semantic Tools for IoT Experimentation and Data Interoperability' with a GitHub logo. Below this is a subtitle 'Testbeds, Tools, Techniques and Best Practices'. The main title is 'Federated Interoperable Semantic IoT/cloud Testbeds and Applications', accompanied by a QR code. The central graphic is a world map with network nodes and icons representing IoT devices and data flow. Text below the map describes the project as a blueprint for experimental infrastructure. Key statistics are listed: 14 Partners, 36 Months, 2 Open Calls, 4-10 IoT Participants, 10-50 Experimenters, and a 2015-2018 duration with a 5,132,584.00 Euro EU contribution. A 'FIRE' logo is associated with the 'Future Internet Research and Experimentation Initiative'. Two quotes highlight the project's focus on Experimentation-as-a-Service (EaaS) and data sharing. The bottom section features logos for the 'Partners Consortium' (including Insight, SODERCAN, Ayuntamiento de Santander, Fraunhofer FOKUS, NEC, University of Surrey, AIT, and KETI) and 'In Cooperation with' (including the European Union, IERC, and IoT-Forum). The website www.fiesta-iot.eu is prominently displayed at the bottom, along with a copyright notice for the FIESTA-IoT Consortium.

Figure 4: FIESTA-IoT Roll up Banner

## 2.4 FIESTA-IoT Leaflet



**FIESTA-IoT**  
www.fiesta-iot.eu



European  
Commission


**H2020 ICT-2014-1 IoT (FIRE)**

Federated Interoperable  
Semantic IoT/cloud  
Testbeds and Applications

### FIESTA: Federated Interoperable Semantic IoT/cloud Testbeds and Applications

**At A Glance: FIESTA**

*FIESTA works towards providing a blueprint experimental infrastructure, tools, techniques, processes and best practices enabling IoT testbed/platforms operators to interconnect their facilities in an interoperable way.*



**Project Coordinator**  
Dr. Martin Serrano  
Insight Centre for Data Analytics  
National University of Ireland Galway  
Tel: +353 91495130  
Fax: +353 91495541  
Email: martin.serrano@insight-centre.org  
Project website: <http://fiesta-iot.eu/>

**Partners:** National University of Ireland - NUIG / Coordinator (Ireland), University of Southampton IT Innovation - ITINNOV (United Kingdom), Institut National Recherche en Informatique & Automatique - INRIA, (France), University of Surrey - UNIS (United Kingdom), Unparallel Innovation, Lda - UNINNOVA (Portugal), Easy Global Market - EGM (France), NEC Europe Ltd. NEC (United Kingdom), University of Cantabria UNICAN (Spain), Association Plate-forme Telecom - Com4innov (France), Research and Education Laboratory in Information Technologies - Athens Information Technology - AIT (Greece), Sociedad para el desarrollo de Cantabria - SCDERCAN (Spain), Ayuntamiento de Santander - SDR (Spain), Korea Electronics Technology Institute KETI, (Korea)

**Duration:** 02/2015 – 01/2018  
**Funding Scheme:** FIRE  
**EC Contribution:** € 5,132,584  
**Contract Number:** CNECT-ICT-643943

**Main Objectives**

The FIESTA project works on integrating IoT platforms, testbeds and associated silo applications. FIESTA will open up new opportunities in the development and deployment of experiments that exploit data and capabilities from multiple testbeds. The FIESTA infrastructure will enable experimenters to use a single EaaS API (i.e. the FIESTA-IoT EaaS API) for executing experiments over multiple IoT federated testbeds in a testbed agnostic way i.e. like accessing a single large scale virtualized testbed. The main goal of the FIESTA project is to open new horizons in the development and deployment of IoT applications and experiments at a EU (and global) scale, based on the interconnection and interoperability of diverse IoT platforms and testbeds. FIESTA project's experimental infrastructure will provide European experimenters in the IoT domain with the unique capability for accessing to and sharing IoT datasets in a testbed-agnostic way. Execution of experiments across multiple IoT testbeds, based on a single API for submitting the experiment and a single set of credentials for the researcher and the portability of IoT experiments across different testbeds and the provision of interoperable standards-based IoT/cloud interfaces over diverse IoT experimental facilities

**"FIESTA Project empowers Experimentation-as-a-Service (EaaS) paradigm for sharing and reusing data"**

**Challenges and Technical Approach**

FIESTA project is associated with the need to aggregate and ensure the interoperability of data streams steaming from different IoT platforms forms or testbeds as well as the forms need to provide tools and techniques for building applications that horizontally integrate silo platforms and applications horizontally integrate silo platforms

**"FIESTA project works for researchers and experimenters to share and reuse data from diverse IoT testbeds in a seamless and flexible way"**

**State of the Art**

Compared to other similar approaches FIESTA stands out by investigating federation and defining service orchestration and security by design and also reusing and repurposing existing sensors and IoT systems without requiring extensive changes in the deployed infrastructure.

FIESTA  
March 2015



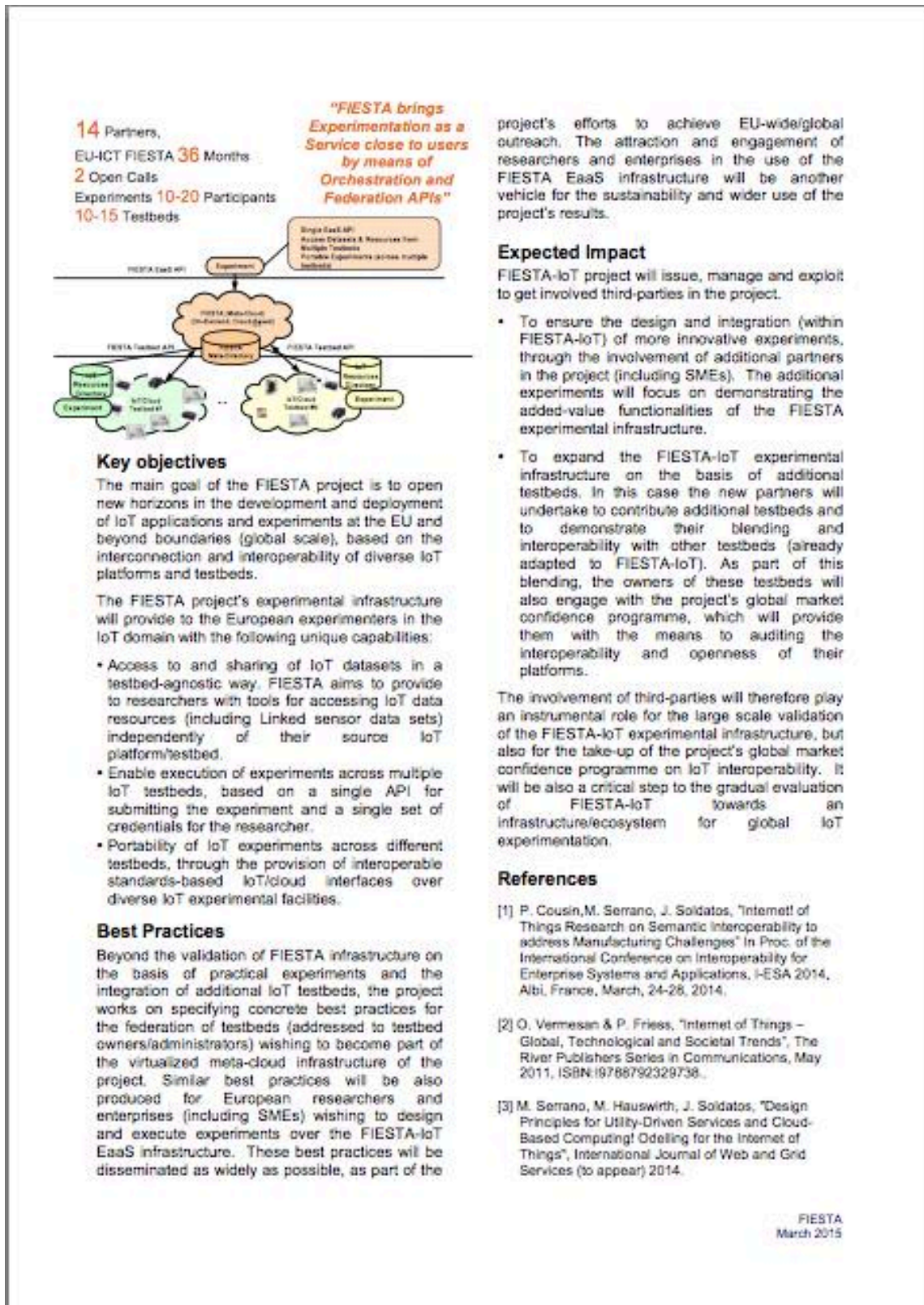


Figure 5: FIESTA-IoT leaflet



## 2.5 FIESTA-IoT Flyers

INTERNET OF THINGS & EXPERIMENTATION
FEDERATION
TESTBEDS, TOOLS AND APPLICATIONS

Experimentation – IoT Labs – IoT Platforms – Interoperability – Federation

# FIESTA-IoT

## Federated Interoperable Semantic IoT/cloud Testbeds and Applications

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FIESTA works towards providing a blueprint experimental infrastructure, tools, techniques, processes and best practices enabling IoT testbed/platforms operators to interconnect their facilities in an interoperable way.

### Experimentation as a Service

- FIESTA is opening new opportunities in the development and deployment of experiments that exploit IoT data and capabilities from multiple testbeds at a EU (and global) scale.
- FIESTA focuses on opening new horizons in the development and deployment of IoT applications for experimentation.
- FIESTA project works on integrating IoT platforms, testbeds and their associated IoT data silos and vertical applications.

### Tools, Techniques and Best Practices

- FIESTA aims to provide to researchers with tools for accessing IoT data resources (including Linked sensor data sets) independently of their source IoT platform/testbed.
- Enable execution of experiments across multiple IoT testbeds, based on a single API for submitting the experiment and a single set of credentials for the researcher.
- Portability of IoT experiments across different testbeds, through the provision of interoperable standards-based IoT/cloud interfaces over diverse IoT experimental facilities.


### Expected Impact

- FIESTA's experimental infrastructure available not only European experimenters but World Wide.
- Facilitate the execution of experiments across multiple IoT testbeds.
- IoT experimentation across different testbeds and the provision of interoperable standards-based IoT/cloud interfaces

*"FIESTA Project empowers Experimentation-as-a-Service (EaaS) paradigm for sharing and reusing IoT data"*

*"FIESTA Project works close to the research industry and academic researchers to share and reuse data from diverse IoT testbeds in a seamless and flexible way"*

*"FIESTA brings Experimentation as a Service close to users by means of Orchestration and Federation APIs"*




**Project Coordinator**  
**Dr. Martin Serrano**  
 National University of Ireland Galway,  
 Insight Centre for Data Analytics (DERI)  
 Tel: +353 91 49 5130  
 Email: martin.serrano@nuigalway.ie

Project website: [www.fiesta-ict.eu](http://www.fiesta-ict.eu)  
 Contract number: GNECT-ICT-643943

**Partners:**

NUIG (IE), TINNOV (UK), INRIA (FR), UNIS (UK), Com4Innov (FR), Unparallel Innovation (PT), EGM (FR), NEC (UK), UNICAN (ES), FOKUS (DE), AIT (EL), SDR (ES), SODERCAN (ES), KETI (KO)

Duration: 02/2015 – 01/2018  
 Funding Scheme: FIRE  
 EC Contribution: € 5.132.584



**IERC**  
European Research Centre on the Internet of Things

Figure 6: FIESTA-IoT Flyer

## 2.6 Web 2.0

Social media and Web 2.0 technologies form an important channel for disseminating information to a wider audience.

There are multiple avenues available:

- In the first year of the project, we have created a **Twitter** account ([https://twitter.com/fiesta\\_iot](https://twitter.com/fiesta_iot)) and generated a reasonable network size to disseminate information to. At present, the account has >200 followers (a visualisation of the twitter feed is shown in Figure 7). With increased project activity in the remainder of the project we hope to increase this network significantly. The Twitter feed will be used to communicate all types of project information – from news about open calls, new technology advances, scientific publications, and FIESTA activities at events and conferences.



Figure 7: FIESTA-IoT Twitter Feed

- Currently, we do not foresee significant benefit in a *Facebook* page and/or *LinkedIn* group. Instead, we will post FIESTA-IoT material and articles to appropriate LinkedIn groups (e.g. the FIRE LinkedIn group).
- When demonstration and presentation material (e.g. videos of FIESTA) becomes available these will be advertised these through a FIESTA **Youtube** and **Slideshare** channels (these will be created in the 2<sup>nd</sup> year of the project).
- Blog articles describing interesting FIESTA-IoT technologies (these may be relevant to open source and IoT communities) will be published and advertised via the FIESTA web page and social media channel (as and when content is created).

### 3 DISSEMINATION PLAN

FIESTA is following a dissemination plan that will:

- i) *Increase the general public awareness* of the projects outcomes. That is, dissemination will utilise the general communication channels e.g. the web page, YouTube, Twitter, Web 2.0 etc. to reach a wider audience.
- ii) *Disseminate information to targeted communities*. FIESTA-IoT also aims to ensure that material describing the FIESTA-IoT activities is targeted and distributed to specific communities who can gain benefits from learning more about FIESTA-IoT, e.g. the scientific community learning about the research contributions, or the IoT community learning about the testing and experimental tools made available. Table 1 outlines the initial FIESTA-IoT dissemination plan; this describes the first communities that will be targeted—for each, promotion strategies that will reach these communities are described.

### 3.1 FIESTA-IoT Dissemination Communities

**Table 1: FIESTA DISSEMINATION PLAN**

Community	Description	Promotion
<b>Scientific Community</b>	<p>FIESTA will provide research advances in the fields of IoT, Semantic Interoperability, IoT Testbeds and data-driven experimental research infrastructures (among others). Such advances will be communicated to the research community through scientific publication venues. Further, experimental computer scientists are target users of FIESTA (more specifically those researching IoT through the development of new systems, software, protocols, etc); they validate their hypothesis using experimental methods and hence FIESTA can provide the facility and tools for such experimentation.</p>	<ul style="list-style-type: none"> <li>• Scientific contributions will be published at high quality scientific venues.</li> <li>• Papers presented at conferences.</li> <li>• Scientific papers listed on FIESTA web page.</li> <li>• New publications advertised on twitter, and in the FIESTA newsletter.</li> </ul>
<b>FIRE Community</b>	<p>FIRE (Future Internet Research and Experimentation) is a large community of Future Internet Testbeds and experimental users. FIRE includes academic, industrial and SME users. Hence, FIRE offers a broad user base and community (particularly experimenters) to engage with. Furthermore, FIRE offers an interested community in the IoT testbed federation technologies created in FIESTA.</p>	<ul style="list-style-type: none"> <li>• FIESTA material posted to FIRE newsletters and web pages.</li> <li>• Engagement with FIRE social media e.g. articles published in FIRE LinkedIn Group.</li> <li>• Exhibition and presentation at FIRE events e.g. FIRE forum.</li> <li>• Exhibition and presentation at events attended by FIRE community e.g. Net Futures, EuCNC.</li> </ul>
<b>IoT and Smart City</b>	<p>The developers of IoT technologies, particularly including SMES, industry and web entrepreneurs offer a key target group of FIESTA results. Particularly in terms of a facility for testing and promoting their technologies.</p>	<ul style="list-style-type: none"> <li>• Exhibition and demonstrations at key IoT events (both industrial and scientific) e.g. IoT Week, IoT World Congress, SIDO.</li> <li>• Promotion of technology information to Web 2.0 channels (Twitter, blogs, etc.).</li> <li>• IoT experiment white papers highlighting FIESTA value to IoT.</li> </ul>

<b>SMEs and local stakeholders</b>	<p>SMEs in particular can benefit from FIESTA in that it provides an experimental facility of value that is available at little cost (and in the case of open calls provides funding). Furthermore, local stakeholders to FIESTA testbeds e.g. SMEs, users within the neighbourhood of an individual testbed.</p>	<ul style="list-style-type: none"> <li>• Stakeholder engagement activities as described in Task 7.2.</li> <li>• Targeted web page content and Web 2.0 promotion.</li> <li>• Advertisement of FIESTA in appropriate SME interest networks.</li> </ul>
<b>FIWARE</b>	<p>FIWARE is a large European initiative creating reusable software and technologies in the Future Internet domain. This crosses numerous sectors, however, IoT is a significant one. Further, a large community of SMEs and web entrepreneurs has grown around the software, and there is significant scope to advertise the benefits of FIESTA to this community.</p>	<ul style="list-style-type: none"> <li>• Exhibition and presentation at FIWARE events (e.g. Net Futures and EUCNC).</li> </ul>
<b>Standards</b>	<p>There are a number of standards bodies that are relevant to FIESTA. FIESTA will define new standards for IoT interoperability to be built upon. Such standards and specifications must be communicated to the standards body itself—who can then communicate them to wider users. The relevant standards bodies and specific standard categories are: ETSI OneM2M, W3C, and others.</p>	<ul style="list-style-type: none"> <li>• Submit new standards and specifications to the appropriate standards body.</li> </ul>
<b>Open Source Community</b>	<p>FIESTA will be developing new software solutions (particularly in the field of semantic data interoperability). This has enormous potential value to IoT and data developers wishing to leverage open source material.</p>	<ul style="list-style-type: none"> <li>• Availability of FIESTA software on highly visible open source communities (e.g. GitHub and/or Sourceforge).</li> <li>• Technical articles and blogs promoted via Web 2.0.</li> </ul>

## 3.2 FIESTA-IoT Dissemination Channels

**Table 2: FIESTA-IoT Dissemination Channels**

Channel	Description	Level
<b>Journals</b>	Scientific and technical journals provide a communication channel to reach a large and broad community of researchers, scientists and technology professionals. FIESTA-IoT will target both academic and magazine style journals.	<ul style="list-style-type: none"> <li>• Communications</li> <li>• Scientific</li> <li>• Technical</li> </ul>
<b>Conferences &amp; Symposiums</b>	FIESTA-IoT will target paper presentations at large scientific and technical conferences that include a technical/research programme. Conferences offer a community of participants in a particular field who can be made aware of the FIESTA-IoT offering.	<ul style="list-style-type: none"> <li>• Collaborative</li> <li>• Scientific</li> <li>• Technical</li> <li>• Keynotes</li> <li>• Dissemination</li> <li>• Demonstration</li> </ul>
<b>Workshops</b>	Workshops offer smaller more focused events (on a specific topic). FIESTA-IoT can organise or participate in such events to ensure that the offering and research contributions are discussed with a relevant community.	<ul style="list-style-type: none"> <li>• Participation</li> <li>• Scientific</li> <li>• Technical</li> </ul>
<b>Meet-ups</b>	Events where communities meet to discuss and exchange ideas and technology. In the field of interoperability, meet-ups often offer a change to perform interoperability tests. Technology or industry focused meetups offer a chance to present and demonstrate the FIESTA-IoT offering.	<ul style="list-style-type: none"> <li>• Standardisation</li> <li>• Demonstration</li> <li>• Participation</li> </ul>
<b>Hackathons</b>	Hackathons offer opportunities to display how FIESTA-IoT can be employed to solve real problems, and/or create new valuable software and applications. FIESTA-IoT can participate in hackathons by providing software to hackatonist and participants in general in order to create awareness and disseminate FIESTA-IoT tools and services.	<ul style="list-style-type: none"> <li>• Technology Provider</li> <li>• Participation</li> </ul>



### 3.3 FIESTA-IoT Dissemination Channels List

#### 3.3.1 FIESTA-IoT Relevant Journals List

The following are a list of relevant journals where the FIESTA-IoT scientific and technical contributions could be published:

- Elsevier Journal of Web Semantics: <http://www.journals.elsevier.com/journal-of-web-semantics>
- IEEE IoT Journal: <http://iot-journal.weebly.com/>
- Sensors Journal: <http://www.mdpi.com/journal/sensors>
- ACM Transactions on Information Systems: <http://tois.acm.org>
- IEEE Software: <http://www.computer.org/web/computingnow/software>
- IEEE Transactions on Dependable and Secure Computing: <http://www.computer.org/web/tdsc>
- IEEE Transactions on Knowledge and Data Engineering: <http://www.computer.org/web/tkde>
- IEEE Pervasive Computing: <http://www.computer.org/web/computingnow/pervasivecomputing>
- ACM Transactions on Knowledge Discovery from Data: <http://tkdd.acm.org>
- ACM Transactions on Internet Technology (TOIT): <http://toit.acm.org/>
- ACM Transactions on Sensor Networks (TOSN): <http://tosn.acm.org/>
- ACM Transactions on the Web (TWEB): <http://tweb.acm.org/>
- Springer Journal of Internet Services and Applications: <http://link.springer.com/journal/13174>
- IEEE Computer. Special Issue on Sensor Data Computing as a Service in Internet of Things: [http://www.computer.org/cms/Computer.org/transactions/cfps/cfp\\_tetcsi\\_sdcsiot.pdf](http://www.computer.org/cms/Computer.org/transactions/cfps/cfp_tetcsi_sdcsiot.pdf)

#### 3.3.2 FIESTA-IoT Relevant Conferences List

- The International Semantic Web Conference (**ISWC**): <http://iswc2016.semanticweb.org>
- The IEEE World Forum on the Internet of Things (**WF-IoT**): <http://www.ieee-wf-iot.org>
- The International Conference on Future Internet of Things and Cloud (**FiCloud**): <http://www.ficloud.org/2016/>
- The International Conference on the Internet of Things (**iThings**): <http://www.swinflow.org/confs/ithings2015/>
- The International Conference on the Internet of Things (**IoT**): <http://www.iot-conference.org/iot2015/>
- Smart cities: <http://sites.ieee.org/isc2/>
- The International Conference on Advanced Information Networking and Applications (**AINA**): <http://voyager.ce.fit.ac.jp/conf/aina/2016/>
- **IEEE Sensors** Conference: <http://ieee-sensors2016.org/>
- The International Conference on Telecommunications (**ICT-2016**): <http://ict-2016.org/>
- The ACM International Joint Conference on Pervasive and Ubiquitous Computing (**UbiComp**): <http://ubicomp.org/ubicomp2016/>
- The IEEE International Conference on Pervasive Computing and Communications (**PerCom**): <http://www.percom.org>
- ACM/Usenix/IFIP International Middleware Conference (**Middleware**): <http://www.middleware-conference.org>

- The IFIP International Conference on Distributed Applications and Interoperable Systems (**DAIS**): <http://2016.discotec.org>
- OnTheMove Federated Conferences & Workshop (**OTM**): <http://www.otmconferences.org>
- The International World Wide Web Conference (**WWW**): <http://www2016.ca/>
- IEEE International Conference on Web Services (**ICWS**): <http://conferences.computer.org/icws/2015>
- International Conference on Cloud Computing and Internet of things (**CCIOT**): <http://www.iccciot.org/CCIOT2016>
- M2M World Congress: <http://www.m2mconference.com>
- European Conference on Networks and Communications (EuCNC): <http://www.eucnc.eu/>

### 3.3.3 FIESTA-IoT Relevant Workshops List

- Workshop semantics for smart cities: <http://kat.ee.surrey.ac.uk/wssc/index.html>
- Workshop semantic sensor networks: <http://event.cwi.nl/ssn-tc-2015/>
- The International Workshop on Secure Internet of Things 2015 (SIoT): <http://siot-workshop.org/>
- Workshop on Middleware for Context Aware Applications in IoT: <http://lii-enac.fr/event/m4iot15/>
- International Workshop on Smart Cities: People, Technology and Data: <http://www.ht.sfc.keio.ac.jp/iwsc15/>
- Workshop on Pervasive Urban Applications: <http://cpemis.eng.cmu.ac.th/~santi/purba2015>
- International Workshop on Context-Aware Smart Cities and Intelligent Transport Systems: <http://awarecities.org>
- International Workshop on Crowd Assisted Sensing, Pervasive Systems and Communications: <http://www.imb.ucl.ac.uk/events/casper2016>
- Workshop on Security, Privacy and Trust for the Internet of Things: <https://sites.google.com/site/sptiot2016>

### 3.3.4 FIESTA-IoT Relevant Meet-ups List

- IoT Meetups:
  - IoT London: <http://iot.london>
  - The Internet of Things Forum: <http://iot.thebln.com>
- FIRE Forum (Experimental facilities community), twice yearly meeting: <http://www.ict-fire.eu/events/past-events/fire-forum-2015.html>

### 3.3.5 FIESTA-IoT Relevant Hackathons List

- Campus Party Europe: <http://nl.campus-party.org>
- Hackathon @ IoT Tech Expo: <http://www.iottechexpo.com/europe/exhibition/iot-hackathon/>

### 3.3.6 Others

- Book chapter - Web of things: <http://yongruiqin.org/wotbook/>



## **4 DISSEMINATION ACTIVITIES (Y1)**

We now provide a list and description of the dissemination activities carried out during the first year of the project.

### **4.1 Scientific Dissemination**

The consortium has published the following publications:

- 1) Amelie Gyrard, Christian Bonnet, Karima Boudaoud, Martin Serrano. “Assisting IoT Projects and Developers in Designing Interoperable Semantic Web of Things Applications”, The 8th IEEE International Conference on Internet of Things (iThings 2015), 11-13 December 2015, Sydney, Australia [INSIGHT].
- 2) Amelie Gyrard, Soumya Kanti Datta, Christian Bonnet, Karima Boudaoud, “Cross-Domain Internet of Things Application Development: M3 Framework and Evaluation”, 3rd International Conference on Future Internet of Things and Cloud (FiCloud 2015), 24-26 August 2015, Rome, Italy [INSIGHT].
- 3) Amelie Gyrard, Martin Serrano, Ghislain Ateazing, “Semantic Web Methodologies, Best Practices and Ontology Engineering Applied to Internet of Things”, IEEE World Forum on Internet of Things (WF-IoT), Milan, Italy, December 14-16, 2015 [INSIGHT].
- 4) Amelie Gyrard, Martin Serrano, “A Unified Semantic Engine for Internet of Things and Smart Cities: From Sensor Data to End-Users Applications”, The 8th IEEE International Conference on Internet of Things (iThings 2015), 11-13 December 2015, Sydney, Australia [INSIGHT].
- 5) Bin Cheng, Salvatore Longo, Flavio Cirillo, Martin Bauer, Ernoe Kovacs, “Building a Big Data Platform for Smart Cities: Experience and Lessons from Santander”. In: 2015 IEEE International Congress on Big Data, pp. 592–599, New York City, NY, USA, June 27 – July 2, 2015 [NEC].

### **4.2 Representation at Relevant Events**

#### **4.2.1 FUTURE INTERNET OPPORTUNITIES FOR INNOVATIVE EUROPEAN BUSINESSES, London, UK, March 9th, 2015**

The main objective of this workshop was to give the opportunity to innovative Small and Medium ICT Businesses and Startups to discover and understand how the Future Internet Research and Experimentation (FIRE) EC Programme can help boost their innovation efforts and reduce time to market.



**Figure 8: Future Internet Opportunities, London, March 2015**

Dr. Martin Serrano presented FIESTA-IoT project (seen in the photo in Figure 8). He explained the vision of integrating IoT platforms, testbeds and associated silo applications and the audience discussed openly the several scientific challenges. The need to aggregate and ensure the interoperability of data streams stemming from different IoT platforms or testbeds was also discussed. Dr. Serrano explained the need for an IoT stack, common understanding and, as well the need to provide tools and techniques for building applications that horizontally integrate silo platforms and applications.

#### **4.2.2 Net Futures, March 2015, Brussels**

FIESTA participated in the following activities at the Net Futures Conference:

- 1) **Experimental platforms Concertation meeting** about the priorities for Future Internet Research and Experimentation (FIRE) in the new Horizon 2020 Work Programme 2015 – 2016. Dr. Martin Serrano presented the FIESTA project. A large part of the Concertation meeting discussed the technical trends and developments in the domain of FIRE resulting in a FIRE Roadmap covering the 2015-2020 across the FIRE, FIWARE and 5G-PPP initiatives.
- 2) **FIRE Booth:** FIESTA promotional material made available from the FIRE booth.

#### **4.2.3 Singapore Smart Nation roundtable**

NEC participated in the Singapore Smart Nation roundtable on Functional OS for the Smart Nation initiative in Singapore. NEC explained the FIWARE project. NEC explained the FIESTA project as a blueprint for Smart Nation, semantic interoperability and large scale IoT.

#### **4.2.4 IoT Week 2015, Lisbon**

FIESTA participated in the following activities at the IoT Week conference and exhibition:

- 1) FIESTA hosted an exhibition stand and disseminated promotional material to attendees.

- 2) UNPARALLEL presented FIESTA in the IoT-Week 2015, in the session: "Action plan on Semantic Interoperability for large scale IoT" – shown in the photograph in Figure 9.



**Figure 9: UNPARALLEL presentation @ IoT Week 2015**

#### **4.2.5 First oneM2M Interop Event, 14-16 September, in Sophia Antipolis, France**

EGM, as a member of oneM2M, participated in the 1<sup>st</sup> oneM2M interoperability testing event held in the ETSI headquarters, in Sophia Antipolis, France, from 14 to 16 September 2015. The objective of this event was to validate the compliance and conformance of oneM2M implementations from multiple vendors against the oneM2M Release 1 specifications, and also to get feedback from participants in order to clarify and enhance the oneM2M specifications.

EGM brought an open-source oneM2M implementation developed by KETI which was hosted on Com4Innov's server, and tested with one or two other implementations during each test session. The test sequence is pre-defined by the oneM2M's Test working Group according to different test configurations which are also defined in the same document. A reporting system is available for partners to evaluate their test results, and a wrap-up session was held at the end of testing sessions to summarize the problems that occurred during testing sessions which needed clarification in the oneM2M specifications.



**Figure 10: OneM2M Interop Event, Sophia Antipolis, France 2015**

#### **4.2.6 Innovation Seminar of EU Delegation, Israel**

This event was held in Tel Aviv on September, 10<sup>th</sup>, 2015. The Santander City Mayor participated in several Smart Cities talks related to Transportation, Mobility, Planning & Public Spaces, Environment, Energy and Health.

Apart from making presentation of Santander Smart City concept and the projects Santander city is currently involved (being FIESTA a significant one in IoT and Smart City paradigm), networking tasks were carried out by the Santander's group.

#### **4.2.7 Spanish model of Smart Cities', Peru**

This event was held in Quito on October, 22<sup>th</sup>, 2015. The Mayor of Santander as chairman of the Spanish Network of Smart Cities (RECI) presented successful Smart Cities projects in Spain.

He also presented FIESTA as one of the innovation projects Santander is currently working on. Networking task were also carried out.

Reference at <http://www.smartcities.es/2015/10/14/jornadas-sobre-el-modelo-espanol-smart-city/>, in Spanish.

#### **4.2.8 Smart City. New city forum, Spain**

This event was held in Madrid on November 11<sup>th</sup>, 2015. The Mayor of Santander of participated in several Smart Cities talks related to Transportation, Mobility, Planning & Public Spaces, Environment, Energy and Health.

Presentation and networking tasks were carried out in this context, including the participation and details of FIESTA project.

Piece of news at <http://www.nuevaeconomiaforum.org/noticias/santander-devolvera-las-empresas-tecnologicas-que-se-instalen-alli-los-impuestos-de-los-dos-primeros-anos>, in Spanish.

#### 4.2.9 Entrepreneurs breakfast: Business opportunities within the Santander Smart City context, Spain

This event was held in Santander on January, 15<sup>th</sup>, 2016. In the context of Santander Smart City, current developments and projects were presented to a set of local entrepreneurs and SMEs. This activity can be considered engagement and also a way to foster the involvement of local stakeholders in current city Santander City Council activities.

The main aim was to explain Santander’s IoT infrastructure and the business opportunities in the IoT and Smart City context for locals and also to try to ease their participation in new developments.

Concerning FIESTA, a brief presentation of the project was made and also the existence of the open-call of the project. Although no details were given because they have not been yet defined, the area and main expectations were transmitted.

Apart from the presentation, networking tasks with attendees were performed.

References at <http://santander.es/contenido/evento/desayuno%20emprededor> and <http://wordpress.campussantanderemprende.com/?p=1282> both in Spanish.



Figure 11: Entrepreneurs Breakfast, Santander, 2016

#### 4.2.10 Other activities

- **Inria@SiliconValley:** as part of the FIESTA-IoT testbed development and further connection with its CityLab@Inria<sup>3</sup> initiative on digital solutions oriented toward smarter inclusive cities and its International program Inria@SiliconValley<sup>4</sup> promoting collaboration with California partners, Inria has been developing the

<sup>3</sup> <http://citylab.inria.fr/>

<sup>4</sup> <https://project.inria.fr/siliconvalley/>

UrbanCivic project<sup>5</sup> supporting the collection and aggregation of heterogeneous urban data sources toward understanding and prompting solutions to urban nuisance. As part of it, the SoundCity app<sup>6</sup> has been released to engage citizens in the understanding of urban noise pollution, including the official launch with the City of Paris smart city initiative and Bernard Jomier, deputy mayor responsible for health, disability, and relations with Paris public hospital system on July 8, 2015<sup>7</sup>. It is our intent to leverage this crowd sensing experiment in the context of the FIESTA-IoT testbed.

- **FIESTA-IoT (NEC)** participated and presented @ Korean IoT Week.
- **NEC** participated in the SAREF Workshop in Brussels concerning ontologies for smart M2M appliances.
- **Keynote talk**, Payam Barnaghi (UniS) " Smart Cities: How are they different?", 2nd EAI International Conference on Software Defined Wireless Networks and Cognitive IoT, October 2015– Rome, Italy.
- **Invited Talk**, Payam Barnaghi (UniS) "What makes smart cities “Smart”?", National University of Ireland in Galway, November 2015.
- **Invited Talk**, Luis Sanchez (UniCan). “SmartSantander: Experimenting on a Future Internet enabled Smart City”, Workshop on Innovative M2M/IoT Solutions and Applications 6th FOKUS FUSECO Forum 2015, November 2015 – Berlin, Germany.
- **Guest lecture**, Payam Barnaghi (UniS), Semantic technologies for the Internet of Things, “IoT 360” Summer School, October 2015– Rome, Italy.
- **Guest lecture**, Intelligent Data Processing for the Internet of Things, “IoT 360” Summer School, October 2015– Rome, Italy.

### 4.3 FIESTA Workshops

The 2015 Open Internet of Things Summer School was an event co-organized by the OpenIoT, City Pulse, VITAL and FIESTA consortiums following the EU IERC-Strategic Research and Innovation Agenda (2015 IERC IoT-SRIA) with focus on providing insights about the solution(s) for Federation, Service Openness and Semantic Interoperability for the Internet of Things.

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<sup>5</sup> <http://urbancivics.com/>

<sup>6</sup> [http://urbancivics.com/soundcity\\_app.html](http://urbancivics.com/soundcity_app.html)

<sup>7</sup> <http://www.inria.fr/en/centre/paris-rocquencourt/news/launch-of-soundcity-mobile-application>





**Figure 12: Open IoT, FIESTA Summer School**

The Open IoT Summer School is an international event for talented researcher(s) across Europe and other parts of the world and it is not limited to research but open to any industry or SME individuals interested to participate, contribute, develop and acquire the know-how about IoT technology, service openness, semantic Interoperability and federated systems based on the open source IoT technologies and middleware and standards.

The summer School covered in depth a range of specialized Internet of Things related topics, from sensor networks, sensing data, stream data processing, methods and protocol implementation to service openness, interoperability, service scheduling, delivery, utility management, and their applications with focus on IoT horizontal solutions in multidisciplinary areas, (e.g. smart city, intelligent manufacturing, car2car communications, M2M, smart appliances, etc.).

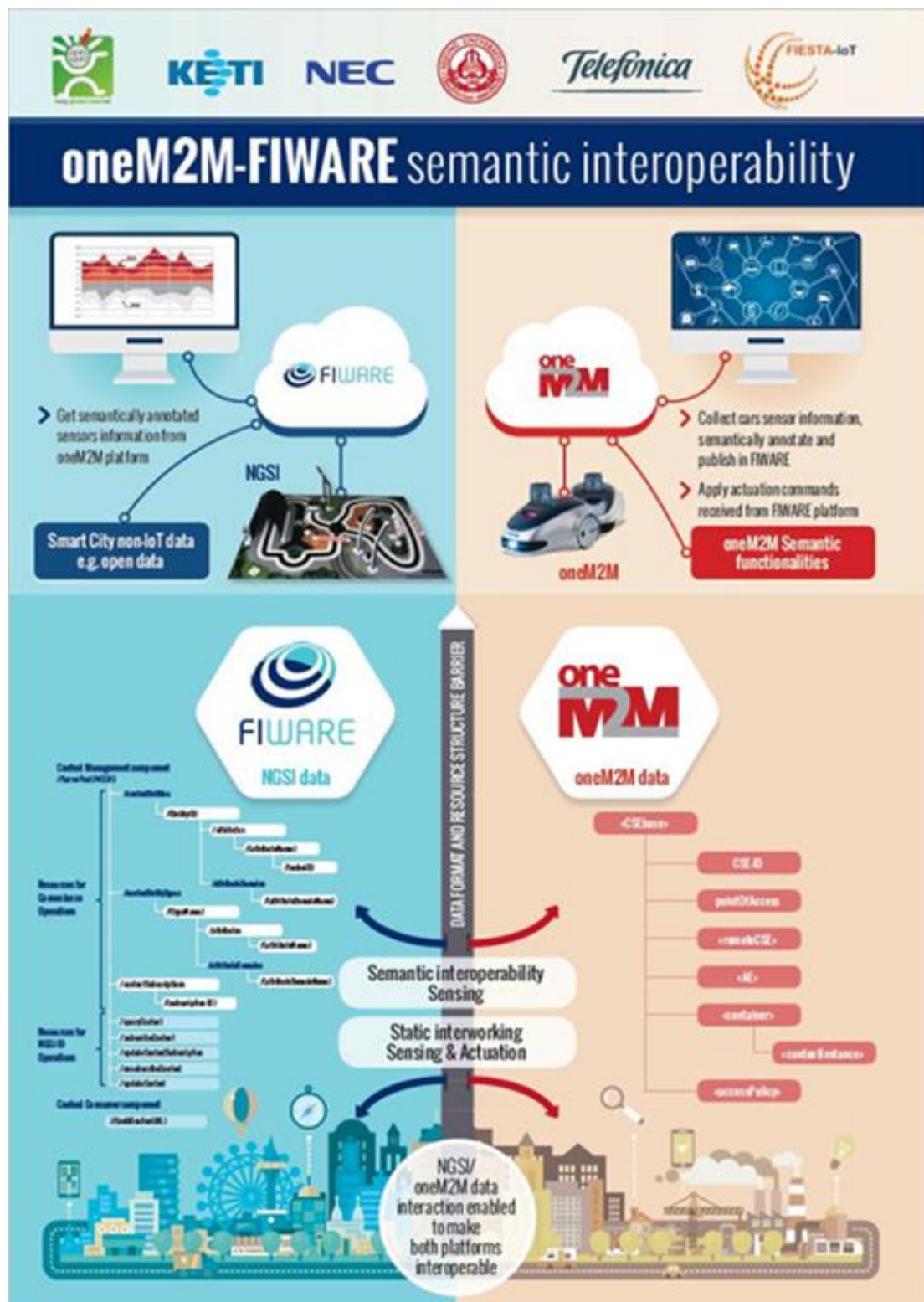
## **4.4 Demonstration at Exhibitions**

### **4.4.1 First oneM2M showcase event, 9-11 December 2015, in Sophia Antipolis, France**

From December 9th to 11th, Easy Global Market, NEC and KETI, who as Fiesta partners presented a semantic interoperability demo between FIWARE and OneM2M solutions at the ETSI M2M Workshop (see Figur 13).

The feedback from the public was very motivating. The teams succeed in the first implementation of a semantic resource in a OneM2M solution. This new approach brings new paradigms for FI-WARE, another way to use the solution fostering a full-scale IoT development for smart cities.

As focussing on data-semantic interoperability, this can also be seen as a significant advance coming from activities carried out within the FIESTA project.



Figur 13: OneM2M Showcase event, Sophia Antipolis, 2015



#### 4.4.2 SIDO, Lyon 2015

SIDO is the largest IoT event in France. It hosts approximately 3000 visitors and includes a programme of talks, workshops, exhibits etc. SIDO also attracts a range of industry and business participants. FIESTA hosted a booth (shown in the photograph in Figure 14) within an EU Village at the SIDO event in 2015. Initial demonstrations of technologies to be leveraged by the FIESTA platform were given; the FIESTA poster was on display; and promotion material was disseminated.



Figure 14: FIESTA Exhibition @ SIDO, Lyon 2015

FIESTA as also part of the IERC (IoT European Research Cluster) was one of the project detailed in the IERC portfolio as shown in Figure 16 (which can be downloaded here:

<http://www.smartaction.eu/publications/detail/114/90c9734fda7c5c2c68e631bf29a9a9d2/>



Figure 15 : SIDO Project Portfolio with FIESTA as one of the 17 projects presented

#InternetOfThingsAndExperimentation #TestbedsToolsAndApplications

# FIESTA-IoT

## Federated Interoperable Semantic IoT/cloud Testbeds and Applications



FIESTA-IoT  
www.fiesta-iot.eu

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FIESTA works towards providing a blueprint experimental infrastructure, tools, techniques, processes and best practices enabling IoT testbed/platforms operators to interconnect their facilities in an interoperable way.

### › Experimentation as a Service

- FIESTA is opening new opportunities in the development and deployment of experiments that exploit IoT data and capabilities from multiple testbeds at a EU (and global) scale.
- FIESTA focuses on opening new horizons in the development and deployment of IoT applications for experimentation.
- FIESTA project works on integrating IoT platforms, testbeds and their associated IoT data silos and vertical applications.

### › Tools, Techniques and Best Practices

- FIESTA aims to provide to researchers with tools for accessing IoT data resources (including Linked sensor data sets) independently of their source IoT platform/testbed.
- Enable execution of experiments across multiple IoT testbeds, based on a single API for submitting the experiment and a single set of credentials for the researcher.
- Portability of IoT experiments across different testbeds, through the provision of interoperable standards-based IoT/cloud interfaces over diverse IoT experimental facilities.

### › Expected Impact

- FIESTA's experimental infrastructure available not only European experimenters but World Wide.
- Facilitate the execution of experiments across multiple IoT testbeds.
- IoT experimentation across different testbeds and the provision of interoperable standards-based IoT/cloud interfaces

AREAS

- FIESTA Project empowers Experimentation-as-a-Service (EaaS) paradigm for sharing and reusing IoT data"
- FIESTA Project works close to the research industry and academic researchers to share and reuse data from diverse IoT testbeds in a seamless and flexible way"
- FIESTA brings Experimentation as a Service close to users by means of Orchestration and Federation APIs"



Testbeds Federation



Linked Data Reasoning



Semantic Interoperability



Open Source

Partners: NUIG (IE), ITINNOV (UK), INRIA (FR), UNIS (UK), Com4Innov (FR), Unparallel Innovation (PT), EGM (FR), NEC (UK), UNICAN (ES), FOKUS (DE), AIT (EL), SDR (ES), SODERCAN (ES), KETI (KO)

Duration: February, 2015 - January, 2018

Funding scheme: FIRE

EC Contribution: €5.132.584

Contract Number: CNECT-ICT-643943

Project Coordinator  
Dr. Martin Serrano  
National University of Ireland Galway,  
Insight Centre for Data Analytics (DERI)  
Tel: +353 91 49 5130  
Email: martin.serrano@nuigalway.ie  
Project website: www.fiesta-iot.eu

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Figure 16 : FIESTA entry information at SiDO Projects Portfolio



## 4.5 Analysis of Progress against Project KPIs

The following table (Table 3) describes the project KPIs concerning communication and dissemination. The target value in column 2 states the overall project indicator that should be reached. Column 3 then discusses how the Y1 activities meet the KPIs. It can be seen that good progress has been made in all KPIs.

**Table 3: Progress in Y1 against dissemination KPIs**

Dissemination Activity	Target Value	Y1
Participation in Net Futures (formerly FIA) Meetings	Participation in All Meetings	1
Journal Publications (International Referred Journals)	8	1
Publications and Presentations in International Conferences (Reviewed Papers)	12	4
FIESTA Newsletter Issues	4	0
Participations in Public Exhibitions and Demonstrations	3	ETSI M2M wkshp, IoT Week, SEDO
FIESTA Workshops and/or Conferences	2	0
Flash studies (white papers about experiments)	2	0
Participation in major IoT / smart cities events relating to experimentation and testbeds outside Europe (USA, Asia)	4	Korean IoT Week
Leaflets	2	1
Other events		SAREF, Digital Catapult, NEC Singapore, Singapore Round table

## 5 OUTLOOK

In the upcoming period, the FIESTA project will continue to follow its dissemination plan as described previously in this document. Specifically, in year 2 we will focus on the following key activities; planned activities are already organised (or anticipated), whereas targeted activities are identified opportunities for the consortium.

### 5.1 Planned Activities

- In relation with the International program Inria@SiliconValley, the Ming Hsieh Institute at the University of Southern California ([mhi.usc.edu](http://mhi.usc.edu)) and Inria@SiliconValley are co-organizing a US-Europe Invited Workshop on the Next Generation Internet of Things, to be held at USC in Los Angeles, California, USA, on March 31 and April 1, 2016. The workshop will span a number of subjects related to this theme, including wireless networking, operating systems, software architecture, middleware, and applications. In particular, the workshop will investigate how to join forces in the area of IoT testbeds by leveraging initiatives in EU, and especially FIESTA-IoT, and in Southern California. Martin Serrano will attend the workshop on behalf of FIESTA-IoT.
- The BIS'2016 workshop is organised by Inria from June 8-10, 2016 in Paris (<https://project.inria.fr/siliconvalley/2015/12/21/june-8-10th-2016-bis2016-in-paris/>). We intend to disseminate FIESTA-IoT material.
- 'Resources and business opportunities within the Santander Smart City context', Santander, Spain. As a consequence of an abovementioned presentation, a contact with and organizer of local IoT and ICT events was done it was requested to give a talk in a forthcoming related event. This event will be held in Santander on February, 4th 2016 as a local instance of the Startup Europe Week, In this event, a more detailed explanation of the projects in which Santander is currently involved will be given to the attendees. Local entrepreneurs and SME are expected to attend. FIESTA open-call existence will be presented as part of the contents ( <https://www.amiando.com/sew-santander.html>, in Spanish).

## 5.2 Targeted Activities

### 5.2.1 Targeted Publications

The following are a list of venues where FIESTA will consider submitting joint authored publications (i.e. authors from multiple consortium partners):

- TRIDENTCOM 2016 (<http://tridentcom.org/2016/show/home>)
  - The paper: “*Towards an Interoperability Certification Method for Semantic Federated Experimental IoT Testbeds*”, Mengxuan Zhao Nikos Kefalakis, Paul Grace, John Soldatos, Franck Le-Gall and Philippe Cousin. EGM, AIT and ITI joint publication was submitted January 31<sup>st</sup>.
- 2nd EAI International Conference on Interoperability in IoT (<http://interoperabilityiot.org/2016/show/home>)
- EUCNC 2016 (<http://www.eucnc.eu/>)

### 5.2.2 Targeted Activities and Events

We plan to present or exhibit FIESTA results at specific events (e.g. poster, booth, talk, etc):

- International Conference on Internet of Things and Big Data. European project space: <http://www.iotbd.org/EuropeanProjectSpace.aspx>
- FIESTA booth and presentations @ IoT Week 2016
- FIESTA presentation and advertisement @ Net Futures 2016
- EUCNC 2016
- SIDO 2016
- IoT World Congress 2016

The project will analyse the benefits of these opportunities and choose the best in order to maximise the communication of FIESTA material.

### 5.3 Progress to Project Goals

Table 4 describes the project KPIs concerning planned progress in year 2 against communication and dissemination goals.

**Table 4: Planned Progress in Y2 against dissemination KPIs**

<b>Dissemination Activity</b>	<b>Target Value</b>	<b>Y2 Plan</b>
Participation in Net Futures (formerly FIA) Meetings	Participation in All Meetings	1
Journal Publications (International Referred Journals)	8	1
Publications and Presentations in International Conferences (Reviewed Papers)	12	TRIDENTCOM + others
FIESTA Newsletter Issues	4	2
Participations in Public Exhibitions and Demonstrations	3	IoT Week + others
FIESTA Workshops and/or Conferences	2	1
Flash studies (white papers about experiments)	2	After <sup>1st</sup> experiment open call, we plan a flash study of these activities
Participation in major IoT / smart cities events relating to experimentation and testbeds outside Europe (USA, Asia)	4	
Leaflets	2	1
Other events		

## APPENDIX I – FIESTA BROCHURE

# FIESTA-IoT



## Federated Interoperable Semantic IoT / cloud Testbeds and Applications

### How does it work?

The vision of integrating IoT platforms, testbeds and associated silo applications is associated with several scientific challenges, such as the need to aggregate and ensure the interoperability of data streams stemming from different IoT platforms or testbeds, as well as the need to provide tools and techniques for building applications that horizontally integrate silo platforms and applications.

The convergence of IoT with cloud computing is a key enabler for this integration and interoperability, since it allows the aggregation of multiple IoT data streams towards the development and deployment of scalable, elastic and reliable applications that are delivered on-demand according to a pay-as-you-go model. **FIESTA-IoT works towards providing a blueprint experimental infrastructure, tools, techniques, processes and best practices enabling IoT testbed/platforms operators to interconnect their facilities in an interoperable way, while at the same time facilitating researchers and solution providers in designing and deploying large scale integrated applications (experiments) that transcend the (silo) boundaries of individual IoT platforms or testbeds. FIESTA-IoT will enable researchers and experimenters to share and reuse data from diverse IoT testbeds in a seamless and flexible way, which will open up new opportunities in the development and deployment of experiments that exploit data and capabilities from multiple testbeds.** The blueprint experimental infrastructure to be provided by FIESTA-IoT will include middleware for semantic interoperability, tools for developing/deploying and managing interoperable applications, processes for ensuring the operation of interoperable applications, as well as best practices for adapting existing IoT facilities to the FIESTA-IoT interoperability infrastructure.

The FIESTA-IoT infrastructure will empower an Experimentation-as-a-Service (EaaS) paradigm for IoT experiments, while will enable experimenters to use a single EaaS API (i.e. the FIESTA-IoT EaaS API) for executing experiments over multiple IoT federated testbeds in a testbed agnostic way i.e. like accessing a single large scale virtualized testbed. Experimenters will be therefore able to learn once the EaaS API and accordingly use it to access data and resources from any of the underlying testbeds. To this end, the underlying interconnected testbed will provide common standardized semantics and



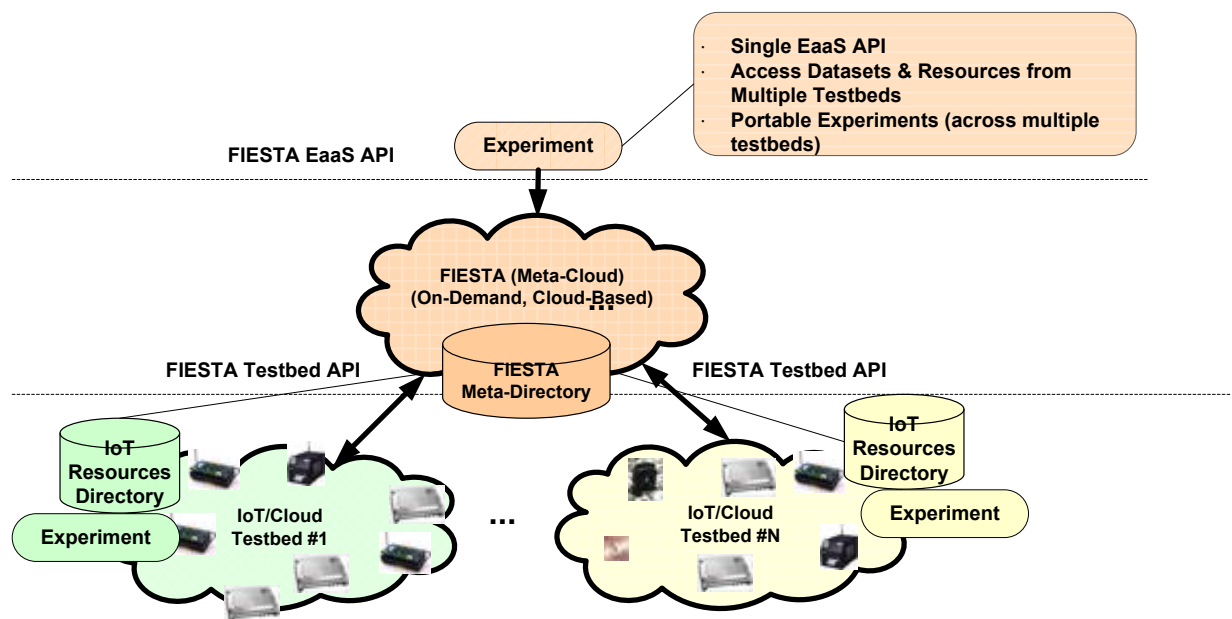
interfaces (i.e. FIESTA-IoT Testbed Interfaces), which will enable the FIESTA-IoT EaaS infrastructure to access their data, resources and other low-level capabilities). FIESTA-IoT EaaS infrastructure will be accessible through a cloud computing infrastructure (conveniently called FIESTA-IoT meta-cloud), on the basis of a cloud-based on-demand paradigm. It will also include a directory service (conveniently called FIESTA-IoT meta-directory), where sensors and IoT resources from multiple testbeds will be registered. This directory will enable the dynamic discovery and use of IoT resources (e.g., sensors, services) from all the interconnected testbeds.

## Key objectives

The main goal of the FIESTA project is to open new horizons in the development and deployment of IoT applications and experiments at an EU (and global) scale, based on the interconnection and interoperability of diverse IoT platforms and testbeds. To this end,

Overall, the project’s experimental infrastructure will provide European experimenters in the IoT domain with the following unique capabilities (Figure 1):

- **Access to and sharing of IoT datasets in a testbed-agnostic way.** FIESTA will provide researchers with tools for accessing IoT data resources (including Linked sensor data sets) independently of their source IoT platform/testbed.
- **Execution of experiments across multiple IoT testbeds,** based on a single API for submitting the experiment and a single set of credentials for the researcher.
- **Portability of IoT experiments across different testbeds,** through the provision of interoperable standards-based IoT/cloud interfaces over diverse IoT experimental facilities.



**Figure 1: FIESTA will realize the interoperability of diverse IoT testbeds, thereby enabling experiments leveraging data and resources from multiple testbeds**

**On the basis of its blueprint infrastructures and processes, FIESTA will also establish, implement and support a global market confidence programme, which will encourage and facilitate stakeholders to comply with the FIESTA interoperability guidelines and accordingly to deploy large scale innovative interoperable IoT applications.** The FIESTA global market confidence programme will include a certification/compliance suite enabling platform providers and solution providers to test and ensure the level of interoperability of their platforms and services. This programme will be a main vehicle for the sustainability of the project's results, as well as for impact creation at a global scale. The programme will be established early on in the project's workplan, in order to be used as a vehicle for the sustainability of the project's results. During its lifetime FIESTA-IoT will boost and ensure the engagement and participation of multiple platforms providers within Europe (including both consortium members and third-parties) in the FIESTA-IoT global confidence programme. Based on this engagement, FIESTA-IoT will ensure the proper design, implementation, validation and fine-tuning of the programme.

**Objective 1 (Blueprint IoT Experimental Infrastructure for EaaS):**

To research and establish a novel blueprint infrastructure for IoT platforms/testbeds interoperability and EaaS (Experimentation-as-a-Service), which will enable researchers, engineers and enterprises (including SMEs) to design and implement integrated IoT experiments/applications across diverse IoT platforms and testbeds, through a single entry point and based on a single set of credentials. **The EaaS infrastructure will facilitate experimenters/researchers to conduct large scale experiments that will leverage data, information and services from multiple heterogeneous IoT testbeds, thereby enabling a whole new range of innovative applications and experiments that are nowadays not possible.**

**Objective 2 (Testbed Agnostic Access to IoT Datasets):**

To provide tools and techniques enabling researchers to share and access IoT-related datasets in a seamless testbed agnostic manner i.e. similar to accessing a large scale distributed database. The objective will also involve linking of diverse IoT datasets, based on the linked sensor data concept.

**Objective 3 (Tools and Techniques for IoT Testbeds Interoperability and Portability):**

To research and provide tools and techniques (semantic models, directory services, open middleware, tools) for virtualizing and federating geographically and administratively dispersed IoT platforms and testbeds. Emphasis will be put in the specification and implementation of common standardized APIs for accessing the underlying testbeds, thereby boosting the portability of IoT experiments. As part of this objective, FIESTA will also research and implement a meta-cloud infrastructure along with accompanying tools (i.e. portal, development, workflow management, monitoring) facilitating the use of the EaaS infrastructure for the design, implementation, submission, monitoring and evaluation of IoT/cloud related experiments and related integrated applications.

**Objective 4 (Global Market Confidence Programme (as Sustainability Vehicle)):**

To design, implement and validate a global market confidence programme, enabling IoT platform/testbed providers and IoT solutions providers to test, validate and ensure the interoperability of their platforms/solutions against FIESTA standards and techniques. The programme will include a certification suite for compliance testing. As part of pursuing this objective, the project will ensure (from its early stages) the development and realization of a clear sustainability path for the project's results. Furthermore, it will collaborate with other bodies and working groups, which are currently working (at EU level) towards the establishment of similar initiatives, such as the IoT forum.

**Objective 5 (Proof-of-Concept Integrated Experiments):**

To validate the FIESTA blueprint experimental infrastructure for EaaS on the basis of the federation and virtualization of three real-life IoT testbeds, but also on the basis of real-life experiments that will be designed, executed and evaluated over them. These will span the areas of pollution monitoring, crisis management, crowdsensing as well as enterprise/commercial activities and will emphasize portability and testbed agnostic access.

### **Objective 6 (Stakeholders Engagement – Expansion in terms of Experiments and Testbeds – Involvement of Third Parties Towards a Global IoT Experimentation Ecosystem):**

To attract and engage stakeholders beyond the project consortium as third parties through managing an open calls process, but also through the mobilization of (third-party) research communities with a strong interest in IoT. FIESTA will allocate a significant share (31%) of its foreseen budget to the introduction of third-parties (through the open calls process), notably third-parties that will undertake the conduction of new experiments and/or the blending/integration of new testbeds within the FIESTA infrastructure. Note that the stakeholders' community of the project will also serve as a basis for validating the global market confidence programme of the project. The active engagement of the stakeholders in the project, but also in the third-parties selection process will be boosted by FIESTA partners already animating ecosystems of researchers and enterprises (i.e. SODERCAN, Com4innov), as well as from participants from non-EU countries (i.e. KETI from Korea). Links to participants from Asia and USA will be also sought (through KETI and the Inria@Silicon Valley programme). The ultimate vision of FIESTA is to provide the basis of a global IoT experimentation ecosystem.

### **Objective 7 (Best Practices):**

To elicit and document a range of best practices facilitating IoT platform providers and testbed owners/administrators to integrate their platform/testbed within FIESTA, along with best practices addressed to researchers, engineers and organizations wishing to use the FIESTA meta-cloud EaaS infrastructure for conducting innovative applications and experiments.

The following table provides a set of quantitative indicators (KPI – Key Performance Indicators), which will be used to track the level of accomplishment of the project's objectives throughout the project. These KPIs refer to what will be achievable within the project's lifetime.

### **How to get involved?**

In order to accomplish its goals, the FIESTA-IoT project will issue, manage and exploit a range of open calls towards involving third-parties in the project. The objective of the involvement of third-parties will be two-fold:

- **To ensure the design and integration (within FIESTA-IoT) of more innovative experiments, through the involvement of additional partners in the project (including SMEs).** The additional experiments will focus on demonstrating the added-value functionalities of the FIESTA experimental infrastructure.
- **To expand the FIESTA-IoT experimental infrastructure on the basis of additional testbeds.** In this case the new partners will undertake to contribute additional testbeds and to demonstrate their blending and interoperability with other testbeds (already adapted to FIESTA-IoT). As part of this blending, the owners of these testbeds will also engage with the project's global market confidence programme, which will provide them with the means to auditing the interoperability and openness of their platforms.

The involvement of third-parties will therefore play an instrumental role for the large scale validation of the FIESTA-IoT experimental infrastructure, but also for the take-up of the project's global market confidence programme on IoT interoperability. It will be also a critical step to the gradual evaluation of FIESTA-IoT towards an infrastructure/ecosystem for global IoT experimentation.

Beyond the validation of the FIESTA-IoT infrastructure on the basis of practical experiments and the integration of additional IoT testbeds, the project will specify concrete best practices for the federation of testbeds (addressed to testbed owners/administrators) wishing to become part of the virtualized meta-cloud infrastructure of the project. Similar best practices will be also produced for European researchers and enterprises (including SMEs) wishing to design and execute experiments over the FIESTA-IoT EaaS infrastructure.

The best FIESTA-IoT practices will be disseminated as widely as possible, as part of the project's efforts to achieve EU-wide/global outreach. The attraction and engagement of researchers and enterprises in the use of the FIESTA-IoT EaaS infrastructure will be another vehicle for the sustainability and wider use of the project's results, which will complement the global market confidence programme outlined above.

## **Project facts**

**COORDINATOR:** Dr. Martin Serrano, National University of Ireland Galway (Insight)

**EXECUTION:** From 2015-02-01 to 2018-01-31

**PARTNERS:** National University of Ireland - NUIG / Coordinator (Ireland), University of Southampton IT Innovation - ITINNOV (United Kingdom), Institut National Recherche en Informatique & Automatique - INRIA, (France), University of Surrey - UNIS (United Kingdom), Unparallel Innovation, Lda - UNPARALLEL (Portugal), Easy Global Market - EGM (France), NEC Europe Ltd. NEC (United Kingdom), University of Cantabria UNICAN (Spain), Association Plate-forme Telecom - Com4innov (France), Research and Education Laboratory in Information Technologies - Athens Information Technology - AIT (Greece), Sociedad para el desarrollo de Cantabria – SODERCAN (Spain), Ayuntamiento de Santander – SDR (Spain), Korea Electronics Technology Institute KETI, (Korea).

**WEBSITE:** <http://www.fiesta-iot.eu>

FIESTA-IoT Consortium 2016