interiot

INTEROPERABILITY
OF HETEREOGENEUS
IOT PLATFORMS.

D8.5

Report on Impact Creation at M18

June 2017

INTER-IoT

INTER-IoT aim is to design, implement and test a framework that will allow interoperability among different Internet of Things (IoT) platforms.

Most current existing IoT developments are based on "closed-loop" concepts, focusing on a specific purpose and being isolated from the rest of the world. Integration between heterogeneous elements is usually done at device or network level, and is just limited to data gathering. Our belief is that a multi-layered approach integrating different IoT devices, networks, platforms, services and applications will allow a global continuum of data, infrastructures and services that can will enable different IoT scenarios. As well, reuse and integration of existing and future IoT systems will be facilitated, creating a de-facto global ecosystem of interoperable IoT platforms.

In the absence of global IoT standards, the INTER-IoT results will allow any company to design and develop new IoT devices or services, leveraging on the existing ecosystem, and bring get them to market quickly.

INTER-IoT

Report on Impact Creation at M18

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Disclaimer

Executive Summary

The Deliverable D8.5 summarises the impact created by the project during the first 18 months. It takes into consideration three different aspects: the Dissemination, the Communication aspects and the Exploitation ones.

Regarding the Dissemination aspects, there has been a steady production of scientific papers since the very beginning of the project. As the consortium basically started working together almost one year before the actual start of the project, and the main concepts were defined at the time of the submission, it's possible to understand why the project was very prolific since its inception.

For what concerns Communication, the first 18 months allowed us to better understand our "customers" and have a precise profile for the effort that will be carried in the second part of the project, when the results will be mature and we will be ready to "sell' our technology. While preparing the plans for the future, all partners were actively engaged in promoting the project, through the participation to a large number of events, not only in Europe but also worldwide (United States, Japan, China, India to name a few).

This links directly with our exploitation section, where we explain our strategy and our actions in this sector; furthermore, we will explain in details the Open Call and the Advisory Board interactions.

Contents

List of Figures

Acronyms

PC	Project Coordinator
D#.#	Deliverable number #.# (D2.1 deliverable 1 of work package 2)
DoA	Description of Action of the project
INTER-IoT	Interoperability of Heterogeneous IoT Platforms
EC	European Commission
EU	European Union
GA	Grant Agreement
H2020	Horizon 2020 Programme for Research and Innovation
IoT	Internet of Things
IPR	Intellectual Property Rights
M#	#th month of the project (M1=January 2016)
WP	Work Package
IPR	Intellectual Property Rights
PCC	Project Coordination Committee
PIC	Project Implementation Committee
STPM	Scientific and Technical Project Manager
TL	Task Leader
WPL	Workpackage Leader

1   Introduction

INTER-IoT contributes to the H2020 ICT30-2015 call for proposals: "Internet of Things and Plat-forms for Smart Objects", addressing strategic high-level goals set by the European Union as well as practical stakeholders' and end users' needs for IoT platforms for smart objects interoperability. Deliv-erable D8.5 summarizes all activities undertaken by the INTER-IoT consortium supported to promote project's results and get feedback from stakeholders, industry, EU bodies, and public institutions. As such this deliverable proves that INTER-IoT presented:

- framework, methodology and tools to provide integrated and interoperable services at different layers,

- proposals of new semantic components for IoT,

- representative scenarios and use-cases,

- documented novel architecture for IoT platforms interoperability,

- implementation issues and prove-of-concept, for external projects and wide audience.

The project used many communication channels to distribute results and for different audiences and relevant agents (e.g. SMEs, IoT application developers, infrastructure integrators and operators). This deliverable reports all achievements for INTER-IoT activities of the impact creation plan de-scribed in D8.3(M4) that was revised in D8.3 v2(M12) in order to include the recommendations of the project reviewers in the different three planned areas:

- Dissemination results in terms of contributions to books, journal papers, conferences, work-shops, events, . . . considering two kind of dissemination actions, scientific and industrial. Sci-entific actions started early in the project due to the long term collaboration between project partners in the areas addressed by the project and the industrial dissemination actions have already started with a plan to be increased in the second half of the project.

- Communication results in terms of the different channels used by the project. During the first 12 months of the project the consortium created the image of the project and started to commu-nicate results using broad channels (e.g website and social networks), following the communi-cation plan, a questionnaire was submitted to the different agents already contacted during the market analysis (D2.1) to understand other communication channels and exploit them in order to increase impact. In terms of communication INTER-IoT partners have continued collaborat-ing actively with IoT-EPI, and with other projects like IoT-LSP cluster.

- Exploitation in close relationship with D8.7a (released as an intermediate deliverable as re-quested by the reviewers), includes a review of the plan for OS delivery of the INTER-IoT products and the evolution of the actions taken by the exploitation team in this area.

The different actions related with the creation of impact have been addressed to different agents, already identified in D2.1 (Market and Stakeholder analysis) and by the definition of the dissemination, communication and exploitation plans. The main agents towards the consortium focused to achieve impact, as indicated in D8.3, have been:

- SME: are a major target for INTER-IoT, as INTER-IoT products will help the SMEs to open boundless business opportunities and unparalleled possibilities to develop new services and improve current portfolios, including the exploitation of new user-centric business models in sectors such as Transport/ Logistics, m-Health and cross-domain. Five of the third parties from the open call are SMEs. Several actions in dissemination and communication have been addressed to create impact among SME and clusters of SME. One of the main goals related with the exploitation strategy is that SME within and outside the project are able to use the different defined products with independence of the application domain in which they develop their activity.

- Integrators: can benefit from the outcomes of the project and with the new definition of INTER-IoT products will allow them to embed different IoT objects and also to improve the applicability of INTER-IoT technologies on robustness, cross platform interoperability and cost of ownership. Moreover, the need of interoperability including communications, semantics and security will be required in future deployments in which more than one platform was involved. An example of the impact with these kind of agents has been achieved in the liaison with H2020 IoT1 LSP and through different communication actions.

- Telecom Operators: have always been interested in new kind of services and data to be transported in their networks. Although some of European Telecom operators are abandoning the vertical markets, the advent of 5G is going to increase the link between IoT interoperability and Telecom Operators. It may be considered that 5G should develop and exploit network programmability functions to capture the IoT market. INTER-IoT products are of high interest for telecom operators and we are addressing the agents with the channels and actions identified for them (e.g. interoperability as a service or the link between SDN/NFV and IoT interoperability).

- Stakeholders and end users are the primary target of INTER-IoT products and for creating impact, with independence of the application domain. Currently the two areas addressed have been transportation and logistics and mobile health, however through the open call and INTER-DOMAIN pilot we have addressed other application domains like emergency management and smart cities. Many of the dissemination and communication actions, for the industrial sector are addressed to stakeholders and end users, some of them have been developed and some others have been planned for the second half of the project.

- Academics: with three universities and two research centers in the consortium and involvement in several major clusters, the impact created in this environment through scientific dissemination, PhD and MSc thesis, courses, . . . will be large. Actions have been taken in different areas, and actions to be taken in the second half of the project are already planned (e.g. inter university courses or MSC actions related with IoT interoperability).

The remainder of the deliverable is organized as follows:

- Section 2 summarizes the identified project's results for dissemination, scientific and industrial.

- Section 3 summarizes the main communication actions, including IoT-EPI and liaison with other projects.

- Section 4 revisits the exploitation plan and summarizes the major achievements with close link with D8.7a.

2 Dissemination

2.1 Introduction

As described in D8.3 dissemination activities aim to establish critical mass and long-term commitment from different selected target groups. Dissemination of project results is one of the tasks (T8.2) within WP8. Therefore, results from various project activities will be disseminated to the widest possible, though precisely selected, communities through a number of focused activities. The dissemination plan considered a continuous activity since the start of the project, but with flexibility and possibility of evolving during the lifetime of the It should be stressed that the dissemination activities have been continuous and that the plan of such activities will evolve throughout the lifetime of the project. The evolution will be caused both by the growth of internal knowledge (e.g. discovery of new target group, like conferences, research cluster or as a result of the Open Call); as well as changes in the ecosystem of research in which INTER-IoT project will grow. The project partners have been working together in areas related with IoT interoperability for several years before the start of the project, so the project has not suffered the typical 'slow start' effect in terms of dissemination activities, as some of the work were already ongoing during the negotiation phase of the project and were linked to INTER-IoT. The identified target audiences, identified in the dissemination plan in D8.3 have remained the same:

- Academic institutions

- R&D departments of industrial companies

- Start-ups

- Business in general, including the remaining stakeholders

- EU-funded projects

- General public, including IoT enthusiasts

Following the recommendation of the project reviewers we split dissemination activities in two blocks:

- **Scientific dissemination:** Disseminate the scientific and policy oriented research done in the framework of INTER-IoT by participating to academic and policy oriented conferences, by presenting working papers and scientific contributions, and by submitting scientific articles to peer-review journals.

- **Industrial Dissemination:** Disseminate the different exploitable services and products of INTER-IoT in the main industrial conferences and exhibitions of the sectors and markets addressed in the project (Ports, Health, IoT, etc.), in order to attract the attention of potential customers and users.

Each dissemination activity had their own development plan and the following sections describe the achievements during the first 18 months of the project.

2.2 Scientific Dissemination

Scientific dissemination is a key impact enabler, and the consortium is making a concerned effort in order to deliver substantial number of high impact publications. Following the scientific dissemination plan the main publication targets have been journals, conferences, workshops and book chapters. The activity has been successful and the results are listed from M1 to M18. The identification of the relevant venues was identified in D8.3, and the list is periodically monitored and updated.

Members of the consortium have also organized a number of scientific events, in line with the activity of the project. It should be stressed that these events are either stand-alone (and in this case organized under the umbrella of respective organizations, e.g. European Alliance for Innovation), or associated with events organized by well established organizations representing IT professionals (e.g. the IEEE). In the following sections we present, in more detail, our activities in this area.

The next period of the project (M19-M36) will bring more activities related with dissemination as the technical project results are increasing and WP6 related with pilots and real testing is starting. It has to be highlighted that as part of the dissemination strategy some activities related with academics are undergoing (e.g. joint seminars, joint PhD thesis,...) and will be consolidated during the second half of the project.

2.2.1 Scientific papers

In what follows we list publications produced so far, describing results related to the project.

2.2.1.1 Book and Book Chapters

We start with the book that will contain chapters prepared by multiple research groups from the consortium.

1	Interconnection, Integration and Interoperability of IoT Systems
Type of Scientific Publication	Book
Authors	Raffaele Gravina, Carlos E. Palau, Marco Manso, Antonio Liotta, Giancarlo Fortino
Title Journal and Equivalent	Springer
Number, Date	(In press) 2017
Place	

2	Interoperability in IoT
Type of Scientific Publication	Book Chapter
Authors	Regel Gonzalez, Diana Yacchirema, Matilde Julian, Carlos E. Palau
Title Journal and Equivalent	Concepts, Technologies, Applications, and Implementations published by CRC Press (Taylor & Francis Group)
Number, Date	(In press) 2017

Place

3	Transmission Power Control in WSNs: From Deterministic to Cognitive Methods, in: Interconnection, Integration and Interoperability of IoT Systems
Type of Scientific Publication	Book Chapter
Authors	Michele Chincoli, Antonio Liotta
Title Journal and Equivalent	Springer
Number, Date Place	(In press) 2017

4	Digitising the Industry Internet of Things Connecting the Physical, Digital and Virtual Worlds.
Type of Scientific Publication	Book Chapter
Authors	Sylvain Kubler; Kary Främling; Arkady Zaslavsky; Charalampos Doukas; Eneko Olivares Gorriti; Giancarlo Fortino, Carlos E. Palau, Sergios Soursos, Ivana Podnar Zarko, Yiwei Fang, Srdjan Krco, Christopher Heinz, Christoph Grimm, Arne Broering, Jelena Mitic, Kathleen Olstedt, Ovidiu Vermesan
Title Journal and Equivalent	IoT Platforms Initiative. Published by River Publishers.
Number, Date Place	2016

5	Micro Virtual Machines (MicroVMs) for Cloud-Assisted Cyber-Physical Systems
Type of Scientific Publication	Book chapter
Authors	Juan V. Pradilla, Carlos E. Palau
Title Journal and Equivalent	R. Buyya, A. V. Dastjerdi (ed.), Internet of Things; Principles and Paradigms (ELSEVIER)
Number, Date Place	January, 2016

2.2.1.2 Journals

We would like to stress that our consortium is publishing results in very good journals, with high impact factors (e.g. Journal of Network and Computer Applications or Computer Networks). Furthermore, while pilots will start next month, we already have a number of publications related to, broadly understood, e-Health. Finally, publication in Journal of Medical Systems is devoted to IoT security.

6	Adaptive re-scheduling web service of time synchronized low-power wireless networks

Type of Scientific Publication	Journal
Authors	George Exarchakos, Ilkar Oztelcan, Dimitris Sarakiotis, Antonio Liotta
Title Journal and Equivalent	Journal of Network and Computer Applications, Elsevier
Number, Date Place	Volume 81 Issue C, March 2017, Pages 62-73

7	Semantic interoperability in the Internet of Things: an overview from the INTER-IoT perspective
Type of Scientific Publication	Journal
Authors	Maria Ganzha, Marcin Paprzycki, Wieslaw Pawlowski, Pawel Szmeja, Katarzyna Wasielewska
Title Journal and Equivalent	Journal of Network and Computer Applications, Elsevier
Number, Date Place	Volume 81, 1 March 2017, Pages 111–124

8	Spatial Anomaly Detection in Sensor Networks Using Neighborhood Information
Type of Scientific Publication	Journal
Authors	Hedde Bosman, Giovanni Iacca, Arturo Tejada, Heinrich J. Wörtche, Antonio Liotta
Title Journal and Equivalent	Information Fusion Journal, Elsevier
Number, Date Place	Volume 33 Issue C, January 2017, Pages 41-56

9	Fusing Bluetooth Beacon Data with Wi-Fi Radiomaps for Indoor User Localization
Type of Scientific Publication	Journal
Authors	L. Kanaris, A. Kokkinis, A. Liotta, S. Stavrou
Title Journal and Equivalent	Sensors. Vol.17(4), MDPI
Number, Date Place	2017

10	Telemedicine and Prevention: electromedical devices experimentation in the nutritional counseling
Type of Scientific Publication	Journal

Authors	Gulino Margherita, Maggi Claudio, Costa Anna, Mortara Marina, De Luca Ilaria, Minutolo Monica, Uberti Massimo, Bernini Luciano, Corona Massimo, Della Torre Angelina, Avataneo Bartolomeo, Aldrighetti Anna, Pata Domenica, Albano Lucia, Maio Fortunata , Rinaldi Maurizia, Cialdini Mario; Palau Carlos E., Olivares Eneko, Esteve Manuel, Fortino Giancarlo, Aloi Gianluca, Gravina Raffaele , Fides Alvaro, Ibañez Gema, Traver Vicente.
Title Journal and Equivalent	Progress in Nutrition
Number, Date	To appear (2017)
Place	Journal

11	Mobile Health: studio pilota sul "Monitoraggio decentralizzato ed in mobilitá degli stili di vita" nell'ambito del progetto europeo "Interoperabilitá di piattaforme eterogenee IoT- INTER- IoT"
Type of Scientific Publication	Journal
Authors	Gulino Margherita, Maggi Claudio, Costa Anna, Mortara Marina, De Luca Ilaria, Minutolo Monica, Uberti Massimo, Bernini Luciano, Corona Massimo, Della Torre Angelina, Avataneo Bartolomeo, Aldrighetti Anna , Pata Domenica, Albano Lucia, Maio Fortunata, Rinaldi Maurizia, Cialdini Mario; Palau Carlos E., Olivares Eneko, Esteve Manuel, Fortino Giancarlo, Aloi Gianluca, Gravina Raffaele, Fides Alvaro, Ibañez Gema, Traver Vicente
Title Journal and Equivalent	Journal of the Italian Association of Dietetics and Clinical Nutrition (ADI Magazine)
Number, Date	To appear (2017)
Place	Journal

12	Interoperabilitá di piattaforme eterogenee internet delle cose (inter-iot): studio pilota mobile health
Type of Scientific Publication	Journal
Authors	A.Costa, M. Gulino, C. Maggi, C. E. Palau Salvador, G. Fortino, P.Pace, M. Uberti, L. Bernini, M. Corona, M. Minutolo, I. De Luca, M. Mortara, F. Maio, A. Aldrighetti, A. Della Torre, D. Pata, B. Avataneo, M. Rinaldi, M. Cialdini, L. Albano
Title Journal and Equivalent	Acts of Scientific XXXVII National Conference- Human nutrition Italian Society- SINU Acts Volume
Number, Date	30 November – 2 December 2016.
Place	Journal

13	Semantically enriched data access policies in eHealth
Type of Scientific Publication	Journal

Authors	Michał Drozdowicz, Maria Ganzha, Marcin Paprzycki
Title Journal and Equivalent	Journal of Medical Systems
Number, Date Place	Volume 40 Issue 11, November 2016, Pages 1-8

14	**Impact of Transmission Power Control in Multi-hop Networks. Future Generation**
Type of Scientific Publication	Journal
Authors	Roshan Kotian, George Exarchakos, Stavros Stavrou, Antonio Liotta
Title Journal and Equivalent	Computer Systems Journal (Special Issue on Cyber-physical Systems, Internet of Things and Big Data), Elsevier
Number, Date Place	October 2016

15	**A Topological Insight into Restricted Boltzmann Machines**
Type of Scientific Publication	Journal
Authors	Decebal C. Mocanu, Elena Mocanu, Phuong H. Nguyen, Madeleine Gibescu, Antonio Liotta
Title Journal and Equivalent	Machine Learning Journal, Springer
Number, Date Place	Volume 104 Issue 2-3, September 2016, Pages 243-270

16	**Smart IoT Gateway For Heterogeneous Devices Interoperability**
Type of Scientific Publication	Journal
Authors	Diana C. Yacchirema, Carlos E. Palau
Title Journal and Equivalent	IEEE Latin America Transactions
Number, Date Place	No 8, vol 14, pp 3900-3906, 2016

17	**Power Control in Wireless Sensor Networks with Variable Interference**
Type of Scientific Publication	Journal
Authors	Michele Chincoli, Aly Syed, George Exarchakos, Antonio Liotta
Title Journal and Equivalent	Mobile Information Systems, Hindawi
Number, Date Place	July 2016

18	Sample Size Determination Algorithm for Fingerprint-Based Indoor Localization Systems
Type of Scientific Publication	Journal
Authors	Stavros Stavrou, Loizos Kanaris, Akis Kokkinis, Giancarlo Fortino, Antonio Liotta
Title Journal and Equivalent	Computer Networks (special issue on Industrial Technologies and Applications for the Internet of Things), Elsevier
Number, Date	Vol. 101, June 2016
Place	

19	Interoperabilitá di Piattaforme Eterogenee Internet Delle Cose (INTER-IoT)
Type of Scientific Publication	Journal
Authors	Fortunata Maio, Margherita Gulino, Claudio Maggi, Carlos Enrique Palau Salvador, Massimo Uberti, Luciano Bernini, Massimo Corona, Monica Minutolo, Anna Aldrighetti, Angelina Della Torre, Domenica Pata, Bartolomeo Avataneo, Maurizia Rinaldi, Mario Cialdini; Gianluca Aloi, Giuseppe Caliciuri, Giancarlo Fortino, Raffaele Gravina, Pasquale Pace, Wilma Russo, Claudio Savaglio, Carlo Aldera, Fabio D'Ercoli, Alberto Delpiano, Giovanna Larini
Title Journal and Equivalent	Studio Pilota Mobile Health, Acts of Scientific Journal of the Italian Association of Dietetics and Clinical Nutrition (ADI Magazine), Acts Volume
Number, Date	April 2016
Place	

2.2.1.3   Conference presentations and publications

INTER-IoT consortium is very active in participation and publication in academic conferences. These conferences are not only organized by the likes of the IEEE, but also take place not only in venues within EU, but also around the world, e.g. in US, Canada, China or Japan.

20	Distributed TSCH Scheduling: a Comparative Analysis
Type of Scientific Publication	Conference
Authors	Tim van der Lee, Georgios Exarchakos, Antonio Liotta
Title Journal and Equivalent	IEEE Conference on Systems, Man, and Cybernetics (SMC'17)
Number, Date	5-8 October 2017
Place	Banff, Canada

21	Modeling Opportunistic IoT Services in Open IoT Ecosystems
Type of Scientific Publication	Conference
Authors	G.Fortino, W. Russo, C. Savaglio, M. Viroli, M. Zhou

Title Journal and Equivalent	WOA 2017 (Workshop "From Objects to Agents")
Number, Date	15-17 June 2017
Place	Reggio Calabria, Italy

22	IoT platforms Interoperability for Active and Assisted Living Healthcare services support
Type of Scientific Publication	Conference
Authors	G. Aloi, Á. Fides-Valero, G. Fortino, R. Gravina, G. Ibáñez Sánchez, P. Pace, C. E. Palau, V. T. Salcedo, D. Yacchirema
Title Journal and Equivalent	Global IoT Summit
Number, Date	6-9 June 2017
Place	Geneva, Switzerland

23	TSCH Schedule Assessment
Type of Scientific Publication	Conference
Authors	T. van der Lee, A. Liotta, G. Exarchakos
Title Journal and Equivalent	14th IEEE International Conference on Networking, Sensing and Control, Special Session on Marine Sensing
Number, Date	May 16-18 2017
Place	Lamezia, Italy

24	AAL open source system for an intelligent control and monitoring of nursing homes
Type of Scientific Publication	Conference
Authors	Regel Gonzalez-Usach, Vicente Collado, Manuel Esteve, Carlos E. Palau
Title Journal and Equivalent	14th IEEE International Conference on Networking, Sensing and Control (ICNSC 2017)
Number, Date	15-18 May 2017
Place	Lamezia, Italy

25	Combining Smart Lighting and Radio Fingerprinting for Improved Indoor Localization
Type of Scientific Publication	Conference
Authors	L. Kanaris, A. Kokkinis, A. Liotta, S. Stavrou
Title Journal and Equivalent	proc. of the 14th IEEE International Conference on Networking, Sensing and Control (ICNSC'17), special session on Smart Lighting
Number, Date	May 16-18, 2017
Place	Calabria, Italy

26	Reliable low-power wireless networks over unstable transmission power
Type of Scientific Publication	Conference
Authors	R. Kotian, G. Exarchakos, A. Liotta
Title Journal and Equivalent	proc. of the 14th IEEE International Conference on Networking, Sensing and Control (ICNSCÕ17), special session on Smart Lighting
Number, Date	May 16-18, 2017
Place	Calabria, Italy

27	Quality of Fingerprint Radiomaps for Positioning Systems
Type of Scientific Publication	Conference
Authors	L. Kanaris, A. Kokkinis, A. Liotta, S. Stavrou
Title Journal and Equivalent	proc. of the 24th IEEE International Conference on Telecommunication (ICT'17)
Number, Date	May 3-5, 2017
Place	Cyprus

28	Graphical Interface for Ontology Mapping with Application to Access Control
Type of Scientific Publication	Conference
Authors	Michal Drozdowicz, Motasem Alwazir, Maria Ganzha, Marcin Paprzycki
Title Journal and Equivalent	9th Asian Conference ACIIDS
Number, Date	3-5 April, 2017
Place	Kanazawa, Japan

29	Towards Common Vocabulary for IoT
Type of Scientific Publication	Conference
Authors	Ecosystems – preliminary Considerations
Title Journal and Equivalent	Maria Ganzha, Marcin Paprzycki, Wieslaw Pawlowski, Pawel Szmeja, Katarzyna Wasielewska
Number, Date	9th Asian Conference ACIIDS
Place	3-5 April, 2017

Kanazawa, Japan

30	Enable IoT Interoperability in Ambient Assisted Living: Active and Healthy Aging Scenarios
Type of Scientific Publication	Conference
Authors	Diana C. Yacchirema; Manuel Esteve; Carlos E. Palau
Title Journal and Equivalent	The 14th Annual IEEE Consumer Communications & Networking

Number, Date	8-11 January 2017
Place	Las Vegas, USA

31	A Survey of Open Body Sensor Networks: Applications and Challenges
Type of Scientific Publication	Conference
Authors	N. Yang, Z. Wang, R. Gravina, G. Fortino
Title Journal and Equivalent	Globe-IoT 2017: Towards Global Interoperability among IoT Systems
Number, Date	8-11 Jan. 2017
Place	Las Vegas, USA

32	From implicit semantics towards ontologies – practical considerations from the INTER-IoT perspective
Type of Scientific Publication	Conference
Authors	Maria Ganzha, Marcin Paprzycki, Wieslaw Pawlowski, Pawel Szmeja, Katarzyna Wasielewska, Carlos E. Palau
Title Journal and Equivalent	The 14th Annual IEEE Consumer Communications & Networking
Number, Date	8-11 January 2017
Place	Las Vegas, USA

33	Towards Interoperability of IoT-based Health Care platforms: the INTER-Health use case
Type of Scientific Publication	Conference
Authors	P. Pace, G. Aloi, R. Gravina, G. Fortino, G. Larini, M. Gulino
Title Journal and Equivalent	11th EAI International Conference on Body Area Networks (Bodynets 2016)
Number, Date	15-16 December 2016
Place	Turin, Italy

34	Towards interoperable, cognitive and autonomic IoT systems: An agent-based approach
Type of Scientific Publication	Conference
Authors	C. Savaglio, G. Fortino and M. Zhou
Title Journal and Equivalent	The 2016 IEEE 3rd World Forum on Internet of Things (WF-IoT)
Number, Date	12-14 Dec. 2016
Place	Reston, VA, U.S.A.

35	Big IoT data mining for real-time energy disaggregation in buildings

Type of Scientific Publication	Conference
Authors	Decebal C. Mocanu, Elena Mocanu, Phuong H. Nguyem, Madeleine Gibescu, Antonio Liotta
Title Journal and Equivalent	IEEE Conference on Systems, Man, and Cybernetics (SMC'16)
Number, Date	9-12 October 2016
Place	Budapest, Hungary

36	Design and Implementation of a Gateway for Pervasive Smart Environments
Type of Scientific Publication	Conference
Authors	Diana C. Yacchirema, Carlos E. Palau
Title Journal and Equivalent	IEEE Conference on Systems, Man, and Cybernetics (SMC'16)
Number, Date	9-12 October 2016
Place	Budapest, Hungary

37	A Topological Insight into Restricted Boltzmann Machines
Type of Scientific Publication	Conference
Authors	Decebal C. Mocanu, Elena Mocanu, Phuong H. Nguyen, Madeleine Gibescu, Antonio Liotta
Title Journal and Equivalent	27th European Conference on Machine Learning and Principles and Practice of Knowledge Discovery (ECMLPKDD'16)
Number, Date	19-23 September 2016
Place	Riva del Garda, Italy

38	Agent-oriented Modeling and Simulation of IoT Networks
Type of Scientific Publication	Conference
Authors	Giancarlo Fortino, Wilma Russo, Claudio Savaglio
Title Journal and Equivalent	The 10th International Workshop on "Multi-Agent Systems and Simulation" (MAS&S'16)
Number, Date	11-14 September 2016
Place	Gdansk, Poland

39	Simulation of Agent-oriented Internet of Things Systems
Type of Scientific Publication	Conference
Authors	Giancarlo Fortino, Wilma Russo, Claudio Savaglio
Title Journal and Equivalent	17th Workshop "From Object to Agents" (WOA16)
Number, Date	29 – 30 July 2016

Place	Catania, Italy

40	The synergy of network science and artificial intelligence
Type of Scientific Publication	Conference
Authors	Decebal C. Mocanu
Title Journal and Equivalent	Twenty-Fifth International Joint Conference on Artificial Intelligence - International Joint Conferences on Artificial Intelligence
Number, Date	9-15 July 2016
Place	New York, USA

41	The double link between network science and artificial intelligence. A key to scalable learning solutions?
Type of Scientific Publication	Conference
Authors	D.C. Mocanu, G. Exarchakos, A. Liotta
Title Journal and Equivalent	proc. of the European Data Forum
Number, Date	June 29-30, 2016
Place	Eindhoven, The Netherlands

42	Hybrid Delay-Based Congestion Control for Multipath TCP
Type of Scientific Publication	Conference
Authors	Regel Gonzalez, Juan Pradilla, Manuel Esteve, Carlos E. Palau
Title Journal and Equivalent	Proceedings of the 18th Mediterranean Electro technical Conference MELECON 2016
Number, Date	18-20 April 2016
Place	Limassol, Cyprus

43	Sensor Observation Service (SOS) / Constrained Application Protocol (CoAP) Proxy Design
Type of Scientific Publication	Conference
Authors	Juan.V. Pradilla, Regel Gonz̆lez, Manuel Esteve, Carlos E. Palau
Title Journal and Equivalent	Proceedings of the 18th Mediterranean Electro technical Conference MELECON 2016
Number, Date	18-20 April 2016
Place	Limassol, Cyprus

44	A Mobile Multi-Technology Gateway to Enable IoT Interoperability
Type of Scientific Publication	Conference

Authors	G. Aloi, G Caliciuri, Giancarlo Fortino, Rafaelle Gravina, P. Pace, Wilma Russo, Claudio Savaglio
Title Journal and Equivalent	1st IEEE First International Conference on Internet-of-Things Design and Implementation (IoTDI)
Number, Date	April 4-6 2016
Place	Berlin, Germany

45	Predictive Power Control in Wireless Sensor Networks
Type of Scientific Publication	Conference
Authors	Michele Chincoli, Aly Syed, Decebal C. Mocanu, Antonio Liotta
Title Journal and Equivalent	1st IEEE First International Conference on Internet-of-Things Design and Implementation (IoTDI)
Number, Date	April 4-6 2016
Place	Berlin, Germany

46	Semantic Technologies for the IoT - an Inter-IoT Perspective
Type of Scientific Publication	Conference
Authors	Maria Ganzha, Marcin Paprzycki, Wieslaw Pawlowski, Pawel Szmeja, Katarzyna Wasielewska
Title Journal and Equivalent	1st IEEE First International Conference on Internet-of-Things Design and Implementation (IoTDI)
Number, Date	April 4-6 2016
Place	Berlin, Germany

47	Dimensions of ontological similarity
Type of Scientific Publication	Conference
Authors	Pawel Szmeja, Maria Ganzha, Marcin Paprzycki, Wieslaw Pawlowski
Title Journal and Equivalent	IEEE Tenth International Conference on Semantic Computing (ICSC)
Number, Date	4-6 February 2016
Place	Laguna Hills, USA

2.2.1.4　Newsletters

In addition to publications in books, journals and conferences, we also communicate results of the project using (possibly online) magazines / newsletters for professionals in domains of our pilots.

48	The Internet of Things
Type of Scientific Publication	Magazine/ newsletter
Authors	Pablo Gimenez
Title Journal and Equivalent	Valencia Port Foundation Newsletter

| Number, Date | July-August 2016 |
| Place | Spain |

49	Smart port, a system of systems approach
Type of Scientific Publication	Magazine/ newsletter
Authors	Miguel Montesinos, Jose Garcia de la Guia
Title Journal and Equivalent	Automation and optimisation
Number, Date	vol. 69, February 2016
Place	UK

50	Abitudini alimentari. Parte il progetto europeo per il monitoraggio decentralizzato ed in mobilitá degli stili di vita
Type of Scientific Publication	Magazine/ newsletter
Authors	
Title Journal and Equivalent	"Quotidiano sanità" -Regione Piemonte
Number, Date	June 2017
Place	Italy

2.2.1.5   Scientific Presentations

The following presentations have been delivered to the scientific community.

51	Towards Multi-Layer Interoperability of IoT Platforms: the INTER-IoT approach
Type of Scientific Publication	Presentation
Authors	Giancarlo Fortino
Title Journal and Equivalent	
Number, Date	12 January 2017
Place	New Jersey Institute of Technology, Newark, NJ, USA

52	Keynote speech: "Towards Multi-Layer Interoperability of IoT Platforms: the INTER-IoT approach"
Type of Scientific Publication	Presentation
Authors	Giancarlo Fortino
Title Journal and Equivalent	The 2016 IEEE 3rd World Forum on Internet of Things (WF-IoT)
Number, Date	15 December 16
Place	Turin, Italy

53	Towards Multi-Layer Interoperability of IoT Platforms: the INTER-IoT approach
Type of Scientific Publication	Keynote
Authors	Giancarlo Fortino
Title Journal and Equivalent	9th International Conference on Internet and Distributed Computing Systems (IDCS) 2016
Number, Date	28 September 2016
Place	Wuhan, China

54	Enabling IoT Interoperability through Opportunistic Mobile Multi-Technology Gateways
Type of Scientific Publication	Presentation
Authors	Giancarlo Fortino
Title Journal and Equivalent	Invited Talk hosted by Prof. W. Li
Number, Date	06 July 2016
Place	Wuhan, China

55	Towards Interoperable, Cognitive and Autonomic IoT Ecosystems: an Agent-based Approach
Type of Scientific Publication	Presentation
Authors	Giancarlo Fortino
Title Journal and Equivalent	
Number, Date	8 May 2017
Place	Data Science Center (DSC/e) of Eindhoven University of Technology, Eindhoven, The Netherlands

56	Interoperability as challenge for (e/m)Health (in Polish)
Type of Scientific Publication	Presentation
Authors	Katarzyna Wasielewska
Title Journal and Equivalent	Technologies in Medicine
Number, Date	31 March 2016
Place	Warszawa, Poland

2.2.1.6 Summary

Overall, in the first 18 months of the project, more than 20 contributions have been either published or accepted for publications. In this context, let us make the following observations. More than 2 papers a month were produced and placed in the pipeline. All academic partners (SRIPAS, TUE,

UNICAL, UPV) have actively participated in the scientific dissemination (on average 6 papers each). Non-academic partners have contributed to magazine-based dissemination of results. Joint papers between academic partners have been already prepared. Majority of journal publications have been placed in journals with ISI (Thomson Reuters) impact factor. Almost all conferences, where scientific results of the project have been published, have their publications in either Springer or IEEE. Therefore, it should be stressed, that the dissemination of scientific results follows precisely what has been outlined in the project proposal.

2.2.2   Organisation of Scientific Events

The consortium has organized or participated in organization of scientific events summarized in the following table.

Type of Event	Event Name	Involved Members	Sponsor	Date	Place
Conference	INTER-IoT: Inter-operability of IoT Systems	UPV, UniCal, Tue, Sripas	EAI	Oct/Nov 2017	Valencia, Spain
Special Session	INTER-IoT, to be held with IEEE ICNSC 2017	UniCal, UOV, TUe	IEEE	16-18 May 2017	Calabria, Italy
Workshop	Globe-IoT Workshop, to be held with IEEE CNCC 2017	UniCal, UPV, Rinicom, Sripas, TUe	IEEE	8 Jan 2017	Las Vegas, USA
Conference	9th International Conference on Internet and Distributed Computing Systems (IDCS) 2016	UniCal	Springer	28-30 Oct. 2016	Wuhan, China
Special Session	Collaborative WSN and IoT, to be jointly held with IEEE SMC 2016	UniCal	IEEE	9-12 Oct. 2016	Budapest, Hungary
Workshop	I4T Workshop, jointly held with IEEE IoTDI 2016	UniCal, UPV, Rinicom, TUe as chairs and all other partners in the Program Committee	IEEE	4th April 2016	Berlin, Germany
Book	Integration, Interconnection, Interaction among IoT Platforms	UniCal, UPV, Rinicom, Tue	Springer	To be published in 2017	

Special Issue	IEEE Computing Now	UniCal, SRIPAS, UPV	IEEE	December 2016
Special Issue	Concurrency and Computation: Practice and Experience, special issue on Internet of People	M. Li, L. Liu, Antonio Liotta	Wiley	May 2016

Since the beginning of the project, academic members of the consortium have been actively pursuing what has been described in the proposal and in the impact creation plan (Deliverable 8.3). Specifically, a number of workshops have been organized and they all were successful in gathering participants from outside of the consortium. It should be stressed, that these workshops / conferences are organized with involvement of key partners: IEEE, EAI and Springer as the publisher. This assures high impact of these events as well as wide dissemination of presented results. As can be seen, concrete plans already exist for dissemination activities for 2017.

2.3   Industrial Dissemination

Since the beginning of the project, industrial dissemination was (and remains) one of our key goals. As a matter of fact, there was a number of industry focused presentations already delivered. Furthermore, we have participated in the SIDO 2017 and IoT Week, in which the consortium presented three demos related with INTER-IoT products. Our presentation attracted considerable interest, including representatives of IBM and W3C. Furthermore, while it is rather difficult to be certain that the Facebook-based dissemination is well-targeted towards business community, the situation changes when LinkedIn (our group) and Twitter (our account) are considered. Here, it is clear that messages that have been posted reach out to the business community (both these channels are, clearly, oriented towards professionals).

Nevertheless, the following observation has to be made. It is rather difficult to reach-out to the business community with no running software / prototype in hand. This is why only now, with the initial modules actually working, we are ready to stress industrial dissemination in three areas:

- IoT in general,

- e-health related IoT issues,

- IoT in logistics.

Several events were already identified in D8.3 and some of them have already been selected for attendance during the second half of the project in which potential for success of our ?products / results? in the business community could be achieved as was clearly visible during the IoT week. The project will perform different showcases to stakeholders during Y3 of the project in Torino and Valencia, location of the pilots.

Furthermore, we fully expect that majority of the collaboration from the Open Call will generate results that will be natural to communicate to the business audience. Here, it is worthy noting that, in the latter case, it will be our partners (from the Open Call) who will take part (hands-on) in the dissemination activities. The two large scale collaborations are tied to ECLIPSE, through the OM2M

project and the recently open sensiNact project. Both aspects started with the presence of INTER-IoT in ECLIPSECON 2016, will provide a possibility of promoting INTER-IoT results, attending to ECLIPSECON 2017 together with the partners of the open call.

During the Advisory Board meetings it was suggested by the stakeholder members and the representant of capital investments present results to industrial community when demonstrations were ready. Henceforth, we are certain that it is now after first demos have been released when we have reached the point when we have product(s) to leverage to disseminate to outreach to our target business audiences.

2.3.1   Industrial Presentations

Finally, a number of presentations have been delivered directly to the business/industrial community.

57	Interoperability in the times of Internet of Things
Type of Scientific Publication	Presentation
Authors	Marcin Paprzycki
Title Journal and Equivalent	IoT Summit
Number, Date	29 Sept. 2016
Place	Warszawa, Poland

58	IoT Interoperability – Panel Participation
Type of Scientific Publication	Presentation
Authors	Marcin Paprzycki
Title Journal and Equivalent	Forum Teleinformatyki
Number, Date	29 Sept. 2016
Place	Warszawa, Poland

59	Internet of Things – unrealized potential of technologies
Type of Scientific Publication	Presentation
Authors	Katarzyna Wasielewska
Title Journal and Equivalent	Interoperability of IoT Platforms
Number, Date	22 Sept. 2016
Place	Warszawa, Poland

60	Success stories in Smart cities and internet of things
Type of Scientific Publication	Presentation
Authors	Miguel Ángel Llorente Carmona

Title Journal and Equivalent	Panel "Smart Cities and the Internet Of Things", during 27th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications
Number, Date	4-7 September, 2016
Place	Valencia, Spain

61	Interoperabilitá di Piattaforme Eterogenee Internet Delle Cose (INTER-IoT)
Type of Scientific Publication	Presentation
Authors	Fortunata Maio, Margherita Gulino, Claudio Maggi, Carlos Enrique Palau Salvador, Massimo Uberti, Luciano Bernini, Massimo Corona, Monica Minutolo, Anna Aldrighetti, Angelina Della Torre, Domenica Pata, Anna Costa, Marina Mortara, Federica Sandiano, Ilaria De Luca, Bartolomeo Avataneo, Maurizia Rinaldi, Mario Cialdini; Gianluca Aloi, Giuseppe Caliciuri, Giancarlo Fortino, Raffaele Gravina, Pasquale Pace, Wilma Russo, Claudio Savaglio, Carlo Aldera, Fabio D'Ercoli, Alberto Delpiano, Giovanna Larini
Title Journal and Equivalent	Studio Pilota Mobile Health, II Residential Course
Number, Date	15-16 April, 2016
Place	Orvieto, Italy

62	Overview of the Inter-IoT Project
Type of Scientific Publication	Presentation
Authors	Alessandro Bassi
Title Journal and Equivalent	NIST/ENEA event (IoT enabled Smart City Framework)
Number, Date	14 April 2016
Place	Rome, Italy

63	Semantic interoperability in the Internet of Things
Type of Scientific Publication	Presentation
Authors	Maria Ganzha
Title Journal and Equivalent	SmartER Europe Conference and Fair
Number, Date	18 Feb. 2016
Place	Essen, Germany

64	Autonomous Resource Access in the Internet of Things
Type of Scientific Publication	Presentation
Authors	Marcin Paprzycki

Title Journal and Equivalent	SmartER Europe Conference and Fair
Number, Date	18 Feb. 2016
Place	Essen, Germany

2.3.2   Demo and Posters for Industrial Events

During the first 18 months we prepared three demo, to be shown mainly at Industrial events, in order to explain what our products ware able to do in practical context.

For what concern the Application and Services layer, we show several isolated services interoperating between each other using Inter-IoT - NodeRED tool. Two trucks are moving around Valencia and a CEP (Fiware/Proton) service fires an event 10km before approaching the port. Then all the service composition wiring comes into play and all information is extracted and collapsed regarding the truck destination (consulting the Port Community System service, PCS) and previous port calls that the truck serviced (consulting the Short Time Historic service of Fiware, STH) and displayed in a GUI dashboard.
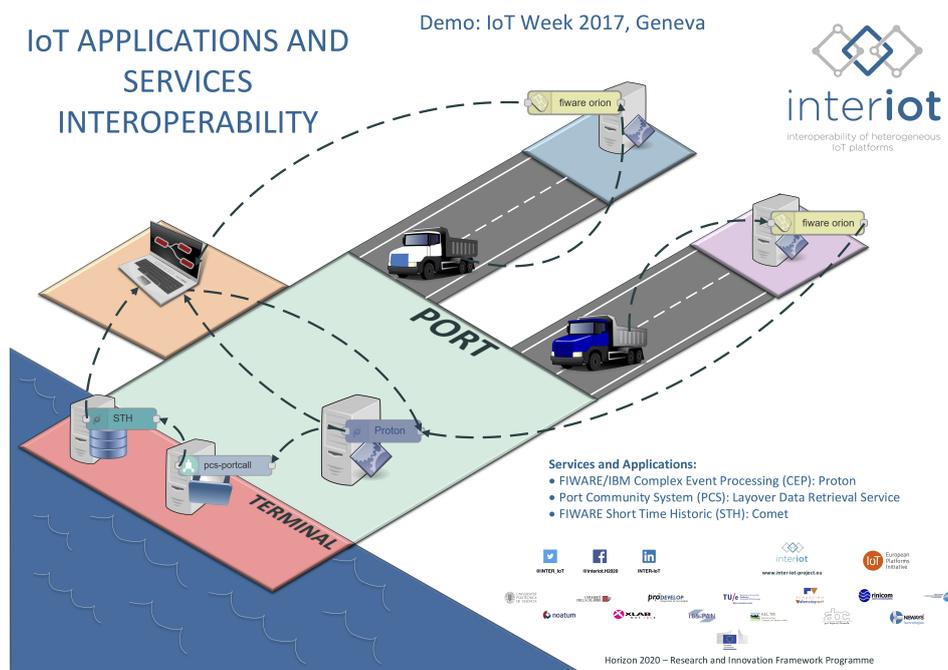
Figure 2.1: AS2AS Demo Poster

For what concern the Demo on the Middleware, we focus on the Integration of Universaal (UaaL) and Orion (FIWARE). The specific setup is the following: the Scale goes to Mobile phone (acting as a gateway, via bluetooth) and the phone sends the sensor information to UaaL (via Wifi). INTER-MW bridges the information of UaaL with Orion (FIWARE) then a GUI to visualize the measurements is subscribed to Orion to prove that the bridging works.

The aim of DS2DS demo was to present the functionality of semantic translation performed by IPSM component. The background story for the demonstration is as follows:

- There are 4 IoT artifacts/platforms that cooperate in e.g. a port environment. They have the

Figure 2.2: MW2MW Demo Poster

following roles: P1 – produces sensor observations; P2 – analytical platform that should receive observations produced by P1; P3, P4 – business logic platforms that consume observations published by P2.

- The architecture of IPSM assumes existence of a central ontology (CO) specific for a deployment and based on GOIoTP. In this case central ontology is based on SOSA and geoSPARQL for geospatial data representation.

- Each platform uses a different ontology:

  P1 http://platform1.eu/sensors# extending SSN and wgs84_pos for geospatial data (e.g. Open-IoT)

  P2 http://platform2.eu/sensors# extending SAREF and wgs84_pos for geospatial data

  P3 P3 - http://platform3.eu/sensors# extending SSN and wgs84_pos for geospatial data (e.g. OPEN-IoT)

  P4 P4 - http://platform4.eu/sensors# extending SSN and geoRSS for geospatial data (e.g. IoT-Lite)

The IPSM architecture is based on communication channels created between components. Each semantic translation channel uses two alignments (performs two translations) – from source ontology to central ontology, and from central ontology to target ontology. Considered translation channels:

1. Between P1 and P2

2. Between P2 and P4

3. Between P2 and P3

Each pair of messages is de facto the same message in terms of metadata, but the payload changes due to applied alignments.

The demonstration included two scenarios: (1) performing semantic translation between selected IoT artifacts and inspecting the results, (2) running continuous translation of messages generated by one of the IoT artifacts and measuring number of translation per second.
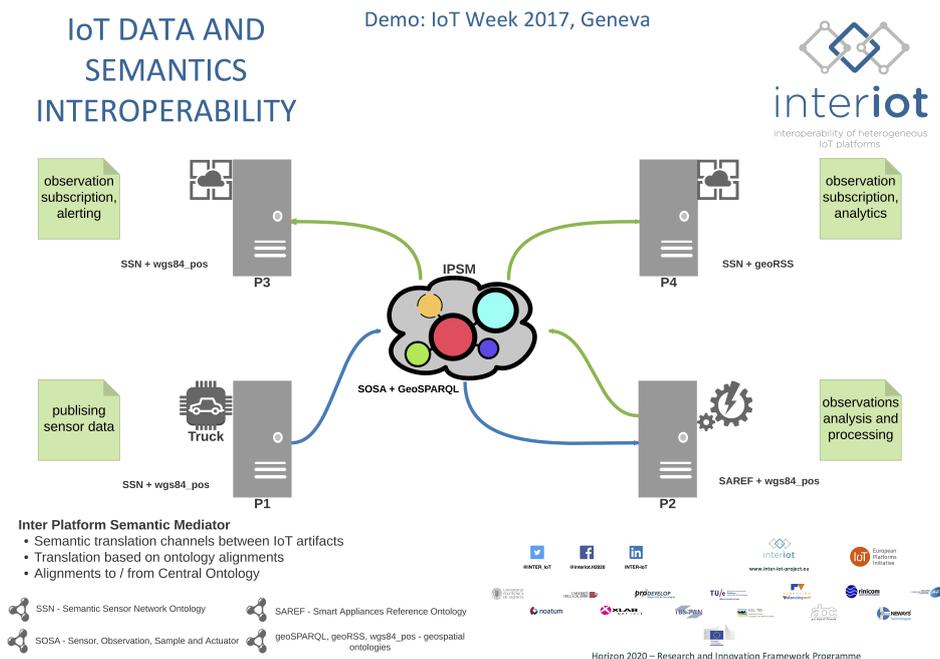
Figure 2.3: DS2DS Demo Poster

2.3.3   Meetings with Industries

A few industrial partners in the consortium engaged in the last few months discussions with relevant industries related to INTER-IoT. Typically, end-users may have environments that grew not organically, following different patterns, and now they have a situation where several different platforms are used, they are not interoperable, and the situation is not scalable any longer. These industries were looking for a long-term plan on improving the situation, but they would rather avoid the "big bang" solution of changing all systems at once. In context like these, the availability of INTER-IoT solutions (such as INTER-Layer or INTER-FW) would be extremely beneficial. INTER-IoT solutions were presented during these private meetings, and generally a very high interest was shown by the potential customers.

While unfortunately it is not possible to list these meetings and the industries, as they were held under strict NDA conditions, we believe that at least some of these will develop in a successful relationship for a direct exploitation of the project results.

3   Report on Communication

3.1   Introduction

As already discussed in the Deliverable D8.3, we believe that communication activities in publicly-funded EU project often fall short, as there is a misconception regarding the communication activities. Successful communication implies to have a target audience, a message that the target is keen on listening, and a media channel where this message can be delivered.
During the first 18 months we put in place the right instruments in order to develop a successful communication of the project results, leading not only to a large uptake of the results, but to a successful continuation of the INTER-IoT development beyond the project's natural end.
The figure 3.1 shows our communication targets on a map; this is fundamental in order to assess the best way to reach our audience.
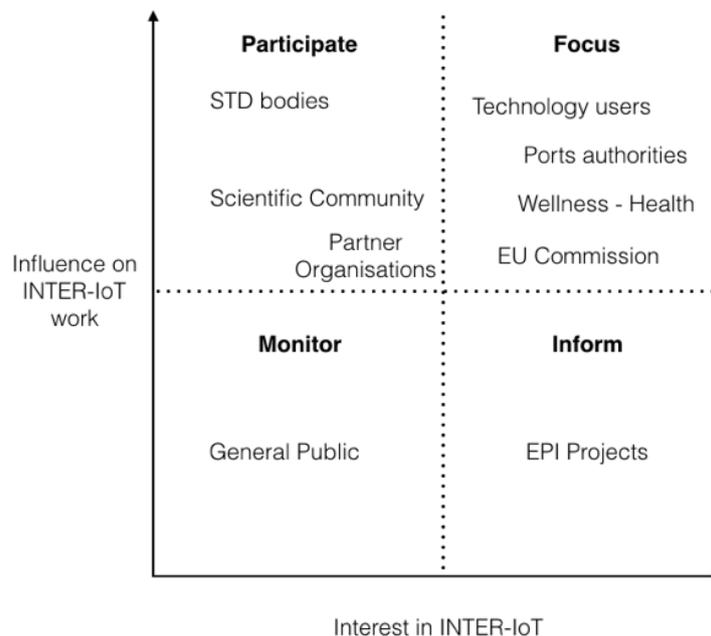
Figure 3.1: INTER-IoT Communication Targets

As planned, we will use different communication means according to the quadrant where a specific target audience is identified. While the web site and social media like Linkedin, Twitter and Facebook have been used as a generic portal for communicating our result to a large audience, the analysis of

a questionnaire that we submitted to our highly relevant targets showed hat seldom those means are used in order to take strategic decisions - or even information - on novel technologies.

3.2   Questionnaire Results

We submitted a questionnaire to our most relevant stakeholders in order to understand the best way to approach the communication towards them. The stakeholders were selected from the ones identified in WP2 (Deliverable D2.1). Out of all stakeholders contacted, which represented a "delphi" set, around half of them replied to the questionnaire. Hereafter the analysis of the answers which are relevant for the Communication Channels. It is important to notice that the answers were mainly given by people that can heavily influence the respective companies on new technologies (C-level executives, Directors, ...).

From which source do you get the most valuable information on Technology Products for your company?	The highest number of replies is from direct search on Internet (around 30%), then with direct communication with R&D partners (25%)
From which source you believe you don't get any interesting information?	Apart from newsletters, which got the highest number of replies, the other replies vary from social media to emails to mainstream media.
Ideally, how often would you like to be informed about new technological developments that could have an impact on your current activities?	Here, we have an almost flat uniform distribution from once a day to once every six months
Did you participate as a delegate to some Fair / Event in the last 2 years? If so, which ones?	The highest number (by far more than 50%) of replies was none; Among the ones that went to some event, TOC Amsterdam is the most common reply
Do you plan to participate to some Fair / Event in the next year? If so, which ones?	Answers were similar to the previous questions, with a large number of replies saying "none" and the majority of the rest TOC Amsterdam
How often do you use social media for your business (Twitter, LinkedIn, Facebook, etc.)?	While the majority of answers were regularly (30%), the second biggest group was never (either because of no interest or because company does not support that activity).

3.3   Web site traffic

Website pages views have been analysed since its launch by using Google Analytics. Results are shown in the figures 3.2 and 3.3
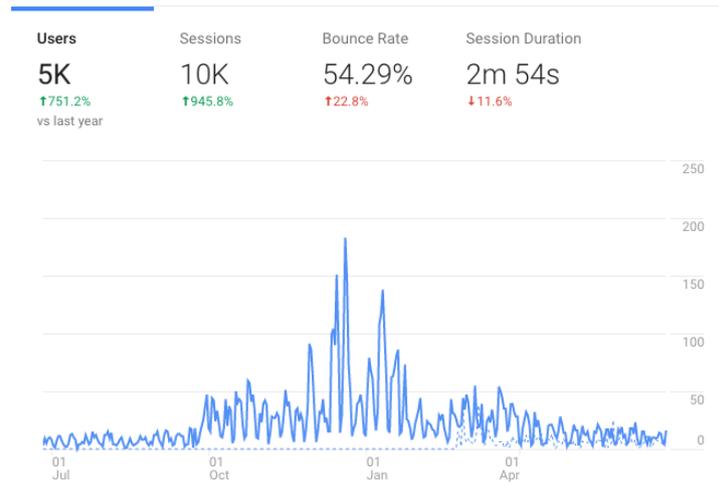
Figure 3.2: INTER-IoT WebSite Traffic
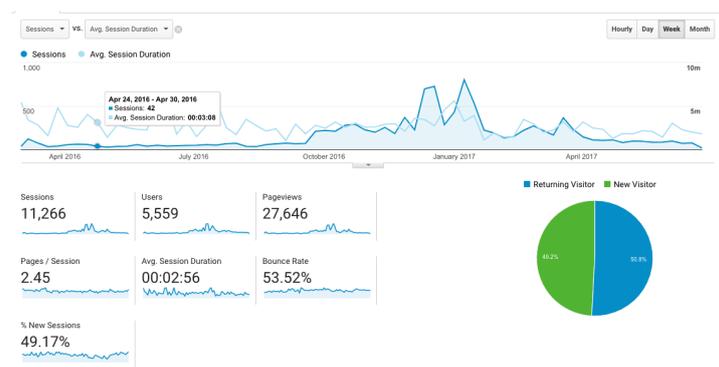
Figure 3.3: INTER-IoT WebSite Traffic

It's very clear that during the open call the web site was very popular, as many people were checking the details of the call. The total number of user, in excess of 5000, is also very good and promising, as we expect this number to grow significantly as soon as some of our results, including the open source software and the deliverables, will be ready. I's also important to see that while the average session duration is growing, which means that the users stay longer on the site; in other words, is not people that landed by mistake on our site and then fly away after a few seconds, but are reading and exploring what INTER-IoT has to offer.

3.4 Social Media presence

For what concerns standard social meda (such as Linkedin, Twitter, Facebook), the project set up from the very beginning the different accounts. While these channels do not seem to be the most appropriate to reach the stakeholders identified in the highest quadrant, we do feel that it's important to have a presence for both the general public and for the stakeholders that do follow these media. The table 3.2 summarises the current statistics regarding social media presence:

Social Media	Followers	Actions
Twitter	400+	78
Linkedin	250+	30+
Facebook	380+	hundreds

Table 3.2: Social Media Presence

3.5 Liaison with other projects

Deliverable D8.3 considered in the communication action the liaison with different project, and a preliminary plan was drafted, however as the relationship with IoT-EPI is ongoing and since January 2017 H2020 IoT1 LSP projects started, the consortium decided to apply a specific strategy in order to manage this action and focus on answering the question with whom the INTER-IoT project plans to engage, when, where, and on which basis. Driven by this underlying question, this section draws current status of the projects external liaisons plan.

The liaison strategy is split into the following five phases over the project duration:

Phase 1: defined the external liaisons strategy and the initial set of Key Performance Indicators (KPI) for documenting the execution of the strategy. In addition, the first phase in external liaisons dealt with the identification and selection of candidate projects with which INTER-IoT plans to engage. The above criteria determine the frame based on which a selection of candidate projects is made.

Phase 2: the purpose consisted in reaching out to previously identified candidate projects. Contacts to partner projects were established and a joint planning in terms of common interests and the organizational aspects of a mutual exchange among involved projects was foreseen. The time frame for establishing contacts was kept as short as possible to allow shifting the focus at an as early as possible point in time to liaising with partner projects on a content-oriented basis.

Phases 3 and **4** were planned to start in parallel with phase 2. Phases 3 and 4 grouped liaising activities along the key set of focal points INTER-IoT will adopt and work upon in the respective time frame. These time frames were in-line with INTER-IoT's project plan, plus the envisioned focal points are aligned with the key project assets.

Phase 5 is more focused on pilots and evaluation of the results.

The following projects were selected initially during the first year of the external liaisons plan:

- IoT-EPI (http://www.iot-epi.eu) group of nine different projects with which INTER-IoT has been interacting. Special liaison with

  - SYMBIOTE (https://www.symbiote-h2020.eu/) as the developed architecture has similarities with INTER-IoT,

  - BIG-IoT (http://www.big-iot.eu) as the concept associated with API and security has been discussed in different meetings,
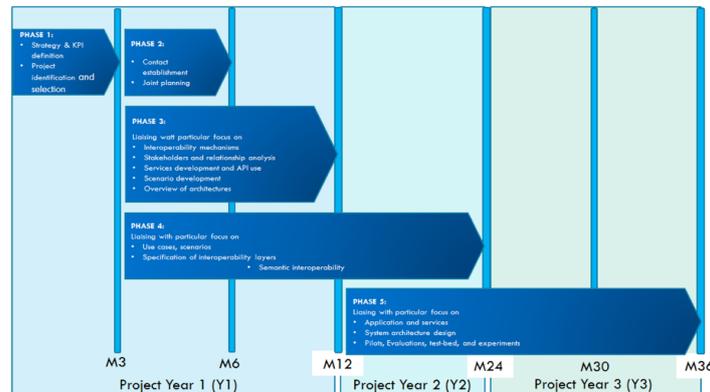
Figure 3.4: External Liaisons Strategy Structures in Phases

– AGILE (http://www.agile-iot.eu) as the concept of gateway presents some similarities with INTER-IoT D2D layer.

- IoT-LSP (web site not available yet) cluster of the five IoT1 LSP projects, a meeting with the five projects was held during IoT Week in order to establish relationships between projects, till now specific interactions with:

  – ACTIVAGE (http://www.activageproject.eu) dealing with interoperability for Active and Healthy Aging (AHA), the link is with the interoperability layer and semantics between IoT platforms, as INTER-IoT MW2MW layer and IPSM meet the requirements.

  – IoF2020 (http://www.iot2020.eu) related with farming and food industries and the need for interoperability, the interaction is twofold related with the interoperability layer and the gateway.

- H2020 Transforming Transport (http://www.transformingtransport.eu/) require INTER-IoT API and INTER-LAYER components to access data in INTER-LogP environment. The pilot for Big Data will deployed over INTER-IoT pilot.

- H2020 F-INTEROP (http://www.f-interop.eu/) FIRE project related with the provision of remote interoperability, the IoT interoperability as a service can be offered in the platform.

- ITEA3 APPS (http://www.apps-project.eu/)intends at future surveillance systems by exploiting the benefits of different sensor modalities. PRO is approaching architectural components of INTER-LAYER with APPS components, and searching for synergies with INTER-LogP and the APPS pilots at Port of Rotterdam.

- BIG-CLOUT (http://big-clout.eu) the project uses interoperability between IoT platforms in smart cities environment and the use of the information for big data analytics. The projects selected for liaison have been analysed in terms of different criteria:

- C1: In which ways could INTER-IoT profit from liaising with the project in question?

  – C1.1: Could INTER-IoT's interoperability mechanisms profit?

  – C1.2: Could INTER-IoT's stakeholder and relationship analysis profit?

- C1.3: Could INTER-IoT's INTER-FW and API profit?
- C1.4: Could INTER-IoT's scenarios development profit?
- C1.5: Could INTER-IoT's overview and/or the specification of solutions profit?
- C1.6: Could INTER-IoT's definition of use cases profit?
- C1.7: Could INTER-IoT's SMART objectives profit.
- C1.8: Could INTER-IoT's system architecture design be influenced?
- C1.9: Could INTER-IoT evaluations, its test-bed, and/or experiments profit?
- C1.10: Are there any other than the previously mentioned areas in which INTER-IoT could profit from that project?

• C2: In which ways could the project in question profit from liaising with INTER-IoT?

- C2.1: Could that project profit from INTER-IoT's interoperability mechanisms?
- C2.2: Could that project profit from INTER-IoT's stakeholder and relationship analysis?
- C2.3: Could that project profit from INTER-IoT's INTER-FW and API?
- C2.4: Could that project profit from INTER-IoT's scenario development?
- C2.5: Could that project profit from INTER-IoT's overview and/or the specification of solutions?
- C2.6: Could that project profit from INTER-IoT's definition of use cases?
- C2.7: Could that project profit from INTER-IoT's SMART objectives.
- C2.8: Could that project profit from INTER-IoT's system architecture?
- C2.9: Could that project profit from INTER-IoT evaluations, its test-bed, and/or experiments?
- C2.10: Are there any other than those previously mentioned areas in which that project could profit from INTER-IoT?

	C1: In which ways could INTER-IoT profit from liaising with the project in question?										C2: In which ways could the project in question profit from liaising with INTER-IoT?									
	C1.1	C1.2	C1.3	C1.4	C1.5	C1.6	C1.7	C1.8	C1.9	C1.10	C2.1	C2.2	C2.3	C2.4	C2.5	C2.6	C2.7	C2.8	C2.9	C2.10
Symbiote	x	x		x	x	x	x	x	X	x	X	X	x	x	x	x	x	x	x	x
BigIoT		x	x	x	x	x	x	x	X	x		X	x	x	x	x	x	x	x	X
AGILE	x						x	x	X	x	X	X					x	x	x	X
ACTIVAGE		x		x	x	x	x			x	X	X	x	x	x	x	x	x	X	x
IoF2020		x		x	x	x	x			x	X	X	x	x	x	x	x	x	x	
TT				x	x					x		X	x	x	x	x	x	x	x	X
F-INTEROP						x		x				X			x		x	x	X	
APPS											X	x	x	x		x		x	x	X
BIGCLOUT				x					x	x	x	x	x	x	x	x		x	x	x

Table 3.3: Projects that have liaisons with INTER-IoT

3.6   Public Events

1	MELECON 2016
Place	Limassol, Cyprus
Date	18-20 April 2016
Partner Participating	UPV (Regel Gonzalez Usach)
Event Type	18TH IEEE Mediterranean Electrotechnical Conference
Description	Melecon 2016 is an IEEE Region 8 flagship conference with a long standing history of excellence both in electrotechnology and in recent years in information and communication technologies as well. Melecon 2016 covers complementary thematic areas that hold great promise for the advancement of research and technological development in the solution of complex engineering systems.
Notes	Presentation of the papers "Sensor Observation Service Contrained Application Protocol Proxy Design" and "Hybrid Delay-Based Congestion Control for Multipath TCP"

2	Re e regine di cuochi
Place	Stupinigi (Turin), Italy
Date	28-29 May 2016
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event on nutrition and lifestyle for citizens "Awareness day" organized to promote proper lifestyle
Description	Regine & Re di Cuochi, the first exhibition dedicated to the Italian cuisine and its protagonists
Notes	A multimedia and interactive exhibition path with photo, documentary and objects that each cook wanted to exhibit. The exhibition is a multisensory experience that allows you to get to know the great interpreters of contemporary Italian cuisine and to enter the creative processes and kitchens that characterize their own production.

3	IERC meeting
Place	Valencia, Spain
Date	4 June 2016
Partner Participating	All partners
Event Type	Meeting of the European Research Cluster on the Internet of Things
Description	The aim of European Research Cluster on the Internet of Things is to address the large potential for IoT-based capabilities in Europe and to coordinate the convergence of ongoing activities.
Notes	

4	Salute in Comune
Place	Piobesi Torinese (Turin), Italy)
Date	25 June 2016
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event on nutrition and lifestyle for citizens "Awareness day" organized to promote proper lifestyle
Description	Salute in Comune, activity of awareness, prevention and health promotion
Notes	Valorization of awareness, prevention and health promotion, proposed in the city area to involve people of different age, culture, gender and interests.

5	Invited Talk
Place	Wuhan, China
Date	6 July 2016
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	Invited Talk
Description	Invited Talk hosted by Prof. W. Li
Notes	Title of the talk: "Enabling IoT Interoperability through Opportunistic Mobile Multi-Technology Gateways"

6	WOA 2016 (Workshop "From Objects to Agents")
Place	Catania, Italy
Date	29 July 2016
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	International Workshop
Description	WOA (Workshop "From Objects to Agents") is a per-year meeting of the Italian research group on Agent and Multi-agent Systems. Topic of 2016 edition was "Multiagent Systems for Internet of Mobile Things". More info at http://woa2016.dmi.unict.it/.
Notes	The paper "Simulation of Agent-oriented Internet of Things Systems." was presented by G. Fortino. Complete paper reference: G. Fortino, W. Russo, and C. Savaglio, "Simulation of Agent-oriented Internet of Things Systems." Proc. 17th Workshop" From Objects to Agents. 2016.

7	Giornata del Benessere 360
Place	Carmagnola (Turin), Italy
Date	27 August 2016
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event on nutrition and lifestyle for citizens
Description	Giornata del Benessere 360, Awareness day organized to promote proper lifestyle

Notes

8	FedCSIS 2016
Place	Gdansk, Poland
Date	11-14 September 2016
Partner Participating	UNICAL (Claudio Savaglio)
Event Type	International Conference
Description	The FedCSIS Multiconference consists of Events (conferences, symposia, workshops, special sessions). The FedCSIS Events provide a platform for bringing together researchers, practitioners, and academia to present and discuss ideas, challenges and potential solutions on established or emerging topics related to research and practice in computer science and information systems. More info at https://fedcsis.org/
Notes	The paper "Agent-oriented modeling and simulation of IoT networks" was presented by C. Savaglio. Complete paper reference: G. Fortino, W. Russo and C. Savaglio, "Agent-oriented modeling and simulation of IoT networks," 2016 Federated Conference on Computer Science and Information Systems (FedCSIS), Gdansk, 2016, pp. 1449-1452. URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7733442-&isnumber=7733200

9	Mini-symposium on Intelligent processes for the Internet of Things
Place	Eindhoven, The Netherlands
Date	12 September 2016
Partner Participating	TU/e (Antonio Liotta)
Event Type	workshop
Description	https://www.tue.nl/universiteit/faculteiten/electrical-engineering/onderzoek/centre-for-wireless-technology/nieuws/19-07-2016-phoenix-mini-symposium-intelligent-processes-for-the-internet-of-things-12-september-2016/
Notes	

10	QCMAN 2016
Place	Würzburg, Germany
Date	12-16 September 2016
Partner Participating	TU/e (Antonio Liotta)
Event Type	Workshop
Description	The 4th IEEE Workshop on QoE Centric Management aims at providing an international forum for researchers addressing these challenges. QCMan 2016 will combine original full paper presentations with a motivating keynote to thoroughly explore this challenging topic.
Notes	

11	AFT Regional Delegates Seminar
Place	Paris, France
Date	13 September 2016
Partner Participating	AFT (Moncef Semichi)
Event Type	Meeting and workshop
Description	AFT Regional delegates and other personnel in charge with institutional relations. Approximately 50 people attended, all representing AFT in different regions of France.
Notes	Each year, all AFT personnel who deal with public authorities and Transport sector professional organisations gather to inform all those present on the status of ongoing activities, while highlighting the most "cutting-edge" activities. This was a good opportunity to present attendees with Inter-IoT video and describe the main objectives of the project. The feedback receives indicates there are high expectations from the transport industry from such projects as the competitiveness our project results could enhance is key in the Transport industry.

12	EUSPN 2016
Place	London, U.K.
Date	19-22 September 2016
Partner Participating	TU/e (Antonio Liotta)
Event Type	Conference
Description	The 7th International Conference on Emerging Ubiquitous Systems and Pervasive Networks (EUSPN-2016) is a leading international conference for researchers and industry practitioners to share their new ideas, original research results and practical development experiences from all Ubiquitous Systems and Pervasive Networks related areas. http://cs-conferences.acadiau.ca/euspn-16/
Notes	

13	New Models of Care
Place	London, England
Date	22 September 2016
Partner Participating	Rinicom (Sam Scott)
Event Type	workshop
Description	exploring new models of care in the NHS
Notes	

14	Invited Talk at Wuhan University
Place	Wuhan, China
Date	23 September 2016
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	Invited Talk

Description	Invited Talk hosted by hosted by Prof. Y. Zhang. The talk was titled: "Towards Multi-Layer Interoperability of IoT Platforms: the INTER-IoT approach"
Notes	

15	Sagra del pane
Place	Piobesi Torinese (Turin), Italy
Date	25 September 2016
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event for citizens
Description	Sagra del pane, Awareness day organized to promote proper lifestyle
Notes	

16	IDCS 2016
Place	Wuhan, China
Date	28 September 2016
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	Keynote speech
Description	The International Conference on Internet and Distributed Computing Systems focuses on emerging models, paradigms, technologies and novel applications related to Internet-based distributed systems, including Internet of Things, cyber-physical systems, wireless sensor networks, next-generation collaborative systems, extreme-scale networked systems, and cloud-based big dada systems. More info at: http://sle.whut.edu.cn/IDCS2016/
Notes	Keynote speech title: "Towards Multi-Layer Interoperability of IoT Platforms: the INTER-IoT approach"

17	Festa dello sport
Place	Nichelino (Turin), Italy
Date	2 October 2016
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event on physical activity and lifestyle for citizens
Description	Festa dello sport, Awareness day organized to promote proper lifestyle and a correct physical activity
Notes	

18	IoT Solutions World Congress
Place	Barcelona, Spain
Date	3-5 October, 2016
Partner Participating	UPV (Jara Suárez de Puga García)
Event Type	Exhibitions, Conferences, Testbeds, and Other Activities.

Description	IoT Solutions World Congress Event is an international space to link the IoT domain with the industry. With more than 172 exhibitors companies, and a total over 8.000 attendants. The Congress is a reference encounter point dedicated to industrial solutions and real-world applications across different vertical markets. http://www.iotsworldcongress.com
Notes	A huge congress with several important technological companies, some of them leaders in the sector (IBM, HUAWEI, etc). There were interesting conferences about new trends in the IoT Market applied to real deployments and with an industrial point of view. The industrial application gives us a really tangible idea of the IoT solutions to increase the productivity in this area.
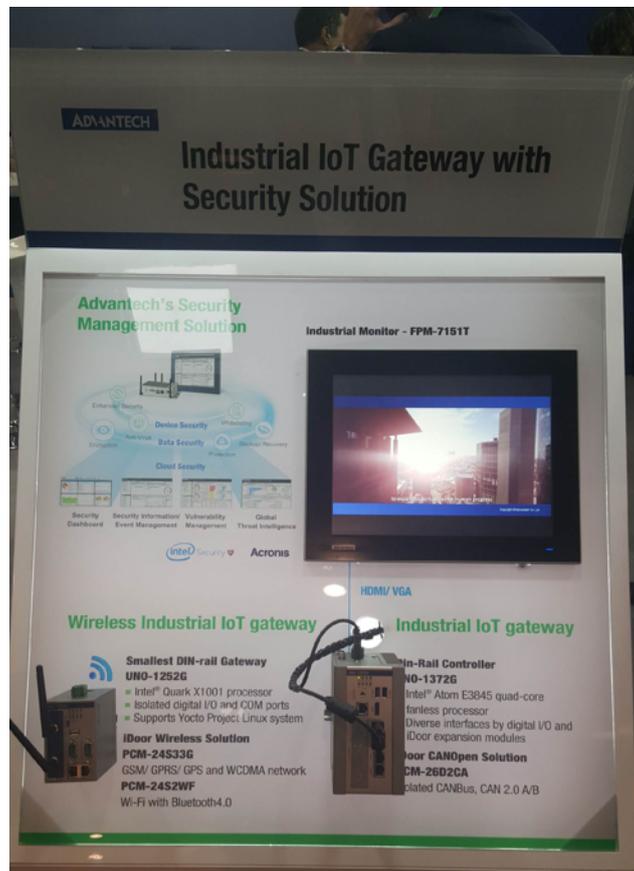
Figure 3.5: IoT Solutions World Congress

19	SMC 2016
Place	Budapest, Hungary
Date	9-12 October 2016
Partner Participating	TU/e (Antonio Liotta)
Event Type	International Conference

Description	The IEEE International Conference on Systems, Man, and Cybernetics (Collaborative Wireless Sensor Networks and Internet of Things) provides an international forum for researchers and practitioners to report up-to-the-minute innovation and development, summarize state-of-the-art, and exchange ideas and advances in all aspects of systems science and engineering, human machine systems, and cybernetics. http://smc2016.org/
Notes	

20	Campagna Obesity day
Place	Chieri, Carmagnola, Moncalieri, Nichelino (Turin), Italy
Date	10 October 2016
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	Obesity day, National Awareness day organized to promote proper lifestyle and a correct physical activity
Description	Participation to World Obesity Day 2016 promoting health, nutrition and physical activity
Notes	The Italian Association of Dietetics and Clinical Nutrition ADI promotes every year from 2001 on October 10, a national Obesity Day. The goal is to properly guide the attention of mass media, public opinion and those who work in health care system.

21	IoT EPI
Place	Vienna, Austria
Date	11-14 October 2016
Partner Participating	XLAB (Mariano Cecowski)
Event Type	Meetup and H2020 IoT projects networking
Description	
Notes	Attending the "Business Models", "Community Management" and "Communications" task forces. Attending the IoT EPI projects cluster collaboration workshops.

22	EclipseCon Europe & OSGi Community Event 2016
Place	Ludwigsburg, Germany
Date	25-27 October 2016
Partner Participating	UPV (Eneko Olivares)
Event Type	Conference

Description	EclipseCon Europe is the Eclipse Foundation's primary European event desgned to create opportunities for the European Eclipse community to learn, explore, share and collaborate on the latest ideas and information about Eclipse and its member companies. The Community Event is the largest OSGi event of the year with multiple full tracks, BOFs and other OSGi activities taking place. It features talks on topics ranging from use cases and experiences with OSGi in enterprise, embedded, cloud and IoT environments, to specification updates and tutorials, meet-ups and other informal sessions.
Notes	Both EclipseCon and OSGi community event are key conferences for the development of Inter-IoT products since state-of-the-art solutions and technologies are presented, as well as interesting workshops to learn new technologies.

23 — Trauma Innovation

Place	London, England
Date	27-28 October 2016
Partner Participating	Rinicom (Stuart Grant)
Event Type	conference
Description	Europe's Leading Forum for Military, Humanitarian and Emergency Medical Healthcare
Notes	

24 — On The Move

Place	Rhodes, Greece
Date	27 October 2016
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	Keynote speech
Description	Uniquely federated event composed of three interrelated yet complementary scientific conferences that together attempt to span a relevant range of the advanced research on, and cutting-edge development and application of, information handling and systems in the wider current context of ubiquitous distributed computing.. More info at: http://otmconferences.org/index.php/
Notes	Keynote speech title: "Towards Multi-Layer Interoperability of IoT Platforms: the INTER-IoT approach"

25 — BASE Conference

Place	Aizu Wakamatsu, Fukushima Prefecture, Japan
Date	31 October - 2 November, 2016
Partner Participating	SRIPAS (Marcin Paprzycki)
Event Type	Conference
Description	Delivery of invited talk at the University of Aizu entitled: Interoperability in the Internet of Things
Notes	

Figure 3.6: IoT Solutions World Congress

Figure 3.7: IoT World Congress

26	AFT Regional Delegates on Innovative projects
Place	Paris, France
Date	18 November 2016
Partner Participating	AFT (Moncef Semchi)
Event Type	Meeting
Description	Those AFT Regional delegates/coordinators (12) who are in charge of coordinating those innovative projects AFT is involved in that are financed by public bodies (EU, State, regions).
Notes	This meeting was an opportunity for us to provide attendees with an update on project implementation status. I was asked when piloting would take place. My answer was that it would probably start to be implemented in the second half of 2017. Concrete illustrations of project applications should provide a clearer sense of how INTER-IoT products can be useful to transport undertakings.

27	Salute in Comune
Place	Piobesi Torinese (Turin), Italy
Date	20 November 2016
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event on nutrition and lifestyle for citizens "Awareness day" organized to promote proper lifestyle
Description	Salute in Comune activity of awareness, prevention and health promotion
Notes	Valorization of awareness, prevention and health promotion, proposed in the city area to involve people of different age, culture, gender and interests.

28	Patient First
Place	London, England
Date	21-22 November 2016
Partner Participating	Rinicom (Soren Udby)
Event Type	conference
Description	Patient First, the UK's largest patient safety event supports those operating within the UK NHS and independent healthcare sectors, aimed at giving practical advice needed to create action for change. With seven conference theatres hostingÊindustry leading content, social and networking events, and the largest sourcing floor in patient safety, in a sector actively looking for solutions, Patient First is unmissable for anyone involved in the improvement of patient care nationwide.
Notes	

29	(Invited Talk at University Reggio Calabria
Place	Reggio Calabria, Italy
Date	24 Novembre 2016
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	Invited Talk
Description	Invited Talk hosted by Dr. G.M. Sarnè
Notes	The talk was titled : "Towards Multi-Layer Interoperability of IoT Platforms: the INTER-IoT approach"

30	IEEE World Forum on Internet of Things
Place	Reston, VA, U.S.A.
Date	12-14 December 2016
Partner Participating	UNICAL (Claudio Savaglio)
Event Type	International Forum

Description	The 2016 IEEE 3rd World Forum on Internet of Things (WF-IoT) – IoT: Smart Innovation for Vibrant Ecosystems is a unique event for industry leaders, academics and decision making government officials. This event is designed to examine key critical innovations across technologies which will alter the research and application space of the future. More info at http://wfiot2016.ieee-wf-iot.org/about/
Notes	The paper "Towards interoperable, cognitive and autonomic IoT systems: An agent-based approach" was presented by C. Savaglio. Complete paper reference: C. Savaglio, G. Fortino and M. Zhou, "Towards interoperable, cognitive and autonomic IoT systems: An agent-based approach" 2016 IEEE 3rd World Forum on Internet of Things (WF-IoT), Reston, VA, 2016, pp. 58-63. doi: 10.1109/WF-IoT.2016.7845459, URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7845459-&isnumber=7845389

31	DaMNet 2016
Place	Barcelona, Spain
Date	12 December 2016
Partner Participating	TU/e (Antonio Liotta)
Event Type	Workshop
Description	The 6th IEEE ICDM Workshop on Data Mining in Networks intends to facilitate the exchange of ideas between different research communities which share a common interest in extracting models and information from complex networks. The workshop focus will encompass data mining algorithms and applications for complex networks, such as communication networks, social networks, biological networks, citation networks, etc. http://damnet.reading.ac.uk/
Notes	

32	TRONSHOW
Place	Tokyo, Japan
Date	15 December 2016
Partner Participating	ABC (Alessandro Bassi)
Event Type	International Session: Collaboration between EU and Japan (invited keynote)
Description	TRONSHOW is a major Industrial event in Japan, featuring more than 5000 participants, with a large majority from Industry. The event was created around the TRON (The Real-time Operating system Nucleus) for embedded systems in 1984, which still has around 60% of the industrial market in Japan in one of its recent versions (t-kernel 2). More info at :http://www.tronshow.org/index-e.html

Notes	Talk very well perceived - after the talk, prof. Sakamura already asked for an update of the project results in the next edition of the Tronshow as it's very relevant to their audience. Possibility of organising a demo in the Exhibitors area if deemed interesting for the project.

Figure 3.8: TRONSHOW

33	11th EAI International Conference on Body Area Networks
Place	Turin, Italy
Date	15-16 December 2016
Partner Participating	UNICAL (Raffaele Gravina, Giancarlo Fortino)
Event Type	International Conference
Description	BodyNets 2016 aims to provide a world-leading and unique opportunity for bringing together researchers and practitioners from diverse disciplines to plan, analyze, design, build, deploy and experiment with/on Body Area Networks (BANs).
Notes	Complete paper reference: P. Pace, G. Aloi, R. Gravina, G. Fortino, G. Larini, M. Gulino, "Towards Interoperability of IoT-based Health Care platforms: the INTER-Health use case", In Proc. of the 11th International Conference on Body Area Networks (BodyNets 2016), Torino, Italy, Dec 2016

34	FIT 2016
Place	Islamabad, Pakistan
Date	19-21 December 2016
Partner Participating	TU/e (Antonio Liotta)
Event Type	Conference

Description	The 14th International Conference on Frontiers of Information Technology, "Computer and Communication Networks and Cloud Computing" is annually organized with the principal aim to focus on modern trends pertaining to computer sciences, engineering, and other related areas. http://fit.edu.pk/
Notes	

35	Globe-IoT 2017: Towards Global Interoperability among IoT Systems
Place	Las Vegas, USA
Date	8-11 January 2017
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	International Workshop
Description	Workshop jointly held with IEEE CCNC 2017 aiming at investigating lack of interoperability in the IoT realm. More info at http://plasma.dimes.unical.it/events/Globe-IoT2017/
Notes	The paper "A Survey of Open Body Sensor Networks: Applications and Challenges" was presented by G. Fortino. Complete paper reference: N. Yang, Z. Wang, R. Gravina, G. Fortino, "A Survey of Open Body Sensor Networks: Applications and Challenges", In Proc. of the 1st edition of Globe-IoT 2017: Towards Global Interoperability among IoT Systems, Las Vegas, USA, January 8-11, 2017

Figure 3.9: Globe-IoT 2017: Towards Global Interoperability among IoT Systems

36	New Jersey Institute of Technology Invited Talk
Place	Newark, USA
Date	12 January 2017
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	Invited talk
Description	Invited talk hosted by Prof. M. Zhou
Notes	Title of the talk: "Towards Multi-Layer Interoperability of IoT Platforms: the INTER-IoT approach"

37	Les Rencontres de la Mobilité Intelligente 2017
Place	Paris, France
Date	25 January 2017
Partner Participating	AFT (Moncef Semchi)
Event Type	Trade show /exhibition
Description	This exhibition gathers each year sustainable transport systems and smart mobility stakeholders (industry, policy makers, academics/scientific, institutional and press). This year there were around d. 1500 visitors, 72 exhibitors, 12 start-ups
Notes	Though the presentation of Inter-IoT was orally implemented for lack of room for a screen presentation, all visitors who came to our booth seemed keen to learn more about the Inter-IoT products as they develop.

38	Intronika
Place	Celje, Slovenia
Date	27 January 2017
Partner Participating	XLAB (Matevž Markovič, Flavio Fuart)
Event Type	Industry fair
Description	Trade Exhibition INTRONIKA is specialized Exhibition for electronic industry, including specilaised services and Industry 4.0. It is a specialized B2B (business to business) exhibition covering Slovenia, Croatia and part of the Balkans region. 74 exhibitors form 9 countries presented their products, the number of visitors was around 2.500.
Notes	We investigated the opportunities for application of Inter-IoT technologies to solving problems arising from integration of IoT and legacy production processes.

39	E-World: Smart Energy
Place	Essen, Germany
Date	7-9 February, 2017
Partner Participating	SRIPAS (Maria Ganzha, Marcin Paprzycki)
Event Type	Conference and Fair
Description	Maria Ganzha delivered invited talk entitled: Towards semantic interoperability in the Internet of Things
Notes	

40	Mobile World Congress 2017
Place	Barcelona, Spain
Date	27 February – 2 March 2017
Partner Participating	UPV (Regel Gonzalez Usach)
Event Type	Industrial event

Description   The GSMA Mobile World Congress is the world's largest exhibition for the mobile industry and a conference featuring prominent executives representing mobile operators, device manufacturers, technology providers, vendors and content owners from across the world. The attendance to this event overpassed 100,000 people, and attendees represented more than 200 countries from across the globe.

Notes   Many developments in the field of IoT. Entrance of SORACOM IoT platform in Europe. Many people to whom I talk, ask for references of the Inter-IoT Project and were interested in it.

41	SITL – Semaine Internationale du Transport et de la Logistique
Place	Paris, France
Date	14-16 mars 2017
Partner Participating	AFT (Moncef Semchi)
Event Type	Exhibition
Description	SITL Paris brings together all the innovative products and services dedicated to the transport of goods, freight forwarding and the logistics chain. It is the most complete concentration of transport and logistics users from manufacturing, retail and distribution who are searching for new service suppliers. There are around 24 000 professionals, 500 exhibitors
Notes	The feedback received was overall positive. Visitors showed a particular interest for the INTER-IoT market analysis, the transport-related piloting, as well as all interoperability products.

42	IoT Meet and Greet; IoT Challenge
Place	Berlin, Germany
Date	16-17 March 2017
Partner Participating	UPV (Eneko Olivares)
Event Type	IoT EPI Meet&Greet and Hackathon
Description	IoT EPI organized a Meet&Greet for locals and interested companies to know about the 7 ICT30 funded projects, each project had a booth and presented a pitch. The following day it was organized a hackathon where people from the 2 CSA and the 7 RIA had to mentorize
Notes	I (Eneko/UPV/Inter-IoT) did the pitch and participated in the meet&greet booth, as well as mentorized 2 teams in the trust challenge of the hackathon (one of those 2 teams was the winner).

43	NAVIS WORLD 2017
Place	San Francisco, USA
Date	27-30th March 2017
Partner Participating	NOATUM (Ivan Deosdad)
Event Type	International event of one of the best TOS (Terminal Operating System) for ports.

Description	The event provide a forum for participants to learn best practices in business and operations management from an international group of terminal and supply chain industry professionals
Notes	We work about how to give to the TOS the information of all the platforms, the conclusion was that have to be done through the Inter-IoT platform o similar.

44	Aizu University Seminar
Place	Aizu Wakamatsu, Fukushima Prefecture, Japan
Date	30-31 March, 2017
Partner Participating	SRIPAS (Marcin Paprzycki, Maria Ganzha)
Event Type	seminar for university faculty
Description	Marcin Paprzycki delivered an invited talk at the University of Aizu entitled: Autonomous resource access in the Internet of Things; the following day Maria Ganzha delivered a second invited talk entitled: Towards Interoperability within Internet of Things ecosystems
Notes	

45	9th Asian Conference ACIIDS
Place	Kanazawa, Japan
Date	3-5 April, 2017
Partner Participating	SRIPAS (Marcin Paprzycki, Maria Ganzha)
Event Type	International Conference
Description	Maria Ganzha; delivery of talk entitled: Towards common vocabulary for IoT ecosystems – preliminary considerations. Marcin Paprzycki: delivery of talk entitled: Graphical interface for ontology mapping with application to access control
Notes	Publication in Springer

46	SIDO
Place	Lyon, France
Date	5-6 April, 2017
Partner Participating	UPV (Jara Suárez de Puga García)
Event Type	Exhibitions and Conferences
Description	Sido Event is an international showroom dedicated to the Internet of Things, with free access for all professionals. Is compose by 2 days of conferences with more than 200 speakers, workshops and uses showrooms with more than 250 exhibitors and 100 startups, solutions, networking and technology to help company conceive tomorrow's uses and reinvent their business models. http://www.sido-event.com/en/
Notes	A really nice environment to exchange impressions and ideas about the IoT technologies and solutions of today's word. With numerous interesting conferences in which Inter-IoT participated together with some other project from the IoT-EPI explaining the Use Cases driven by the project.

47	Container Terminal Automation Conference 2017
Place	London, UK
Date	19-20 April 2017
Partner Participating	NOATUM (Ivan Deosdad)
Event Type	International event for port sector.
Description	The Container Terminal Automation Conference 2017 brought together thought leaders in the automation and training sectors of the port industry to discuss best practices with regards to cutting-edge automation solutions. The event looked at the need for terminal automation to remain efficient, safe and productive. The format was "Question Time" inspired, allowing attendees to directly ask questions and steer the sessions in a topical direction. The key themes included; Simulation, E-Learning, Gamification, Process Automation, Automated Decision Making and Robotisation.
Notes	A networking was made and Inter-IoT was exposed as a solution for interconnect the different platforms.

48	INTEGRA2 Port conference
Place	Tarragona, Spain
Date	20th April 2017
Partner Participating	Prodevelop (Miguel Montesinos, José Ferri)
Event Type	Conference
Description	Conference about: IT solutions for Port Management in Spain (around 20 Port authorities present).
Notes	

49	Web Camp
Place	Ljubljana, Slovenija
Date	22 April 2017
Partner Participating	XLAB (Flavio Fuart, Tomaž Martinčič, Laura Pipan Petan, Marta Štimec
Event Type	Conference / meetup
Description	Webcamp Ljubljana is an international event aimed at the web developers community. This year the focus was on IoT.
Notes	XLAB was one of the sponsors of the event and had a booth where company activities were presented. Among others, we presented Inter-IoT activities.

50	EESTEC SPRING CONGRESS
Place	Ljubljana, Slovenija
Date	22-30 April 2017
Partner Participating	Flavio Fuart, Matic Cankar, Lara Tasev
Event Type	Electrical Engineering Students' European Association Congress
Description	The biggest and most important annual gathering of youth leaders from all EESTEC Local Committees and International Bodies

Notes	XLAB was one of the sponsors of the event and presented its activities, including Inter-IoT to future industry leaders.

51	IoT Seminar Series
Place	Eindhoven, Netherlands
Date	8 May 2017
Partner Participating	UNICAL (Giancarlo Fortino)
Event Type	Invited talk
Description	Invited talk hosted by Prof. W. van der Aalst and Prof. Antonio Liotta
Notes	Talk title: 'Towards Interoperable, Cognitive and Autonomic IoT Ecosystems: an Agent-based Approach". Event organised in the Data Science Center (DSC/e) of Eindhoven University of Technology, Netherland.

52	IEEE International Conference on Networking, Sensing and Control
Place	Calabria, Italy
Date	16-18 May 2017
Partner Participating	UNICAL (Giancarlo Fortino), TU/e (Antonio Liotta)
Event Type	International Conference
Description	http://icnsc2017.dimes.unical.it/INTER-IoT.html
Notes	This conference will provide a remarkable opportunity for the academic and industrial communities to address new challenges and share solutions, and discuss future research directions. More info at: http://icnsc2017.dimes.unical.it/

53	Salute in Comune
Place	Piobesi Torinese (Turin), Italy
Date	20 May 2017
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event on nutrition and lifestyle for citizens "Awareness day" organized to promote proper lifestyle
Description	Salute in Comune activity of awareness, prevention and health promotion
Notes	Valorization of awareness, prevention and health promotion, proposed in the city area to involve people of different age, culture, gender and interests.

54	Lions Ten
Place	Santena and Poirino (Turin), Italy
Date	21 May 2017
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event on physical activity and lifestyle for citizens
Description	non competitive race

Notes

55	UK Digital Health Club

Place	London, Eng;and
Date	25-28 May 2017
Partner Participating	Rinicom (Sam Scott)
Event Type	conference
Description	The programme is a collaboration between the three London Academic Health Science Networks (AHSNs); Imperial College Health Partners, UCLPartners and the Health Innovation Network, plus the Mayor of London and Academic Health Science Centres (AHSCs).Ê It draws upon leading NHS experts with world-class insight to pioneer the development, commercialisation and adoption of digital technologies in health and social care to improve health outcomes.

Notes

56	LOS PUERTOS DEL FUTURO: SMART PORTS

Place	Avilés, Spain
Date	25th May 2017
Partner Participating	Prodevelop (Christophe Joubert, José Abellán)
Event Type	Conference
Description	Conference about: IT solutions for Port Management in Spain (around 20 Port authorities present). The last 25th May Prodevelop participated at the conference "The Port of the future: Smart Ports" organized by the Port Authority of Avilés and the Transport and Logistic Management Master of the Oviedo University. The conference was started by Mr. José Llorca Ortega, President of the Ports of the State (Spain), Mr. Santiago Rodríguez Vega, President of the Port Authority of Avilés and Mr.José Manuel Montes Peón, Director of the Master of Transport and Logistic Management of the Oviedo University. Prodevelop had the opportunity of making a presentation about the trends in R&D in the Maritim Sector for Smart Ports in an international context for an audience of more than 120 attendees. This presentation agglutinated projects like Port of Cork (DOCKINGASSIST), Port of Rotterdam (APPS), Port of Valencia (INTER-IoT) and DICE

Notes

- URL: http://www.puertoaviles.es/es/puertoyciudad/actividades.asp

- Document:http://www.puertoaviles.es/upload/descargas/01.%20-Christophe%20Joubert_Tendencias_de_IDi_en_los%-20puertos_Los_Smart_Port.pdf

- News in Prodevelop's website: https://www.prodevelop.es/es/noticia/17/05/29/tendencias-idi-puertos-smart-port

57	Giornata di prevenzione della salute
Place	Castelnuovo Don Bosco (Asti), Italy
Date	4 June 2017
Partner Participating	ASL TO5 (Margherita Gulino, Ilaria De Luca, Marina Mortara, Anna Costa)
Event Type	local event on nutrition and lifestyle for citizens "Awareness day" organized to promote proper lifestyle
Description	Giornata della prevenzione della salute, activity of awareness, prevention and health promotion
Notes	Valorization of awareness, prevention and health promotion, proposed in the city area to involve people of different age, culture, gender and interests.

58	IoT Week
Place	Geneva, Switzerland
Date	6-9 June 2017
Partner Participating	UPV (Carlos Palau, Eneko Olivares, Jara Suárez de Puga); XLAB (Flavio Fuart, Matevž Markovič); SRIPAS (Katarzyna Wasielewska-Michniewska)
Event Type	Conference
Description	IoT Week & Global IoT Summit (GIoTS) collocated. The IoT Week is the leading conference on IoT research and emerging technologies. It is organized under the umbrella of the IoT Forum to promote international dialogue and cooperation for IoT innovation, as well as to discuss technical, societal and market issues related to the Internet of Things. The GIoTS is piloted and will be independently managed by the IEEE Subcommittee on the Internet of Things. It will select top level peer-reviewed IoT-related scientific articles encompassing the latest research results.

| Notes | Inter-IoT had a booth with 3 demos deployed showing interoperability in middleware, application&service and semantics level. Carlos was chairman of the session IoT, Smart Living & Ageing Well. There were also private IoT-EPI meetings. We also attended the IoT EPI meetup where projects were presented to the local startup community. |

59	Global IoT Summit
Place	Geneva, Switzerland
Date	6-9 June 2017
Partner Participating	UNICAL (Pasquale Pace)
Event Type	International Conference
Description	Giobal IoT Summit 2017 attracts experts from industry and research in current and emerging technologies such as 5G-based IoT, software-defined IoT, IoT-centric Cloud Computing, including the Social Internet of Things - http://www.globaliotsummit.org/
Notes	Complete paper reference: G. Aloi, Á. Fides-Valero, G. Fortino, R. Gravina, G. Ibáñez Sánchez, P. Pace, C. E. Palau, V. T. Salcedo, D. Yacchirema, "IoT platforms Interoperability for Active and Assisted Living Healthcare services support", In Proc. Of Global IoT Summit (2017) - Geneva-Switzerland, June 2017.

60	WOA 2017 (Workshop "From Objects to Agents")
Place	Reggio Calabria, Italy
Date	15-17 June 2017
Partner Participating	UNICAL (Claudio Savaglio)
Event Type	International Workshop
Description	WOA (Workshop "From Objects to Agents) is a per-year meeting of the Italian research group on Agent and Multi-agent Systems. Topic of 2017 edition was "Agents in Online Social Networks". More info at http://woa2017.unirc.it/
Notes	Presented paper: G.Fortino, W. Russo, C. Savaglio, M. Viroli, M. Zhou, "Modeling Opportunistic IoT Services in Open IoT Ecosystems", to be published in Proc. 18th Workshop" From Objects to Agents. 2017.

61	Health+Care
Place	London, England
Date	27-29 June 2017
Partner Participating	Rinicom (Sam Scott)
Event Type	Exhibition

Description   Europe's largest integrated care conference - exploring ideas and solutions to support the NHS and social care as it faces its worst ever crisis. The programme will focus on the crucial 'how' of delivering complex transformation, with examples from areas demonstrating the most rapid progress in implementing STPs, digital transformation and other priorities.

Notes

62	TOC Europe

Place   Amsterdam, the Netherlands
Date   27-29 June 2017
Partner Participating   NOATUM (Ignacio Huet, Ivan Deosdad)
Event Type   International event.
Description   The free exhibition is a global showcase of excellence in port technology and terminal operations; with 170+ exhibitors, product launches, equipment demonstrations & more.

Notes

Figure 3.10: Les Rencontres de la Mobilité Intelligente 2017

Figure 3.11: IoT Meet and Greet; IoT Challenge
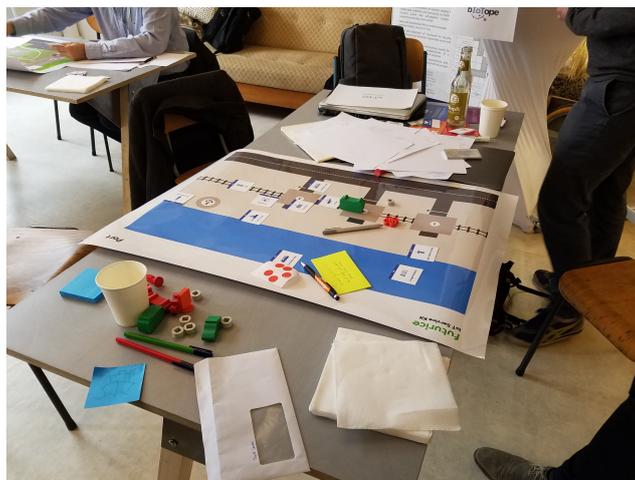
Figure 3.12: IoT Meet and Greet; IoT Challenge
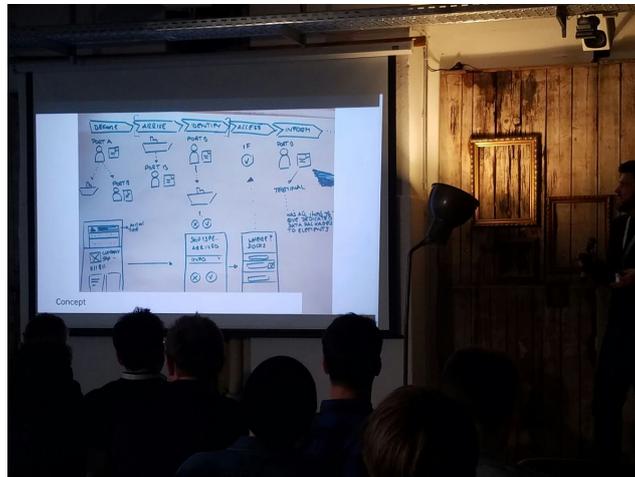
Figure 3.13: IoT Challenge

Figure 3.14: INTEGRA2 Port conference
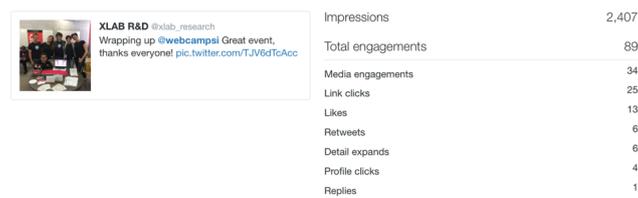
Figure 3.15: Web Camp

Figure 3.16: EESTEC SPRING CONGRESS

Figure 3.17: LOS PUERTOS DEL FUTURO: SMART PORTS

Figure 3.18: LOS PUERTOS DEL FUTURO: SMART PORTS

Figure 3.19: Los Puertos del Futuro

Figure 3.20: IoT Week

Figure 3.21: IoT Week

Figure 3.22: INTER-IoT IoT week contribution

Figure 3.23: INTER-IoT IoT week contribution

Figure 3.24: INTER-IoT IoT week contribution

Figure 3.25: Global IoT Summit

Figure 3.26: Health+Care

4 Exploitation and commercialization strategy report

4.1 Introduction

During this period M1-M18, the INTER-IoT Consortium has followed the roadmap of the INTER-IoT Exploitation Plan included in D8.3 (M4) towards the non-commercial and commercial use and operation of the INTER-IoT exploitable services and products. See figure 4.1. The elaboration of the individual and exploitation strategy started on M7 and ended at the time of this report M18. Along this period (M6-18), the Task 8.4 Exploitation, has taken into account the inputs from tasks and results obtained in work packages WP2 and WP8.

4.2 Report on activities

The elaboration of the individual and exploitation strategy plans started in M7 and it is planned to be finished on M36. This report includes the activities carried out from M7 till M18, addressing the phases I and II of the roadmap as the following figure shows.
The first phase, called "Phase I: Initial INTER-IoT Business Model definition" started on M7 and ended on M12. This phase started with the definition and consolidation of the Exploitation Team (ET) composed of 14 members, each member from each partner was carried out.

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P03	UniCal	Gianluca Aloi	gianluca.aloi@unical.it
P04	PRO	Amelia del Rey	adelrey@prodevelop.es
P05	TU/e	Decebel Mocanu	decebelmocanu@gmail.com
P06	VPF	Alexandre Sánchez Pérez	asanchez@fundacion.valenciaport.com
P07	RINI	Eric Carlson	eric@rinicom.com
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P12	ASL TO5	Anna Costa	dott.annacosta@libero.it
P13	ABC	Alessandro Bassi	alessandro@bassiconsulting.eu
P14	NEWAYS	Remco van den Berg	remco.van.den.berg@newayselectronics.com
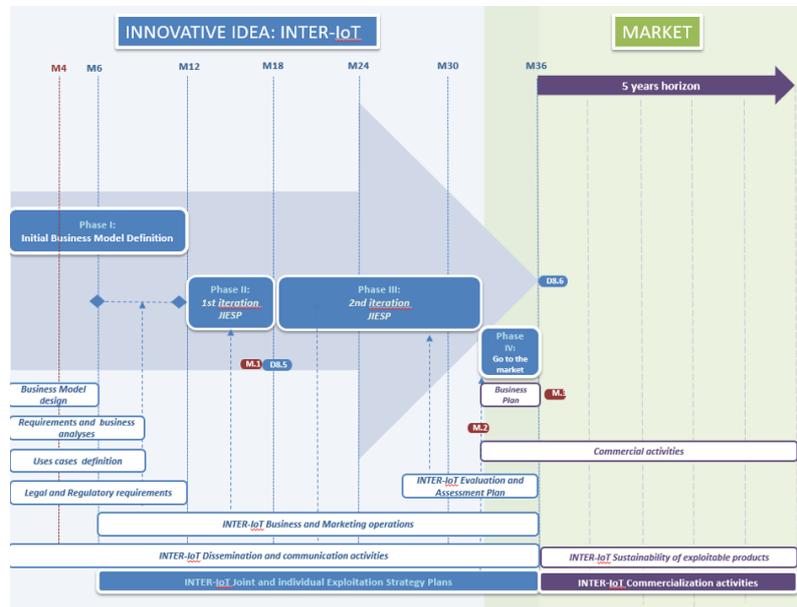
Figure 4.1: INTER-IoT exploitation plan

Figure 4.2: INTER-IoT Phase 1 detailed exploitation plan

Figure 4.3: INTER-IoT Phase 2 detailed exploitation plan

The Exploitation Team reviewed D8.3 and INTER-IoT business models (joint and individual) elaborated in WP2 and included in D2.2 (M6). The selected business scenarios (transport and logistics and m-Health) were considered as the baseline for exploitation. On M6, the INTER-IoT consortium also participated at the EPI IoT celebrated in Valencia (on 24th- 23rd June). Some INTER-IoT partners assisted and participated in the TF-4 Business Model workshop with the presentation of the INTER-Layer BM at Workshop in Valencia (24th- 23rd June). The INTER-IoT project received feedback from other projects as well as from IoT experts with previous expertise in IoT business models.

The ET participated in TF4-Business Models online conferences and webinars during this period as TF Community Building, TF Business Models and Data Business Models. Besides, on M12 the EU Commission asked for the review of the D8.3 (M4) in terms of strengthening the industrial Dissemination Strategy and the standardization and Open Source strategies of the project. The joint and individual exploitation templates attached in D8.3 were also enforced following the LLava Matrix Framework and Lean Innovation Process (that has been proposed and used in T8.3: Business and Marketing Operations). This methodology has helped the ET to have a common and particular vision of INTER-IoT business models on the selected business scenarios with the identification of customer segments, common needs, value promise, set of exploitable products, value network, competitors and alternatives, revenue models, SWOT analyses and IPR issues. It is also important to point out, that the communication and dissemination activities reported during this period are direct connected with the Exploitation Plan in order to create impact and have been reported in previous sections. The INTER-IoT consortium had also engagement with business and investment community. More specifically, RINI arranged representation of TALIS Capital (one of the venture firms specialising in investment into IoT sector) on INTER-IoT Advisory Board. This cooperation is proved to be quite useful as through TALIS Capital network, RINI (and INTER-IoT project in general) is receiving the continuous updates on the latest technological advances in IoT sector. Furthermore, TALIS Capital will be directly engaged in the later stages of the project by reviewing and optimising the developed business model and advising on potential exploitation paths.

The INTER-IoT consortium had also engaged with the business and investment community. TALIS Capital, a venture capital firm specialising in investment into IoT sector, SaaS, and security, is now a member of INTER-IoT Advisory Board. They invest around the world while maintaining their focus on the UK and Europe. TALIS specialise in bringing state of the art technology together with conventional businesses to produce reliable revenues for their clients. This cooperation has proved to be quite useful for the project. Through TALIS Capital's network, the INTER-IoT project is receiving continuous updates on the latest technological advances in IoT sector. Furthermore, TALIS Capital will be directly engaged in the later stages of the project, reviewing and optimising the developed business model and advising on potential exploitation paths.

The second phase called "Phase II: First iteration of the joint and individual Exploitation Plans (M12-M18)" started on M12 and finished by the time of this report on M18. The first iteration of the joint and individual Exploitation Plans started in M14 during the workshop held by the ET in Slovenia and was finished in M16. During M13 the ET prepared a workshop to be held on M14 to conduct the activities to start the first iteration of the Joint and individual Exploitation Plans. The workshop was celebrated in Slovenia and the ET presented the results of the WP2 in order to have a clear picture of the initial business models (joint and individuals) as starting point for Exploitation Plan. Therefore, during this workshop, the collaborative INTER-IoT business model and scenarios defined in WP2 were discuss and the ET requested also to rank the business scenarios according to risk, cost, opportunities etc. from the perspective of INTER-IoT as a project. In addition, to start with the execution of the first iteration of the joint and individual Exploitation Plans, the partners were asked to present the first iteration of the joint and individual Exploitations Strategy Plans on M16 as internal milestone MS1 by

filling the templates attached in D8.3. Regarding Joint Exploitation Plans, the ET asked the INTER-IoT partners to identify and describe the joint exploitation opportunities the envision at this stage of the project, its role in the project and their vision about long-term sustainability of INTER-IoT Platform for commercialization. The ET proposed the following types of business models for a joint exploitation plan:

- B2C/ B2B based on OS plus Professional consultancy services

- B2B not OS: License

- Specific B2B. Collaborations BM between concrete partners

Further discussion about open source strategy were carried out analysing the possible OS licenses to be adopted. Finally, the INTER-IoT consortium agreed in the selection of the license Apache 2.0. Regarding the Individual Exploitation Plans, the ET asked to the partners to explain in depth their business selected scenarios from their own organizations perspective and to identify opportunities for exploitation to be explored until M32. On M15, during the 5Th Plenary Meeting celebrated in Valencia. The ET joined in parallel sessions to work together on the exploitation vision of the project, and the interaction between the Community Product, promised in the DoW, and the Commercial Product that will address the further exploitation challenges beyond the duration of the project. These activities culminated in a Joint Exploitation Plan based on an open source strategy that has been included in D8.7 (M18) and it is shown in the figure 4.4.

Taking into account the aforementioned Joint Exploitation Plan based on open software, the partners presented their first iteration of their Joint and individual Exploitations Plans on M16 and the ET agglutinated them to be included in D8.7. The ET has also monitored the market and reviewed the initial INTER-IoT exploitable products defined in WP2, according to the achievements of exploitation activities during project's lifecycle as an iterative process (Lava Matrix Methodology). In order to define the INTER-IoT Value Proposition, the Exploitation Team (ET) asked to all partners of the consortium to fill in several templates related to the products and components they are implementing in the context of INTER-IoT, the technologies they are bringing in, the services they are offering, similar initiatives and advantages over them, etc. In the following sections, we present in detail these contributions.

In parallel to this phase, the INTER-IoT has worked on an open call described in section 4.3. The execution of the selected projects will start approximately by M17 and will finish in M34 and will contemplate the building of particular business models and market strategies by the selected third parties.

4.3   Open Call

4.3.1   introduction

The main objective of the open call is testing the INTER-IoT proposed components and methodology by proposing new scenarios, platforms and components to achieve interoperability between IoT platforms. The proposals will help to validate INTER-IoT proposal and components in scenarios deployed in different application domains. Allowing the evolution of the INTER-IoT products or parts of them (i.e. INTER-LAYER, INTER-FW and INTER-METH) as a whole to match the needs of proposers, but at the same time evolve their products in order to add new interoperability features.

Figure 4.4: Joint Exploitation Plan based on OS

The development of INTER-IoT may allow more stakeholders and developers to interact with different IoT platforms in a domain agnostic ecosystem. The Open Call has addressed the needs of use cases and scenarios in which different IoT platforms are involved, and mainly in those in which more than one application domain is addressed.

The call is open to individual European SME[1], Universities and Research Centres that can contribute to the INTER-IoT paradigm. Selected entities will receive funds as third parties of UPV. Only one entity per proposal will be admitted, so activities in co-operation will not be considered eligible. It is not necessary that the applicants are located in any of the two demonstration sites (i.e. Valencia or Torino).

The successful applicants, who have been awarded funding have been required to sign a collaboration agreement with UPV, INTER-IoT Project Coordinator, in order to be able to receive the funds and become third party of the project. The activities eligible for receiving funding, as listed in the Grant Agreement between EC and INTER-IoT Consortium were:

- Design, implementation and integration of interoperable device layer components for INTER-FW. Device layer components should be based on different low-level communication standards (e.g. Zigbee, 6LowPan, WIFI, Bluetooth, IEEE 802.15.4, NFC, etc) or on ad-hoc proprietary device solutions.

- Design, implementation and integration of interoperable networking layer components for INTER-FW. Networking layer components should be based on different standards higher-level communication standards (e.g. TCP/IP, HTTP, CoAP, etc) or on ad-hoc proprietary networking solutions.

- Design, implementation and integration of interoperable middleware layer components for INTER-FW. Middleware layer components need to deal with the different middleware services such as discovery, management, querying, coordination and interaction.

- Design, implementation and integration of interoperable application service components for INTER-FW. Application service layer components should exploit major standards e.g HTTP, SOA, or REST as well as proprietary solutions.

- Design, implementation and integration of interoperable data and semantics layer components for INTER-FW. Specifically semantics layer components have to deal with heterogeneous IoT ontology matching.

- Design, implementation and integration of virtualization mechanism for smart objects and platform of smart objects for INTER-FW, including context-aware mechanisms and transfer of virtual objects between servers and cloud platforms.

- Design, implementation and integration of cloud support mechanisms to be integrated in INTER-FW, including support for different services, inter cloud mechanisms applied to IoT and support for virtualization.

- Design and implementation of new components of the INTER-METH tool for supporting integration among IoT platforms. Extension of the INTER-METH tool is needed to include the support for other IoT platforms to be made interoperable.

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[1]Legally registered in a member state of the European Union or in an H2020 associated country

- Development of services/applications on top of the proposed use cases (INTER-Health and INTER-LogP) by (re)using the INTER-API to obtain a novel INTER-IoT ecosystem, representing the INTER-DOMAIN use case.

- Integration of IoT platforms in the three addressed use cases (INTER-Health, INTER-LogP, INTER-DOMAIN), following the INTER-METH methodology and the associated tools.

4.3.2   Evaluation Process

Every proposal was checked to ensure that it met requirements before it was sent for evaluation to the INTER-IoT Experiment Evaluation Committee (EEC). This committee consisted of two external observers and the PCC. The two observers monitored the whole process in order to ensure tracking of every action. Each application was assessed by at least two external experts. The experts were individuals with experience in the fields of innovation linked to this Open Call and also with the highest level of knowledge. The selected experts signed a declaration of confidentiality concerning the evaluation process and the content of the proposals they evaluated. They declared their absence of any conflict of interest for the assigned tasks. Some details about the evaluators:

- Our choices

  - 2 reviews per application, selected 16 evaluators (out of 26) - gender balance 6/10
    * Assignation following expertise and geographical distribution, supervised by observers
  - individual evaluation → consensus meeting → evaluation summary reports
    * Tool used for every part of the process, to speed up other means allowed for consensus
  - defined custom evaluation criteria based on previous open call experience
  - evaluators were not anonymous during the evaluation, but every communication was done through the tool so could be monitored by the observers
  - webinar for evaluators on the tool and Open Call material (same as for applicants), manual written to support reviewers, support office for technical problems

- Outcomes from the evaluation

  - All consensus reached on time except one proposal, third reviewer appointed
  - Evaluators can see each others' name and scores only after submitting the review
  - Consensus could be modified until closure of the review process for quality check

Each evaluator will recorded his/her individual opinion on each proposal using a predefined evaluation form. Afterwards, they reached consensus on the quality of each proposal. The result of that agreement (comments and scores) was reflected on the Evaluation Summary Report (ESR).
After the applications were evaluated they were ranked by the EEC. For both the large and small contributions, the EEC provided any feedback and give a score for each of the evaluation criteria. A ranking list was assembled with all proposals that score above the thresholds (the proposals were evaluated under five criteria: (i) Relevance to INTER-IoT; (ii) Impact and sustainability; (iii) Technical excellence; (iv) Quality of implementation (v) Quality of the team, the thresholds to be applied to the different criteria are 4/4/3/3/3 over 5 for the different criteria, and 18 as a global threshold over 25). The EEC met and made a final funding decision based on the ranking list. In case of applications
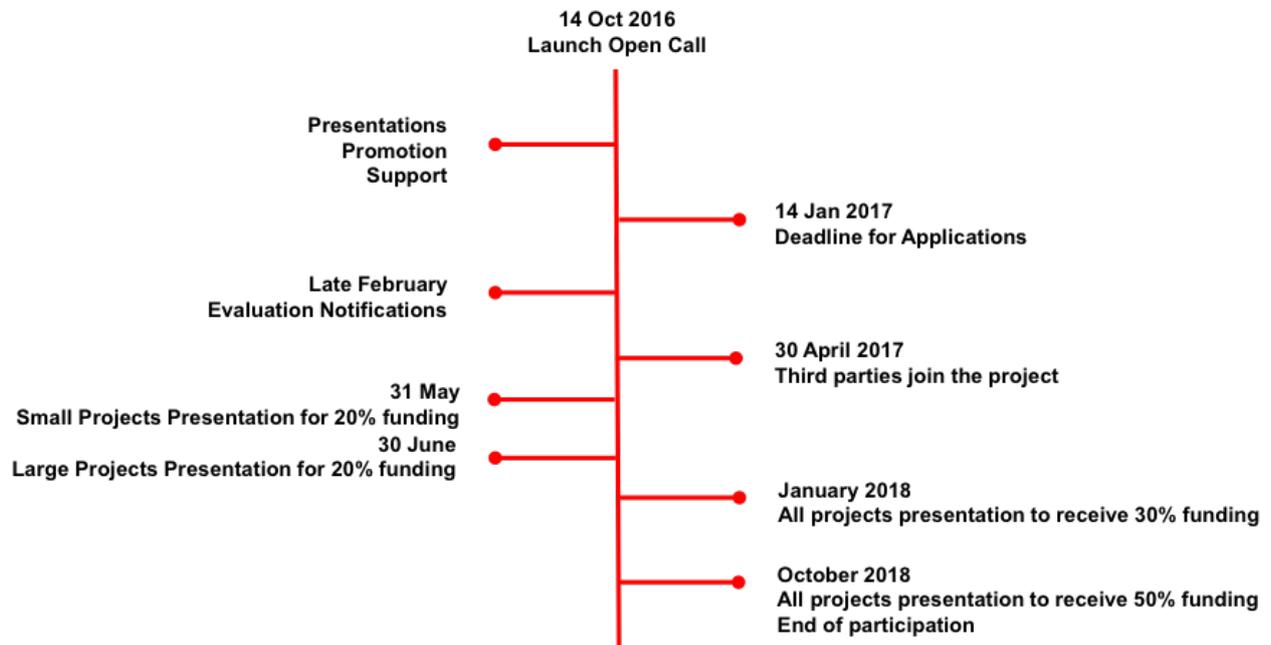
Figure 4.5: Opencall - Timeline of evaluation process

receiving an equal score the prevalence criteria was the marks in criteria 1, criteria 2, criteria 3, criteria 4 and criteria 5.

Figure 4.5 represents the time line of the evaluation process.

The evaluation process was managed by an own developed tool by the consortium, instead of using F6S or other similar tool:

- Full control on statistics and requirements for the open call

    - Customization of OpenConf tool
    - Submission and evaluation integrated in a single tool

- Consensus also through the tool

- Creation of the role of observer to monitor the whole process

- Every action logged by the system for traceability

- Templates fully adequate for the process

    - Minor points could not be automated
    - Satisfaction from the evaluators and for the applicants

There were specific activities kept with the observers as they assisted the PCC in order to provide support in the evaluation process:

1. Training session on 13th February 2017 related with INTER-IoT concept; evaluation process; developed evaluation tool management and observer options in order to manage the whole process.

2. On 13th February 2017 the assignation matrix of the proposals vs evaluators was provided to the observers. Assignation was performed by the Consortium considering gender, expertise and nationality of the reviewers and the applicants. Two evaluators were assigned to each proposal and one of them was selected as advocate/rapporteur. The observers validated the assignment on 16th February 2017, in order to assess the fair and correct assignation the observers had access to the evaluators CVs, proposals, and the evaluation process online management tool.

3. On 17th February 2017 the evaluation process started and the observers accessed the platform in order to check the different individual reports and discussion between the evaluators to reach consensus. The observers validated the fairness of the process and did not find any activity and evaluation not attending the stated procedures.

4. On 10th March 2017 the Open Call panel was held between the observers and the PCC, the proposals were ranked and the observers validated the process.

5. On 28th March 2017 after validation by the Project Officer the Evaluation Reports were sent to the applicants and the observers were informed on this aspect The observers guaranteed that the process was fair in order to select the third party collaborations.

4.3.3   Funded collaborations

73 entities registered a proposal in the submission portal, and finally 63 proposals were submitted (all of them were eligible). From the proposals received 19 were requests for large contributions and 44 for small contributions. From country of origin, the applicants come from different countries of Europe:

Country	Registered	Uploaded
Austria	2	2
Belarus	1	0
Belgium	1	1
Croatia	1	0
France	5	4
Germany	1	1
Greece	11	10
Italy	10	10
Netherlands	3	3
Norway	1	1
Poland	1	1
Portugal	3	1
Romania	3	1
Serbia	1	1
Spain	25	24
Sweden	1	0
United Kingdom	3	3

In order to achieve a high impact of the open call, and reach a large number of entities, the consortium performed different communication actions that proved highly effective:

- 2 events

    – IoT meet-up Vienna (openning of the open call)
    – Event in Valencia related with Entrepreneurship

- e-means

    – 4 massive e-mails sent, to a gathered mailing list of more than 500 entities.
    – Mail sent internationally by Spanish NCP
    – Support from the regional diffusion center of CV Universities
    – Concurrent posts on our website, Twitter, LinkedIn and FaceBook

- 1 Publication in EC Participants Portal

- 1 webinar w/ 32 participants (recording available)

- 14 tweets and re-tweets, 4 posts on LinkedIn (INTER-I T account), 8 posts in FaceBook (INTER-IoT account

- Direct communication (e-mails) with Associations, local communities, NCPs, possible applicants & dissemination of posts to personal networks

4.3.4   Selected Proposals

4.3.4.1   Small Contribution

27	INTER-HINC: Interoperability through Harmonizing IoT, Network Functions and Clouds
Entity	TU Wien - Vienna University of Technology
Abstract	On-demand IoT applications require various resources from Internet of Things (IoT), Network Function Virtualization (NFV), and cloud systems. Such resources must be interoperable for the application use. In this project, we propose to address IoT interoperability together with its NFV and cloud counterparts in a context of resource slices, which can be provisioned and customized, on the demand, for different applications. Our approach "resource slice interoperability" not only leverages existing layered interoperability solutions but also builds cross-layered interoperability and cross system interoperability solutions for a system of IoT, NFV and cloud resources. A framework called INTER-HINC (Interoperability through Harmonizing IoT, Network Functions and Clouds) will be developed and validated with scenarios in the domain healthcare.
Impact	The main impact of the project is related with INTER-LAYER and two of the components: D2D and N2N, addressing partially MW2MW and the connectivity with cloud environments.

43	Mission Critical operations based on IoT analytics (MiCrOBIoTA)
Entity	Nemergent Solutions S.R.L.

Abstract   Mission Critical (MC) communications are evolving towards open mobile broadband standards. While considerable progress is done by the 3GPP concerning MCPTT, MC-Video and MC-Data, the adoption of IoT for MC operations has not received the required consideration. In order to overcome the lack of standards, MiCrOBIoTA will use the INTER-IoT INTER-FW layer to gather information from heterogeneous IoT platforms in a converged way. MiCrOBIoTA will also contribute (i) to the definition of an INTER-Domain scenario where MC operations involve joint monitoring of port logistics (INTER-LogP) and on-body health-related sensors (INTER-Health); (ii) to the definition of the common semantics and ontology. The applicant will gain the expertise to perform advanced data analytics from heterogeneous IoT platforms, while INTER-IoT will validate its outcomes in a realistic use case.

Impact   The main impact of the third party is associated with the validation of INTER-IoT with a novel application and service related with emergency management. The collaboration between the consortium and the third party will lead to a validation of the INTER-IoT API and associated layers.

| 74 | E3Tcity Smart City Platform and Devices Integration |

Entity   E3CITY S.L.

Abstract   This project is aimed to integrate E3Tcity vertical platform with the Middleware Layer of INTER-IoT Inter Layer Platform. This development will provide INTER-IoT with a whole device/cloud/app vertical solution to be applied in the Smart Port pilot. E3Tcity Smart City platform allows control and monitoring of different types of installation, which include lighting, irrigation, HVAC, energy measurement, sensing, and generally any system to be controlled remotely. The platform is currently being deployed in more than 20 towns in Spain, with services spanning from public lighting control to mobility control solutions such as traffic, parking, crowd, traffic lights, irrigation and water quality, and heating, ventilation and air conditioning control.

Impact   The impact of the collaboration in INTER-IoT is related with the extension of the gateway and the provision of a new application from smart city domain, allowing to extend the results of INTER-IoT to new domains.

| 49 | SENSHOOK |

Entity   IRIDEON S.L.

Abstract   Many companies want to develop IoT products, however lack the neces-
                sary financial and human resources using existing methods. To address
                this need, IRIDEON has developed Senscapeĺ, a disruptive, standards
                based platform which enables fast time-to-market development of IoT
                sensorserver applications and information services. To date, we have
                focused on the development of IoT devices using our own hardware and
                embedded operating system - SENSOS. Now, we wish to contribute to
                the INTER-IoT project with a new open tool called SENSHOOK, to enable
                full interoperability of our Senscapeĺ IoT platform with other IoT platforms
                and services, and fully exploit the unique selling points of our existing
                technology. This will allow us to address a wider range of customers
                and applications, and to grow our revenue and the company, via more
                customer projects, via licensing of Senscapeĺ, and exploitation of SEN-
                SHOOK as an open-source tool compliant with the INTER-IoT framework.
Impact   The collaboration will interact with INTER-IoT in the middleware layer and
                in the gateway, allowing to extend the products to new protocols and com-
                ponents. Senshook will interact with the pilot use case in the port area
                adding value with the Senscape product.

| 39 | SOFOS: A software-defined end-to-end IoT gateway with virtualization capabilities |

Entity   INFOLYSIS P.C.

Abstract   SOFOS aims at advancing the existing INTER-IoT framework with
                SDN/NFV functionalities towards a Software-defined end-to-end IoT in-
                frastructure with service chaining support. The main objective of the pro-
                posed SDN/NFV-enabled framework is to enhance the interoperability of
                the INTER-IoT framework in order to facilitate the unified management of
                a large number of diverse smart objects that currently operate utilizing a
                variety of different IoT protocols. Interoperability is expected to boost the
                global IoT market value by 2022 at approx. \$14.4 trillion and therefore
                SOFOS market expectations are attractive. SOFOS will impact the in-
                dustry and the research community to innovate, experiment and demon-
                strate the advantages of the integrated software-based interoperable IoT
                networking leading to novel services and technological benefits in the in-
                dustry.
Impact   Impact of SOFOS collaboration will enhance SDN capabilities in INTER-
                IoT, especially with the use of Open Day Light controller and use of NFV
                as support within the project. SOFOS will act as gateway between the IoT
                and 5G communities in which INFOLYSIS has a strong representation.

| 70 | SecurIoTy - security for the IoT |

Entity   AvailabilityPlus GmbH

Abstract
Security is paramount for the safe and reliable operation of IoT connected devices. Currently there is consensus that in order for IoT to become widespread, security issues have to be resolved. There is less consensus on how to best implement security in IoT. In our proposal SecurIoTy, we give a practical approach to address IoT security dimension such as confidentiality, integrity and availability for data in transit and at rest. SecurIoTy integrates as a cross-layer into INTER-IoT and connects with all layers of INTER-IoT. SecurIoTy will solve data privacy and protection issues as well as security concerns in the healthcare market and other verticals, thus reducing a major barrier for the successful proliferation of Internet of things.

Impact
The impact of the collaboration is related with confidentiality and privacy issues related with IoT and INTER-IoT. The collaboration will contribute to the cross-layer component and will provide support to the different products derived from INTER-LAYER and INTER-FW.

52	ACHILLES: Access Control and autHenticatIon deLegation for interoperabLE IoT applicationS

Entity
Athens University of Economics and Business Đ Research Center (AUEB)

Abstract
Access control and authentication in the IoT is a challenging problem. Things cannot perform complex operations and they cannot be trusted with sensitive data. ACHILLES allows the delegation of authentication and access control decisions to trusted entities, which can be implemented either as a service by a third party, or as an enhancement to an existing user management system. It requires only a secret key per Thing and it uses lightweight operations to provide secure communication channels and endpoint authentication. It can be easily incorporated into new services, it facilitates service interoperability, and it creates new business opportunities. ACHILLES will enhance the INTER-IoT platform by providing a protocol module that allows gateway/Thing authentication, as well as, extensions to the INTER-FW that allow secure access to protected CoAP resources.

Impact
The collaboration will provide an access control mechanism based in a proprietary server to the different components of INTER-IoT. The connectors with ACHILLES will be open source and included in INTER-IoT releases. The benefit and impact for INTER-IoT is the possibility of enlarging the ecosystem with a relevant new service.

42	INTER-HARE platform: Integration of multiband IoT technologies

Entity
Universitat Pompeu Fabra

Abstract

The continuous emergence of new technologies based on the IoT paradigm has resulted in a heterogeneous ecosystem. The proposed INTER-HARE platform will create synergies between LPLANs and LP-WANs, by building and testing an IoT platform easily scalable (both in coverage range and devices) and flexible (both in the considered use cases and the frequency bands from employed devices). Interoperability is provided by a hierarchical two-tier network, where dual-band devices simultaneously interact with end devices and the INTER-IoT gateway. INTER-HARE platform will allow in the mid-long term the deployment of advanced services based on sensor networks, from a wide range of everyday life applications, at reasonable costs, and low time-to-market.

Impact

The impact of the third party contribution will enhance the connectivity possibilities and consequently the interoperability at Device level, including the INTER-HARE gateway. The collaboration will enhance INTER-LogP pilot however will provide means for the extendibility of the project results in different application domains.

66	A Semantic Middleware for the information synchronization of the IoT devices
Entity	Institute of Industrial Technologies and Automation - National Research Council (ITIA-CNR)

Abstract

This project proposes the development of a new component, called Semantic Middleware, to be added within the set of middleware modules supported by the INTER-IoT platform. The new component aims to provide near real-time synchronization between all the enabled devices of the IoT platform. Many solutions available in literature enable the data synchronization, but do not support the information synchronization and this lack limits the semantic interoperability of the involved devices. In order to contribute to bridge this gap, Semantic Middleware allows to express all the exchanged information (included the synchronization requests) under the form of semantic model. This capability can also be realized leveraging various modules of the INTER-IoT platform.

Impact

Impact of the collaboration is related with Data and Semantics interoperability component. The contribution will provide a semantic middleware that will make use of the global ontology and the developed IPSM. The validation of this technologies by a third party will enlarge INTER-IoT ecosystem.

53	Interoperable Situation-Aware IoT-Based Early Warning System
Entity	University of Twente

Abstract   This collaboration proposal offers to INTER-IoT an Early Warning System (EWS) on top of an IoT platform (e.g. FIWARE), which interoperates with other EWSs, emergency systems and emergency services, applied and validated in INTER-DOMAIN use cases. In accordance with the INTER-IoT challenges, the contribution intend to support the achievement of semantic and syntactic interoperability among IoT platforms, i.e. enable data to be understandable for both sender and receiver platforms. In particular, we focus on coordinating emergency services based on IoT devices, alerting the involved parties (e.g. emergency command control, first responders and employees) when an accident occurs. The main objective is to improve the semantic interoperability of the INTER-IoT platform with emergency services through the IoT-based EWS, enabling data exchange among heterogeneous IoT platforms by developing emergency application services that require IoT ontology translations.

Impact   The innovation capacity of our solution is leveraged by stressing the role of the OASIS Emergency Data Exchange Language (EDXL) for emergency services, applied in cross-domain scenarios in logistics/transportation (INTER-LogP) and healthcare (INTER-Health). The contribution may add standards, ontologies and data models for the description of decision rules to detect emergency situations, amongst others: - IoT: W3C SSN, SAREF, OGC SWE (SensorThings and I3WSN) - Emergency: OASIS EDXL (CAP, SitRep, TEP, HAVE, DE, RM) - e/m-Health: HL7, OpenEHR, ISO EN13606 - Logistics: OTN, LogiCO (LogiTrans). Finally, through this collaboration the INTER-IoT consortium will be able to use the decision rules to support the design and implementation of the global IoT ontology (GOIoTP).

4.3.4.2   Large Contrbutions

25	Collaboration INTER-OM2M
Entity	Vrije Universiteit Brussel

Abstract   Both oneM2M and INTER-IoT address interoperability issues for the IoT. This project will compare the development, deployment and exploitation of a demonstrator, featuring widely used application protocols (HTTP, MQTT, CoAP), over different radio (BLE, LoRA, IEEE 802.15.4) and power line communication (PLC), including security mechanisms, in the oneM2M and INTER-IoT framework. The interoperability test between the oneM2M and the INTER-IoT platform will also be realized and evaluated. Thanks to the embedding of this project in several national projects involving many Dutch and Belgian companies and 4 ICT network organizations, some supported by major national telecom operators, the results of this project will have immediate industrial impact.

Impact   The collaboration as requested in the open call may bring a new standard platform like OneM2M to the INTER-IoT ecosystem. The implementation will be tested in the port transportation pilot.

71	Integrating sensiNact platform with Inter-IoT Framework

Entity	CEA
Abstract	CEA has developed the IoT platform sensiNact within various collaborative European projects such as BUTLER, ClouT and SocIoTal and now under further development and deployment in several other European projects such as BigClouT, FESTIVAL, OrganiCity, Wise-IoT, IoF2020 and ACTIVAGE. Our motivation to participate to Inter-IoT project is two-fold: i) to take benefit of Inter-IoT interoperability methodology and tools and include them into the sensiNact platform, ii) provide to Inter-IoT the opportunity to validate their framework with the integration of sensiNact platform and thus access to all compatible data sets from sensiNact from different domains such as smart cities, smart farming, smart ski resort, smart building, smart living and well-ageing, etc.
Impact	The collaboration as requested in the open call may bring a new standard platform like sensiNact to the INTER-IoT ecosystem. The implementation will be tested in the INTER-DOMAIN pilot, considering that the platform is more focused in smart cities environment and has a direct link with ECLIPSE since February 2017, that may allow INTER-IoT to have an extended impact in ECLIPSE.

4.4   Advisory Board

The INTER-IoT Advisory Board includes by now 7 members in total, three from relevant stakeholders (two large port authorities and one from a Health National System), two academic (one from a University and another from a research center), one from capital risk entity and another from a large industry related with IoT:

- Jose García de la Guia (Port Authority of Valencia), SPAIN.

- Prof. MengChu Zhou (New Jersey Institute of Technology - NJIT), USA.

- Frank Molendijk (Port Authority of Rotterdam), THE NETHERLANDS.

- Francesco Giuliani (IRCCS Casa Sollievo della Sofferenza), ITALY;

- Matus Maar (Talis Capital), UK.

- Dr. Arkadiusz Hruszowiec[2] (INTEL), POLAND.

- Dr. Mihael Mohorčič (Institute Jozef Stefan - IJS), SLOVENIA.

Individual interaction with the members has been held in different parallel meetings, and two teleconferences have been held with the members of the advisory board:

- 13th December 2016, in which the main architecture and situation of the project was presented. First inputs from the AB were received and used mainly to fix priorities in product development.

- 17th May 2017, in which an update of the architecture components and developments were presented. The core of the presentation was devoted to product identification, business models and ecosystem building through the open call results.

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[2]Andrzej Jankowsk is Internet of Things Ecosystem Manager in Intel Corporation for Central Europe region and has substituted Dr. Arkadiusz Hruszowiec since 1st June 2017

The two Advisory Board Meetings consisted out of a presentation program followed by open discussions with a "Questions and Answers" session. Inputs from the advisors had been gathered, and INTER-IoT discussed and decided upon their particular use. The board's summary below includes major overall comments received

4.4.1   Contributions from the AB

This is the first report of the INTER-IoT Advisory Board interaction. The project has presented to the Advisory Board a summary of its progress and achievements in two different telcos. In addition, the Advisory Board has had access to preliminary versions of upcoming project deliverables. The inputs from the AB have been divided in two sections: comments and recommendations.

4.4.1.1   Comments

The project is now approaching its midterm (M18) and the overall impression from the advisory board is positive and is willing to assess and advice the consortium to continue on the same path:

- The INTER-IoT project has created a relevant set of deliverables and publications that well represent the use cases, mechanisms, techniques, methods, and the components that are under development, as well as the initial business models, exploitation plans and ecosystem building through the open call.

- These results have been accomplished based on well-structured approaches where the requirements, working methods and the use case templates themselves are well documented and followed-up. Participation in events like IoT-EPI in Berlin and IoT Week in Geneva, so as interaction with stakeholders will provide good impact and exploitation possibilities to the project.

- The project has over the last 18 months attempted to leverage previous technical results to address a more product/pilot oriented approach, which pulls together solution elements into more realistic deployment scenarios.

- The project is well managed and there is a good team spirit within the group. Recommendations/General While most of the INTER-IoT components are now designed there are still a few important deliverables that are on the to-do-list. With respect to these deliverable or other relevant dissemination activities (e.g., show cases, conference organization or industrial dissemination) the following general advice or comments should be taken into consideration, in particular in pulling together the "executive" story-line and selling points:

- A strong introduction message about the relevance and benefits of SmartenIT will help to set the stage and can function as guide for the detailed reports.

- Clearly describe the benefits of INTER-IoT for each stakeholder in a summarized way where appropriate. Identification of the different products as has been done in the last teleconference provide a better and clear understanding of INTER-IoT benefits to the individual stakeholders.

- In particular some of the mechanisms developed in INTER-IoT will raise privacy issues. The presentations and clarifications at the meeting show that these issues have been addressed and considered by the consortium. However, the assumptions and approaches taken towards addressing the privacy issues can be lifted up to tell a more convincing story.

- Often there is a somewhat simplistic claim that INTER-IoT will solve every interoperability issues at different layers, simply by having a solution for every IoT platform. A more in-depth reasoning around the complexity of INTER-IoT components and products will depend on user expectations and alignment with application specific context should be considered. This can help making solution elements that relate to interoperability in a smarter way, and provide arguments that are more robust for the use and benefits of INTER-IoT.

- The proposed business models and the identified products have to be refined in order to be effective and interesting mainly to SME. Open Source policy and the exploitation plan proposed seem adequate however the AB advices to analyze and review them during the execution of the project.

- The identification of the products resulting from INTER-IoT will allow the identification of the selling points of the project. The AB was comfortable and agreed on the different identified products, and see them clearer after the second telco. The stakeholders enquired about the impact of requirements gathered from their particular application domain in the definition and the specification of the specific products (i.e. INTER-LogP and INTER-Health).

- In the future the Internet of Things may offer more advanced and media-rich messaging or interoperable services with universal reach and multi-platform interworking. The layered inter-operability mechanisms proposed by INTER-IoT, may in this context be even more attractive from a business perspective by a solution that will be application domain agnostic, or potentially extended inter-domain by "peering" among similar providers with aligned incentives to extend reach of the solution. This can be an additional selling-point for the relevant INTER-IoT solutions.

- Cross-layer aspects are part of the project and therefore have a prominent position in terms of interoperability of heterogeneous IoT platforms. In the project it is dependent on the needs of the different layers, except security and privacy. It is recommended to address and increase cross-layering aspect when the task activity is consolidated.

- Security and Privacy are major concerns for the AB members, there is a need of clarification in terms of how these aspects are going to be addressed by the consortium. The explanation and integration in the architecture makes sense for the AB, however the stakeholders were more worried for their specific application domains.

- Contribution to standards bodies requires a strong effort from the consortium. Use of standard components in the INTER-IoT solution is a very good decision however the contributions to existing standards are more difficult. It will be interesting that the consortium may focus in a set of standard organization and WG inside them and try to follow them as a first step and later on contributing to them. The AB was especially insistent in addressing standardization bodies' specific to application domains, e.g. smart-cities or transportation and logistics. From the venture capital point of view addressing standards in the area of interoperability is a difficult task due to the broad landscape.

- Learnings acquired through work in the SDN controller and subsequent recommendations for improvements should be pushed towards relevant open source initiative (e.g. Open Daylight) or different 5G projects. Link between SDN and IoT and BigData and IoT are major contributions that may come out from the project. Currently SDN interaction with IoT in INTER-IoT is a mean

to achieve flow distribution between gateways and achieve QoS, it is recommended to devote more effort to the activity as the market trends indicate it will be a major market niche.

- The AB considered the open call a success in terms of entities presenting proposals and the quality of the ones selected. From the AB point of view the coverage of the INTER-IoT components is fully covered. They suggested to organize a presential meeting of the AB during one of the evaluation milestones of the third parties.

- It would be useful to add recommendations on what mechanisms to use and when: kind of guidance on how to use your evaluations. The AB agreed that the methodology provided in WP5 will support this aspect and additionally that WP7 (starting in M21) should provide a detailed evaluation plan for interoperability aspects.

- It is important the project presents the results in a clear way, as the large number of components has a risk that potential customers or reviewers lose track of:

    - The role of the different components: why are they needed; what is their purpose;
    - How components are related (in text and through more diagrams): the hierarchy between components. It is advised to emphasize the important and mature ones.

Finally, the Advisory Board had provided a valuable list of smaller, but technically detailed comments and hints on all active work packages and their results to come by the end of the project. It can be concluded that the INTER-IoT project already has addressed those Advisory Board recommendations in the last project year and addressed them in Y3 deliverables as far as time and resources did allow for that.

4.5   Next Steps

The ET will continue working on the elaboration of the individual and exploitation strategy plans starting the third phase called: Second iteration of the joint and individual Exploitation Plans. This phase will run from M18 to M32 and will consolidate the work and data collected during phases I and II, including the results of the Evaluation and Assessment Plan developed in WP7 (M32) and the business model and marketing operations, carried out in T8.3 (M18-M32). The ET plans to hold a workshop at M31 to conduct the activities to start the second iteration of the joint and individual Exploitation Plans.

4.6   Exploitation Measures KPI

The proposed KPIs in D8.3 have been reviewed and the ET asked the partners to give figures about them in order to measure them during the period M1-M18. The following table shows the results of these mesures.

4.6.1   Academic and research KPI

The KPI obtained in Academic Research in general shows that INTER-IoT is creating big impact in IoT sector. The creation of 2-3 spin-offs and the increase of the number of research human resources acquired in the IoT area is also creating impact in the economy. It should be also highlighted that the expected KP9 has been increase in two units.

KPI	Description	Amount
KP1	Number of IoT research papers published	50
KP2	Number of spin-offs generated	3
KP3	Number of IoT related courses and programmes taught.	11
KP4	Number of research human resources acquired in the IoT area	20
KP5	Number of participation to IoT-related projects at local, national, and international level	31
KP6	Number of IoT prototypes developed	28
KP7	Solutions based on social and environmental responsibility	3
KP8	1 new open source community on Industrial IoT network management system	2
KP9	1 open IoT testing and experimentation facility to help research and business teams develop new concepts and products	4
KP10	1 open online network management platform for Industrial IoT infrastructures	1

4.6.2   Communication KPI

The KP1 reflects that activity in social media per partner in their own webs pages should be increased. The communication activities till the moment are focused on the promotion of the project through the official web page. (see section 3)

KPI	Description	Amount
KP1	Social media KPI: Number of twits per month, number of visits in Facebook, Linkedin per month, etc. in the web pages of the partners	31

4.6.3   Exploitation and commercialization KPI

Although the commercial activities where planned to start on M32, the KP1 demonstrates that the commercial partners of INTER-IoT are pushing actively to raise awareness of the INTER-IoT exploitable services and products among their potential customers, thus creating impact on the society. It is also remarkable that at the middle stage of the project the commercial partners have created new commercial products/services and improved existing ones (KP3 and KP4). This fact helps them to improve their portfolio creating impact in the general IoT market by the increase of services and solutions marked oriented. The number of customers (KP4) is low but is expected to have an increase during the second iteration of the joint and Individual Exploitation Plans (M18-M32) and during the Go to market phase (M32-M36) where the INTER-IoT consortium will have an effective business plan to bring the exploitable INTER-IoT products and services into the market. It is also important to remark that some SMEŌs has arranged partnerships (KP7) and strategic alliances (KP8) in order to give INTER-IoT products and services more reliability in the market.

KPI	Description	Amount
KP1	Number of commercial presentations to existing customers	38
KP2	Number of new commercial products/services based on INTER-IoT	5
KP3	Number of existing commercial products/services improved with results on INTER-IoT	6
KP4	Number of existing and new customers of INTER-IoT LogP or derivate of INTER-IoT interested before M36	23

KP5	Required time to acquire a new customer	6- 24 months
KP6	Number of patentable solutions developed during the project	
KP7	Number of partnerships	57
KP8	Number of strategic alliances	3

4.7   Open Source Communities

During the Exploitation workshop in Ljubljana the ET presented the following information:

4.7.1   The Open source licenses selected by the IoT-EPI Projects.
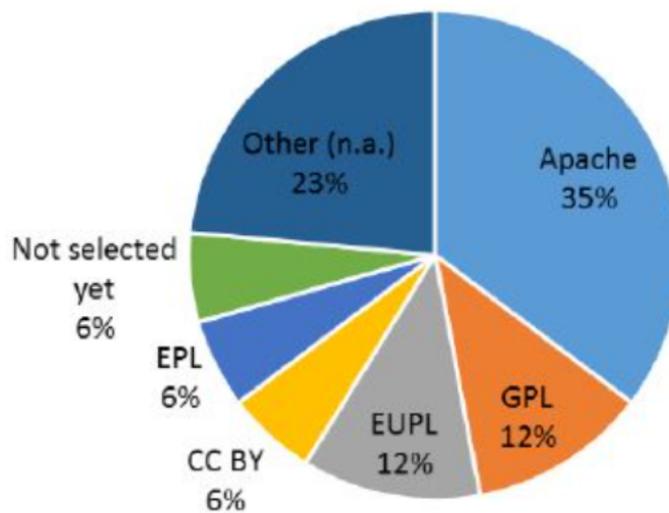
Figure 4.6: Open Source Licenses

4.7.2   IoT Platform Licenses

Project	License
FIWARE	GPL/AGPL
OpenIoT	LGPL 3.0
Eclipse OM2M	EPL
UniversAAL	Apache 2.0
Sofia2	Apache 2.0

Matrix about different open source licenses and a reason for using them.
Specific list of Compatible Software Licenses that we can use in an Apache 2.0 license Project
Forbidden licenses (Cannot be included within Apache products)
Weak copyleft (can be used in binary form if the inclusion is appropriately labelled)

Feature	Description	AGPL 3.0	GPL 3.0	LGPL 3.0	EPL 1.0	Apache SL 2.0	BSD 3.0	EUPL 1.1	MIT
Patent Use	This license provides an express grant of patent rights from the contributor to the recipient	x	x	x	x	x		x	
Disclose Source	Source code must be made available when distributing the software	x	x	x	x			x	
Network Use is Distribution	Users who interact with the software via network are given the right to receive a copy of the corresponding source code	x						x	
Same License	Modifications must be released under the same license when distributing the software. In some cases a similar or related license may be used	x	x	x	x			x	
State Changes	Indicate changes made to the code	x	x	x		x		x	
Trademark Use	This license explicitly states that it does NOT grant you trademark rights, even though licenses without such a statement probably do not grant you any implicit trademark rights					x		x	

Figure 4.7: IoT Platform Licenses

Taking into account the aforementioned information the INTER-IOT consortium discussed about that finally then decided to go for the Apache license because it better suits our exploitation activities. Some OS individual activities have been carried out during this period as follow:

- SABIEN: During the testing of the universAAL Bridge for Inter-MW a couple of issues were identified in the original code base of universAAL, both related to the Android version of its middleware:

  - First, the content of the messages of universAAL Android middleware could be, under some circumstances, using some specific ontologies, not as complete as it could be expected. An issue was created in universAAL's Github repository for the Android version (https://github.com/universAAL/nativeandroid/issues/6) and it was fixed in due time. This fix will be included in the next release of universAAL.

  - The other, smaller issue has to do with opening universAAL's Android middleware source code in recent versions of Android Studio. Because the source had not been updated in a while, there have been some updates to Android Studio and Android itself that require minor setup updates in the universAAL source code. An issue has not been created in universAAL's Github for this, but it has been properly notified.

- XLAB-PRODEVELOP: Both will provide more OS in INTER FW (as SDK/Eclipse plugins).

- UPV is participating at the Eclipse initiative sensiNact for the applications of interoperability to smart cities

During the second iteration of Exploitation Plan (second Phase of the project) the INTER-IoT consortium plans to increase the activities in OS communities, once the code is mature enough to be provided to them.

4.8   Standardization Activities

The standardization activity will profit from previous and current presence of project partners in key standardization organizations. Therefore, it is also planned to target industrial alliances in order to promote INTER-IoT results. Clearly, in the first phase of the project, when no technological results are ready to be standardised, the partners just followed the main standardisation activities and trends, in order to be ready to act as soon as results will be considered worth the effort to be standardised. Hereafter, the different partners interests are summarised:

- **UPV**

    - IETF WGs related with IoT (6LoWPAN, ROLL and CORE)
    - ITU-T SG20 (lead group on IoT) and SG21 (IoT related issues with interoperability).

- **UNICAL**

    - IEEE
    - ETSI
    - ITU
    - IETF
    - W3C
    - 0neM2M

- **VPF**

    - AIOTI

- **PRO**

    - AIOTI

- **TUE**

    - IETF 6tisch WG.
    - MBAND (IEEE802.15.6 or IEEE802.15.4j)

- **XLAB**

    - AIOTI

- **SRIPAS**

    - OpenEHR initiative
    - AIOTI

- **ABC**

    - IETF (WG ROLL, CORE)
    - ETSI
    - ITU-T (SG20)
    - AIOTI WG3

Specific list of Compatible Sw Licenses that we can use in an Apache 2.0 license project					
Apache License 2.0					
Apache Software License 1.1. Including variants:					
	PHP License 3.01				
	MX4J License				
BSD (without advertising clause). Including variants:					
	BSD 2-clause				
	BSD 3-clause				
	DOM4J License				
	PostgreSQL License				
	Eclipse Distribution License 1.0				
MIT/X11					
ISC					
ICU					
University of Illinois/NCSA					
W3C Software License					
W3C Community Contributor License Agreement - if at least 45 days after publication					
X.Net					
zlib/libpng					
FSF autoconf license					
DejaVu Fonts (Bitstream Vera/Arev licenses)					
Academic Free License 3.0					
Service+Component+Architecture+Specifications					
OOXML XSD ECMA License					
Microsoft Public License (MsPL)					
Creative Commons Copyright-Only Dedication					
Python Software Foundation License					
Adobe Postcript(R) AFM files					
Boost Software License Version 1.0					

Figure 4.8: List of compatible licenses

Forbidden licenses (Cannot be included within Apache products)					
Binary Code License (BCL)					
Special exceptions to the GNU GPL (e.g. GNU Classpath)					
GNU GPL 1, 2, 3					
GNU LGPL 2, 2.1, 3					
GNU Affero GPL 3					
NPL 1.0/NPL 1.1					
QPL					
Sleepycat License					
Code Project Open License (CPOL)					
BSD-4-Clause/BSD-4-Clause (University of California-Specific)					
Field of use restrictions:					
Microsoft Limited Public License					
Amazon Software License (ASL)					
JSON License					
Non-commercial licenses:					
Creative Commons Non-Commercial variants					

Figure 4.9: List of forbidden licenses

Weak copyleft (can be used in binary form if the inclusion is appropriately labeled)			
Software under the following licenses may be included in binary form within an Apache product if the inclusion is appropriately labeled (see below)			
Common Development and Distribution Licenses: CDDL 1.0 and CDDL 1.1			
Common Public License: CPL 1.0			
Eclipse Public License: EPL 1.0			
IBM Public License: IPL 1.0			
Mozilla Public Licenses: MPL 1.0, MPL 1.1, and MPL 2.0			
Sun Public License: SPL 1.0			
Open Software License 3.0			
Erlang Public License			
UnRAR License (only for unarchiving)			
SIL Open Font License			
Ubuntu Font License Version 1.0			
IPA Font License Agreement v1.0			
Creative Commons Attribution (CC-BY) 2.5, 3.0, and 4.0			

Figure 4.10: List of weak copyleft licenses