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INTEROPERABILITY
OF HETEREOGENEUS
IOT PLATFORMS.

D8.7

Business Models and Marketing Operations

September 2018

INTER-IoT

INTER-IoT aim is to design, implement and test interoperability tools, a framework and a methodology 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-layer approach to the integration of different IoT devices, networks, platforms, services and applications will allow a global continuum of data, infrastructures and services. Additionally, a reuse and integration of existing and future IoT systems will be facilitated, enabling the creation of a de facto global ecosystem of interoperable IoT platforms.

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

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INTER-IoT

Business Models and Marketing Operations

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Disclaimer

Executive Summary

The Deliverable D8.7 aims to provide the guidelines and the rules for management of marketing operations and development of business models that are built upon the interoperability solutions that the INTER-IoT project provides.

INTER-IoT innovations in interoperability create proven value for the customers and as such they may give place to a wide range of potential but viable business models. One of the goals of INTER-IoT is to establish business partnerships, by creating ecosystems among the partners of the Consortium to define appropriate methodologies for the development of an INTER-IoT marketing plan and to exploit the value that is created. In this sense, the value proposition of INTER-IoT products will be explored and the products themselves defined.

The deliverable D8.7 provides the results of the market analysis, further implications (e.g., financial, industrial/manufacturing, regulatory aspects to be taken into account) and business models to be adopted by partners of INTER-IoT. This deliverable benefits from the work on business and market analysis carried out in previous deliverables: D2.1, D2.2 and D8.3. The stakeholders and market analysis report provided in D2.1 has been used in order to design and perform an optimal marketing strategy and market plan that are described in this document. This deliverable completes the market study, extending the SWOT analysis already provided in D2.1, and performing a detailed study of potential competitors. Therefore, it takes into consideration the regulatory aspects of the different countries in UE that were mentioned in D2.5.

This deliverable provides a study of sustainable business models that will be used by INTER-IoT partners by using the iterative LLAVA Matrix Methodology instead of the Canvas model due to it allows to improve the business models presented in D2.2. In depth analysis of four of the selected products is undertaken. Additionally, further results of the market analysis including regulatory considerations requested by the commission will be presented, and a supplement to the business model analysis to facilitate the exploitation planning in commercial and academic areas.

The marketing operations and exploitation vision provided in this deliverable have been designed and developed upon the description of the project communication, dissemination, data management, and exploitation plan provided in D8.3, a previous document devoted to the INTER-IoT Impact Creation Plan.

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Change control datasheet

Version	Changes	Chapters	Pages
0.1	Creation of the document, table of contents and introduction	All	15
0.2	Contributions to ToC	All	18
0.3	Introduction, market forecasting, domains, regulatory considerations	1,3,4	66
0.4	Addition of appendices	8, 9	110
0.5	Addition of value proposition and product definitions. Addition of exploitation strategy	2,6	116
0.6	Market analysis	3	122
0.7	IPR strategy and general revision	6, All	130
0.8	Marketing Operations	5	137
0.9	Conclusions, editing	8, All	137
0.10	Marketing Operations Plan. Appendices updated.	5	137
0.11	Competitor analysis. New products added.	2, 3, 5	143
0.12	All sections updated. Chapter numbing redone	All	202
0.13	Addition of the appendices	appendices	320
1.0	Final		320

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Acronyms

Im	Class I monitoring
Is	Class I sterile
Aas	As a service
AIOTI	Alliance for Internet of Things Innovation
BMC	Business Model Canvas
EC	European Commission
EHR	Electronic Health Record
ET	Exploitation team
FDA	Food and Drug Administration
GP	General Practitioner
ICT	Information and Communication Technology
INTER-FW	INTER-IoT Interoperable IoT Framework
INTER-Health	INTER-IoT Platform for Health monitoring
INTER-LAYER	INTER-IoT Layer integration tools
INTER-LogP	INTER-IoT Platform for Transport and Logistics
INTER-METH	INTER-IoT Engineering Methodology
IPR	Intellectual property rights
JOA	Joint ownership agreement
IoT	Internet of Things
IoT-EPI	IoT European Platform Initiative
LATAM	Latin American
MDD	Medical Device Directive
MDR	Medical Device Regulations
NHS	National Health Service
OEM	Original equipment and machines
OSS	Open source software
PHR	Personal Health Record
QoS	Quality of Service
ROI	Return on investment
SDN	Software defined network
SDR	Software defined radio
SoTA	State of the Art
TTO	Technology Transfer Officer
USP	Unique selling points
VNF	Virtual network function

1 Introduction

The internet of things (IoT) is constantly growing with the development of new platforms, applications, and sensors. A key challenge in the world of IoT is to provide interoperability in this diversified landscape of closed and often fragmented systems. INTER-IoT[1] addresses this by providing technological innovations and clearly defined methodologies appropriate for this ever-evolving landscape. In order to garner consumer interest, it is required to move beyond simply connecting more things. In order to drive adoption, INTER-IoT needs to appeal to consumers' priorities. This work facilitates new opportunities for business innovation by the ever-expanding number of businesses and private users of the IoT services.

Work package eight oversees the projects work on impact creation. A large part of this work is developing business models for the products produced within the project and defining the way in which these products will be presented to the public. This document will address this in detail with a focus on exploiting specific products.

This deliverable will explore the spaces where the INTER-IoT innovations in interoperability can provide viable business cases. The value proposition of INTER-IoT products will be explored and the products themselves defined as combinations of different pieces of INTER-IoT technology. Additionally, further results of the market analysis including regulatory considerations requested by the commission will be presented. A supplement to the business model canvas will also be presented to further define our plans for exploitation in both commercial and academic arenas. This is the LLAVA methodology.

In deliverable 2.2, several business models were explored to exploit the INTER-IoT results. A common theme identified in the value proposition by all partners was interoperability of heterogeneous platforms, devices, and applications. Early preparation and design of these business models ensures that the project solutions are business focused but also allows time for the business models to evolve with the project's technical development. Transport, logistics, and healthcare paradigms were explored during the initial work and they remain the focus of the pilots. Additional market segments have been identified and will be explored throughout the course of the project.

Most of the individual business models have common elements. As an example, every partner has pointed out that the interoperability of heterogeneous platforms is essential for their value proposition. Time savings, reduction of operational costs, better quality of life, social improvements, and environmental sustainability to create growth are also common themes.

Finally, all partners have defined joint business models to take advantage of the common outputs of the project. The business models have evolved though the use of the LLAVA methodology. The creation of joint business models, ecosystems, communities, and partnerships with the different partners of the INTER-IoT consortium has been identified as indispensable to obtain the necessary synergies and knowledge to implement the proposed solutions. Through strategic business partnerships, it will be possible to create real value for potential target customers.

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[1] http://www.INTER-iot.eu

2 Methodology

2.1 Introduction

In the first stage of the project, there was a task devoted to find the business model of the INTER-IoT products. The task T2.2, led by VPF, was executed between M1 and M6 and it initiated the definition of the business options at strategic level from the very beginning. All the information regarding this task is included in the public deliverable D2.2. All the partners in the consortium were involved is this task, as it is everyone's responsibility to take advantage of the project results to create new products and services.

The first activity in this task was to select the methodology to represent the business model of a product or company. For that we select the Canvas Business model. Canvas is a management and entrepreneurial tool for generating business models through nine basic building blocks that show the logic of how a company intends to create value and make money. These nine blocks are: customer segment, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure.

In a first stage of this task, each partner defines its own business model following the Canvas methodology. This individual business model contains a particular vision of how to create value with the INTER-IoT expected results. Furthermore, we were able to create and provide value to different market segments when commercializing and exploiting the main results and outcomes of the INTER-IoT project, as in the project there are universities, research organisations, industry organisations, SMEs, and public body organisations.

In the last months of this task, when we had a clear idea of the final INTER-IoT products, we started the business model of each of the technical products (INTER-LAYER, INTER-FW and INTER-METH). All the involved partners in each product define a joint Canvas business model, where we identified different business opportunities, potential clients, costs, etc.

In the end, we had an initial business model for all of the market segments where the partners are involved which we developed in WP8.

Due to the oriented innovation process and iterative nature of INTER-IoT, the ET has decided to adopt the LLAVA Matrix methodology for further development of the Exploitation Plan during the second iteration.

The LLAVA Matrix is a hypothesis driven tool to embed user and business model innovation in Living Labs. It has been developed by iMinds Living Labs[2] studying over 40 SME cases. This methodology has been also used and tested by SMEs and start-ups within the framework of the FI-C Programme[3], among them PRO that is the leader of T8.4 Exploitation Plan.

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[2]   https://openlivinglabsdays15.files.wordpress.com/2015/09/LLAVA-matrix-hypothesis-driven-tool-to-embed-user-and-business-model-innovation-in-living-labs.pdf

[3] http://www.fic3.eu/our-startups/

This methodology will help to define an effective innovative business models (joint and individual) in order to bring the expected INTER-IoT outputs (INTER-LAYER, INTER-FW, and INTER-METH) into the market. The LLAVA Matrix considers the right components for a Living Lab that are not contemplated in the Canvas Business models such as: customer needs, value network, competition, solution, and willingness to pay. These aspects are very important to achieve successful effective business models.

2.2 LLAVA Matrix purposes

The LLAVA matrix is a driven tool to embed user and business model innovation in Living Labs addresses the following three purposes to build an effective innovative business model:

- Framework
- Process
- Assessment

The LLAVA matrix allows the INTER-IoT consortium to advance another step in the definition of the business models, considering aspects that are limited by the already used CANVAS model.

2.3 LLAVA Matrix: Framework

The LLAVA Matrix Framework allows the creation of an internal alignment on business models and critical assumption (from R&D) to have a COMMON VISION. This common vision identifies the common needs of the customer segments

The following figure shows the components of LLAVA matrix:

Figure 1: LLAVA Matrix framework

The LLAVA Matrix framework address the following questions that are key to have an innovative effective business model:

Question	LLAVA Matrix related components	Questions per component

WHY?	• Customer segment Common need	• What are you customer segment? • In what way do segments differ? • What is their common need, pain, or aspiration? • What market or societal trends will amplify their need?
WHAT?	• Value promise • Solution	• What is your value proposition? • What is your marketing message? • What are your core and specific components and functionalities for both of them?
HOW?	• Value network • Competition & alternatives • Revenue model	• E2E Solution • Who controls which assets? • Service creation, delivery and capturing • Who takes up each role? What value do they bring? • Who are your competitors and what alternatives do customers have? • How do you differentiate from them? • What is your pricing model? • What is your pricing level with that model?
WHY YOU?	• Solution • Competition & alternatives	• What are your core and specific components and functionalities for both of them • Who are your competitors and what alternatives do customers have? • How do you differentiate from them?

Table 1: LLAVA Matrix questions

2.4 LLAVA Matrix: Lean Innovation Process

The LLAVA Matrix process allows the definition and management of a lean innovation track for exploration and validation of the process, through the Lean Innovation Process.

With the state of the art (SoTA) the dreams, delights, habits and frustrations of the customers and the customer segments of the business idea can be detected. The SoTA can be carried out through desk or field research through interviews with potential customers from the customer segments identified. The analyses of SoTA outputs will help to define the wants and needs of the customers.

Considering these needs as fact, the innovation process will help to identify opportunities, strengths, weakness and threats of the business idea and the product/service to be sold into the market.

However, at the first stage of the business idea, the common needs come from assumptions built from R&D technical outcomes. Thus, these needs should be tested for a further validation. The goal is to find out if they are real needs of the initially identified customer segments and to determine which their common needs are. Once the common needs are identified, the solution can be built and convert into a specific market solution that will have a unique value promise being a different alternative among the competition alternatives.
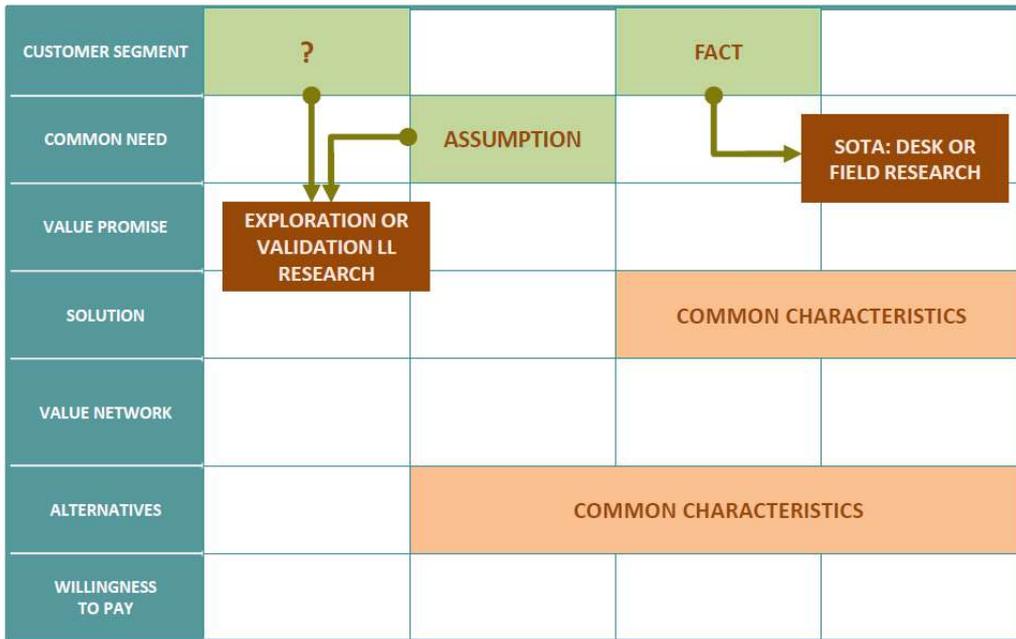
Figure 2: Lean innovation process

2.5 LLAVA Matrix: Assessment

The LLAVA Matrix considers that assessment of the business model sustainability should be carried out, thus having a Sustainable Strategy.

The correct assessment of an innovative business model will be based on the compliance of the following **three laws of business modelling**:

- **Focus:** The market solution will be design based on cost opportunity, limited resources, team sales and development cost.

Figure 3: Assessment Focus

- **Differentiated:** The compliance of Focus is not enough and the value network, alternatives in the market and willingness to pay should also to be defined. This law is based on standing out and sustainability of the envisioned solution. The number of solutions to be developed and their value promises should be reduced in order to reduce the costs of the solution production and to avoid a price war. The solutions should be unique and competitive enough to attract the attention of the customer segments in front of the competition alternatives.

CUSTOMER SEGMENT	SEG 1	SEG 2	SEG 3	
COMMON NEED	NEED 1	NEED 2	NEED 3	
VALUE PROMISE	VP 1	VP 2	VP 3	
SOLUTION	SOL 1	SOL 3	SOL 3	
VALUE NETWORK	ECO-SYSTEM			
ALTERNATIVES	ALTERNATIVES COMPETITION			
WILLINGNESS TO PAY	PRICE WAR			

Figure 4: Assessment Differentiation

- **Design for coherence** based on avoiding inconsistencies and a design for positive feedback loops. The value promise of the market solution should be unique and should be competitive enough to attract the attention of the customer segments identify.

CUSTOMER SEGMENT	SEG 1	SEG 2	SEG 3	
COMMON NEED	NEED 1 & 2		NEED 3	
VALUE PROMISE	VP 1 & 2		VP 3	
SOLUTION	SOL 1		SOL 3	
VALUE NETWORK	ECO-SYSTEM		3	
ALTERNATIVES	ALT 1	ALT 2	ALT 3	
WILLINGNESS TO PAY	WTP 1	WTP 2	WTP 3	

Figure 5: Assessment coherence

2.6 LLAVA Matrix: Application to INTER-IoT

The LLAVA Matrix methodology helps INTER-IoT to complement the different business analysis and exploitation strategies previously used in the project.

The actions associated with the execution of the LLAVA Matrix methodology were already started in D2.1 (M3) providing a market analysis, continued in D8.4 (M4) and the second version released in M12 with preliminary exploitation plan and start of the definition of the value promise, and also in D2.2 (M6) with the corresponding business models of the project. The technical review in M9, highlighted the limitations of some of the tools proposed by the consortium, although they are widely used.

The first action in order to meet the requirements and needs of the LLAVA Matrix methodology was the design of a new exploitation questionnaire (individual and joint) during the first iteration of the Joint and Individual Exploitation Plans (see section 3.2) and it is reinforced for the second iteration looking for concrete exploitation actions. The new questionnaires of the first iteration were already reported in D8.3 v2, resubmitted in M12 and the questionnaires of the second iteration are included in ANNEX A: Individual Exploitation Plans and ANNEX B: Joint Exploitation Plans of this deliverable.

The questionnaires were responded by the consortium partners after the withdrawal from ET. Additionally, from D8.3 v2 till the release of this deliverable D8.7b, through the open call the consortium incorporated 12 third parties (10 small and 2 large). The 10 small third parties' contributions filled the questionnaires during the first evaluation, and their responses were incorporated in the intermediate D8.7a. (M18). For the present deliverable, they have consolidated their responses through the questionnaires of the second iteration.

The following table links the different questions in the questionnaires (1st and 2nd iteration) elements of the LLAVA Matrix.

LLAVA matrix component	Exploitation Questionnaires (1st and 2nd iteration)
Customer Segment	• INDIVIDUAL: Q5, Q3, Q4 • JOINT: Q3
Common Need	• INDIVIDUAL: Q2, Q6, Q7, Q12, Q17 • JOINT: Q3, Q5
Value Promise	• INDIVIDUAL: Q4 • JOINT: Q4, Q5
Solution	• INDIVIDUAL: Q3, Q10, Q13, Q14, Q15, Q17, Q1, Q11, Q12 • JOINT: Q4, Q6, Q8
Value Network	• INDIVIDUAL: Q11, Q5, Q6, Q7, Q9, Q10 • JOINT: Q5
Competition and Alternatives	• INDIVIDUAL: Q9, Q5, Q6, Q7, Q8, Q9 • JOINT: Q7
Revenue Model	• INDIVIDUAL: Q13, Q14, Q16, Q18, Q2, Q3, Q4, Q12 • JOINT: Q6, Q7, Q8

Table 2: LLAVA Matrix input from questionnaires (1st and 2nd iteration)

The information gathered from the questionnaires of the first iteration was used to complete the deliverables D8.7a and D8.5 and it has been merged with the information gathered from the questionnaires of the second iteration for this deliverable D8.7b.

The following table presents the state of the application of the LLAVA Matrix methodology together with other methods already used in previous works related with business modelling.

LLAVA matrix component	INTER-IoT Result
Customer Segment	• D2.1 provide a stakeholder and market analysis needed to understand the different customer segment and needs. • Section 4 of D8.7a analyses again the IoT market in a broad sense in order to put into context INTER-IoT and products. • Collaboration with IoT-EPI has identified the different application domains and segments for the IoT interoperability market. • Section 8 of this deliverable updates 4 of D8.7a
Common Need	• D2.1 provided an analysis of needs related with interoperability and INTER-IoT products, specifically the stakeholders of the two pilot needs. • Collaboration with IoT-EPI Task forces identified the common need of the stakeholders
Value Promise	• D2 provided a preliminary identification of the value promise of the project that has been further refined. • Section 3 of D8.7a provides the values promise and exploitation vision of the project, providing an extensive identification of the products that could be exploitable and the value promise of them. • Section 6 of D8.7a providing the marketing plan. • Section 4 of D8.5 provides an overview of the OSS strategy as a complement of the value promise of INTER-IoT. • IoT-EPI TF in business models has received contributions from INTER-IoT. • Section 6 of D8.7b will extend and improve the overview of OSS strategy. • Section 7 of D8.7b provides the final marketing process
Solution	• D2.1 included the first definition of the proposed solutions with a first identification of the products. • D4.1 provided the architecture of the solution • D3.1 provided the mechanisms and technical implementation of the solution. • Section 3 of D8.7a identifies the different products and solutions that can be exploited from INTER-IoT. • Section 3.3 of D8.7b with INTER-IoT product definitions with its corresponding LLAVA Matrix • Section 5.5 of D8.7a provides an overview of the IPR of the products and section 4 of D8.5 provides the OSS licensing strategy. • Section 4 of D8.7b provides the final IPR Management
Value Network	• Section 3 of D8.7a provides the value network and link between partners for the exploitation of products and results. • Section 4 of D8.5, discusses about OSS strategy associated with the value network of INTER-IoT. • Open Call third parties contribute to the value network with the extension of the ecosystem. • Sections 3 and 5 of D8.7b provides the value networks perspectives of the individual exploitation plans and common OSS vision.
Competition and Alternatives	• D2.1 analysed preliminary some competitors of INTER-IoT products. • Section 4.4 of D8.7a provides an extended analysis of competitors. • IoT-EPI collaboration provided analysis of competitors and alternatives. • Sections 3.5 and 7.4 of D8.7b provides a competitor analysis
Revenue Model	• Preliminary analysed in D2.2 with the individual and joint business models. • Section 3 of D8.7a provides an initial detailed analysis of the revenue models • Section 4 of D8.5 contributes to this vision that will be consolidated in D8.7 final version. • Open call third parties provide their revenue model for their individual products and the joint revenue model with INTER-IoT. • Section 5.3 and 5.4 provide revenues models of the individual exploitation plans of INTER-IOT partners and third parties

Table 3: LLAVA Matrix link with INTER-IoT result

The full application of the LLAVA Matrix methodology to the INTER-IoT project has allowed the ET to address three lines of business development:

- Business development for individual exploitation plans for INTER-IoT partners and third parties (See section 5.3). All the partners of INTER-IoT filled in the LLAVA Matrix Template of their individual exploitation plans (commercial and non-commercial) to envision solutions/products based on core INTER-IoT products (see section 3). The LLAVA Matrix presented are included in Annex F.
- Business development of the products and solutions of the common OSS exploitation plan (See section 6).
- Business development for individual exploitation plans for third parties. See section 5.4. All the third parties (commercial and non-commercial) consolidated its business development of products/ solutions based on INTER-IoT core components. They have not built LLAVA Matrix Template but fill in the second iteration questionnaire. (see Annex C and D)

3 Exploitation vision

3.1 Exploitation Model

This section is dedicated to highlighting the most relevant exploitation features that will drive the exploitation activities during project's lifecycle by following the document D8.3, Impact Creation Plan (M4 and its review in M13), as a reference document about the exploitation and commercialization strategy. It establishes the basis to be followed by all partners. This plan provides comprehensive guidelines; templates; schedule; exploitation key performance indicators (KPI's), and initial open source communities and standardization strategies to maximise the impact of the INTER-IoT project. Furthermore, this document agglutinates the updated views of the aspects highlighted by technical reviewers during the M9 review meeting; inputs from the collaboration within IoT-EPI; inputs from the collaboration of INTER-IoT in the H2020-IoT1 LSP and an updated analysis after eighteen months of the execution of the project.

In accordance with the Description of Work and the Grant Agreement, the INTER-IoT results are offered in an open source version under the Apache 2.0 license, to which we will call the *Community Product.* The IPR (intellectual property rights) strategy is further explored in section 4. The importance of this instance is connected to the building of a community of users around the technology and methodology established in the context of this project. Its main goal is the stability of the durable technology, much due to the INTER-Meth methodology, and a consequent standardization. Much as in other open source business models, the maintenance resources of the community product are provided by donations and by commercial activities like: services, support, customization, consultancy, and training.

The exploitation of the community product is based on several combinations of the technology items described below, according to the needs of a potential client. The sales process is heavy and slow because there is no defined client persona and, therefore, there are too many (and too diverse) potential clients. The technological knowledge needed to succeed with the sales activities is high. There is no fixed price in this scenario, as it depends on the business opportunity of the identified lead.

There is much potential from an academic exploitation perspective of the community product due to its creative freedom and active community input. It will be led by the academic partners in the Consortium, selecting, extracting, and exploring novel research ideas from the community of users. The outcomes of this exploitation are the new journal papers in related topics published in high ranked journals, the participation in high ranked conferences, and the growing attraction of PhD students with more competitive courses and didactic materials.

On the business development side, the market trends research and the competition analysis potentiate the identification of specific solutions and services that can solve specific needs of selected client types. This identification is done on the basis of the business development activities and has the main objective to put together pieces of INTER-IoT technology that can be further developed into a premium version, eventually with specialised support and customisation, attracting the client that has that specific problem to solve in his/her business. That b2b solution – that we call *Commercial Product* – is focused and therefore much lighter in the scope of the sales approach, where the potential clients are easier to identify and reach out to. This also permits a fixed price and technology selection that the marketing and sales teams can work with.

Finally, the need of new features in the commercial product that are expensive to provide in an in-house technology development action, can be set up within a *Business to Community* approach.

By that we mean an investment in the development of specific features by the assignment of resources, experts or better documentation focused on the specific features that the commercial product needs to differentiate itself from the competitors.

The following schema describes the exploitation strategy described above:
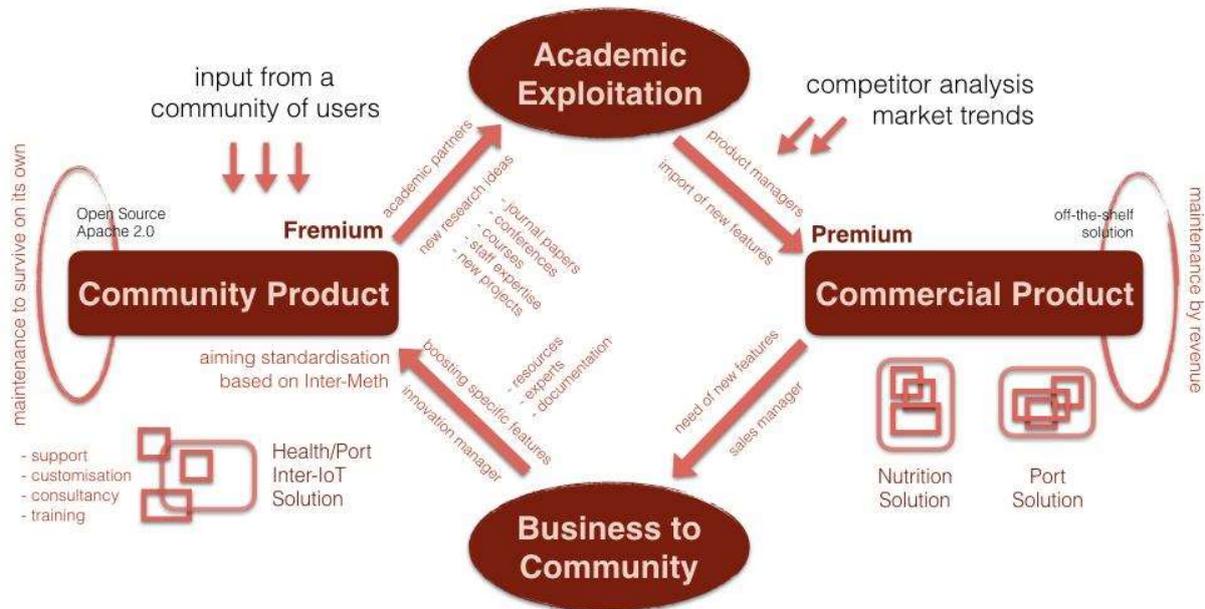
Figure 6: Global schema of the INTER-IoT exploitation vision

The content of this section was collected through all the partners during the month of May 2017. This collection and review were processed through a shared master spreadsheet identifying the main aspects of the INTER-IoT technology and their positioning in the project's implementation structure in order to proceed with the tangible product definition based on the potential of the IPR generated in the context of the project to be exploited with the contribution of this Work Package. Building on that technical information, the shared master spreadsheet includes a tab focused on the tangible product definition, coordinated with the potential of the INTER-IoT technology, and another tab disclosing the overall value proposition.

In detail, the content collected and reviewed by the consortium partners respects the following structure:

1. Technology
    a. Leading partner – in the context of the project's implementation
    b. WP/Task – in the context of the project's implementation structure
    c. Technology item – as a collection of IPR items that has a certain unity
    d. INTER-IoT exploitable results – the IPR references it depends of
    e. Main Features – the description of most relevant properties
    f. Building block – the project categories it includes
    g. Dependency - the project categories it depends of

2. Product
    a. Responsible partner – the project partner that will be responsible for the solution
    b. INTER-IoT exploitable result – the IPR references that the solution depends of
    c. Exploitable result type (Consultancy or training / Product / Cloud service / Academic) – a multiple choice of exploitation categories

d. Modules and results used – the IPR references that the solution depends of
e. Features Overview – the description of most relevant product properties that can serve as selling points
f. Building Blocks – the project categories it includes

3. Value
   a. Value Proposition item – the technology value point affecting the overall exploitation
   b. Description – the description of how this value point is connected to the produced technology and why (if applicable) it is a market differentiator
   c. INTER-IoT exploitable results - the IPR references that the value proposition depends of

This master spreadsheet is complemented with the information extracted from the following requested materials to partners:

- Individual exploitation plan questionnaire for first and second iteration
- Joint exploitation plan questionnaire
- Impact creation questionnaire

In the next subsections we will describe in more detail the aforementioned points, describing the value proposition and the product and services definitions of the project.

3.2 Value proposition

The value proposition (or what is the same as the marketing message of a business idea) is the most critical factor that must be defined early in the project. The value proposition is the promised benefit that will be delivered, communicated and acknowledged once the project is completed. Globally, the INTER-IoT Value Proposition is the following:

INTER-IoT provides an interoperable and open IoT framework, with associated engineering tools for seamless integration of heterogeneous IoT platforms, regardless of the application domains, using a layered approach.

To have a clear value proposition that will refer to INTER-IoT, initial assets and exploitable products have been defined in D2.3 and D.2.4 (M12). Therefore, in D2.2 (M6), each partner has elaborated its initial business models, defining its value promise and the first drafts of joint business models have also be complied.

However, the exploitation team will continuously monitor the market and revise these assets and exploitable products according to the achievements of exploitation activities during project's lifecycle as an iterative process (see section 2.2 LLAVA Matrix Methodology). The initial analysis should consider project's core objectives and envisioned results so as to conclude on the basics of each asset that will not change. Such aspects correspond to the project's innovation, the motivation, and the added value offered to the INTER-IoT stakeholders.

Finally, the analysis mentioned before will facilitate the definition of other important parts of the INTER-IoT exploitation strategy, namely the project's market segments, trends and target groups. A qualitative comparison of features from existing developments against expected ones of the INTER-IoT ecosystem, with respect to stakeholder's needs, will be the key to the project's long-term sustainability.

The following table dives into the details of the above proposition in order to highlight several statements that positions INTER-IoT in the business and technological market.

Value Proposition	Description	INTER-IoT exploitable results
INTER-LAYER interoperability and Integration	- Provide the interoperability for different layers (D2D, N2N, MW2MD, AS2AS and DS2DS). - Reach the integration of proprietary IoT Platforms with other heterogeneous IoT Platforms.	INTER-IoT physical Gateway INTER-IoT Virtual Gateway SDN Component SDR component INTER-IoT middleware Application services module IPSM - semantic mediator INTER-LAYER security module INTER-LAYER platform
Connection of unconnected IoT Platforms	INTER-LAYER will make possible for customers to access multiple IoT platforms' services thanks to the integration of unconnected IoT platforms.	INTER-IoT physical Gateway INTER-IoT Virtual Gateway SDN Component SDR component INTER-IoT middleware Application services module IPSM - semantic mediator INTER-LAYER security module INTER-FW SDK INTER-LAYER platform
Different mechanisms of integration	The platform will offer different mechanisms of integration.	INTER-LAYER
Multi-layer approach	The customer has more possibilities.	INTER-LAYER
Access to multiple IoT Platforms	This access will make possible to reuse and exchange heterogeneous services from the different IoT platforms and allow application developers to produce new added value services from existing IoT services.	INTER-IoT physical Gateway INTER-IoT Virtual Gateway SDN Component SDR component INTER-IoT middleware Application services module IPSM - semantic mediator INTER-LAYER security module INTER-FW SDK INTER-LAYER platform
Replicability	The solution can be implemented in all types of domains.	INTER-FW framework INTER-Health
Open source community	The INTER-IoT consortium is jointly committed to build a strong, extensible open-source sustainable community based on the architecture of INTER-IoT and its outputs through and Open API and Open platform. To provide benefit to the European member states and their citizens at large.	INTER-Framework
Simplicity	Easy to use by ecosystem of entrepreneurs and developers through the INTER-FW (API/SDK)	INTER-FW framework INTER-FW SDK INTER-METH CASE Tool

		INTER-IoT Transportation support platform
		INTER-IoT health platform
		INTER-IoT Cross-domain solutions
		INTER-LAYER platform
		INTER-IoT platform
Easy access to that for companies developing services	Easy to use by ecosystem of entrepreneurs and developers through the INTER-FW (API/SDK)	INTER-Framework INTER-Health INTER-LogP
Critical mass for IoT	INTER-IoT open source community will be part of the critical mass for IoT Ecosystem	INTER-FW framework
Extendibility	Fewer dependencies during development and well as reduced coupling and more cohesive abstractions, plus well-defined interfaces.	INTER-FW framework
Assists others to achieve interoperability at different layers	(Semi)automation of application of the INTER-FW framework for making heterogeneous IoT platforms interoperate, and guide the process.	INTER-FW framework INTER-FW SDK INTER-METH CASE Tool
INTER-IoT methodology	Adding value to all products by providing a consistent global methodology.	INTER-METH methodology book INTER-METH Training schemes INTER-METH CASE Tool
Global API	Access to information, configuration and performance is done through a single API, facilitating its use.	INTER-FW framework INTER-FW SDK
Access to public data	Companies can easily publish public data available to everyone.	INTER-FW framework INTER-LAYER Platform
Low cost	Reduced cost at appliance lifecycle (purchase, operation, maintenance, and refresh cycles) and the Total Cost of Ownership (TCO) optimisation	INTER-IoT physical Gateway INTER-IoT Virtual Gateway SDN Component SDR component INTER-IoT middleware Application services module IPSM - semantic mediator INTER-LAYER security module INTER-LAYER platform
Versatile and scalable	The solutions are capable of adapt themselves for many domains and to include new elements into the deployment.	INTER-LAYER platform INTER-FW framework INTER-FW SDK INTER- METH Case Tool

Table 4: Value Proposition

We can observe in the table above a number of value propositions extracted from the project with process already mentioned. In the middle column, we have identified what they consist of, with a definition of this value and its impact in the market looking ahead. Finally, in the last column, we select the product or products, identified as outputs from the project that better accomplish the proposed value.

3.3 Technology and candidate products

In this section, the innovations assets and individual product definitions of INTER-IoT are described. Having the value proposition that we want to offer, and identifying the products that will ensure this value, we create an analysis of these products. These exploitable products will be tracked during the lifecycle of the project in order to guide the partners to develop them with the goal of achieving a future successful exploitation in M32 and beyond the end of the project, when the commercialization phase begins.

An applied technology or service becomes a product, in a manner that several technologies can be combined to create a specific product. For that reason, we have divided the exploitation results into technologies and products that are going to be analysed in the following sections.

3.3.1 Technology

The wide variety of technology produced in the context of the INTER-IoT project needs to be structured to track the IPRs it depends on, as well as to properly define services and solutions that can be taken to the market. These technologies will be considered in the future as a product or they will compose a product working together with other technologies. In the following table, we describe all the technology items identified in the context of this project:

Technology	
Item #T1	Technology item: **D2D (device to device) interoperability: Interoperability at device level** Exploitable results: **INTER-IoT Gateway composed of INTER-LAYER physical gateway, INTER-LAYER virtual gateway.** Main Features: **Interoperability at device level implies that** **(i) heterogeneous IoT devices are able to interact with each other;** **(ii) heterogeneous IoT devices can be accessed through a unifying interface;** **(iii) heterogeneous IoT devices can be integrated into any IoT platform.** **Providing interoperability and integration at device level with two different approaches: gateway-based and virtualization. Ensuring reliability, security, and trust.** Building block: **INTER-LAYER** Dependency: **none** Leading partner: **UPV** WP/Task: **WP3/T3.1**
Item #T2	Technology item: **N2N (network to network) interoperability: Interoperability at network level** Exploitable results: **SDN Component, SDR component** Main Features: **(i) Virtualisation of network services by using SDN (Software Defined Network) approach and OpenFlow protocol: The services offered at this layer will include routing algorithms based on typical routing protocols (OSPF, RIP, etc.) and variations for IoT traffic, storage of the network topology and state of the elements that compose the network, topology discovery and management, host tracking, packets statistics to know information about the type of traffic and security.** **(ii) SDR (Software Defined Radio) component: This INTER-IoT SDR component will be developed to provide an additional entry point in the Access Network Controller Modules section of the physical plane of the INTER-IoT gateway. The flexibility of this technology means that the applications to utilizing this feature are still to be defined. It is envisioned that as the technology develops and becomes less expensive, specific use cases will become more apparent.** Building block: **INTER-LAYER** Dependency: **none** Leading partner: **RINI** WP/Task: **WP3/T3.2**

Item #T3	Technology item: **MW2MW (middleware to middleware) interoperability: Interoperability at middleware level** Exploitable results: **INTER-IoT middleware + bridges for specific platforms** Main Features: **Interoperability at the middleware layer is achieved through establishment of an abstraction layer and subsequent attachment of all platforms to it. These attachments are established using bridges abstraction layer. This way we avoid the need to interconnect all platforms among themselves, instead connecting them directly to the abstraction layer and providing a mechanism for their communication within this layer.** Building block: **INTER-LAYER** Dependency: **none** Leading partner: **XLAB** WP/Task: **WP3/T3.3**
Item #T4	Technology item: **AS2AS (Application Service layer interoperability)** Exploitable results: **Orchestrator for service composition, Flow based programming module and API to provide interoperability** Main Features: **Making it possible to reuse and exchange heterogeneous services from the different IoT platforms and allow application developers to produce new added value services from existing IoT services.** Building block: **INTER-LAYER** Dependency: **none** Leading partner: **UPV** WP/Task: **WP3/T3.4**
Item #T5	Technology item: **DS2DS (Data & Semantic layer interoperability)** Exploitable results: **IPSM module (Inter Platform Semantic Mediator)** Main Features: **Common interpretation of data and information among different IoT systems and heterogeneous data sources, to achieve semantic interoperability.** Building block: **INTER-LAYER** Dependency: **none** Leading partner: **SRIPAS** WP/Task: **WP3/T3.5**
Item #T6	Technology item: **Cross-layer interoperability** Exploitable results: **INTER-LAYER security module** Main Features: **Definition of modules in progress. For now, we defined the need to implement security across all layers** Building block: **INTER-LAYER** Dependency: **none** Leading partner: **UPV** WP/Task: **WP3/T3.6**
Item #T7	Technology item: **INTER-FW (INTER Framework): interoperable framework web application, API, and engine** Exploitable results: **INTER-FW Web application, INTER-FW Engine, INTER-FW API** Main Features: **Fundamental infrastructure and tools through which the integration of heterogeneous IoT platforms can be fully enabled. INTER-FW relies on modules produced in WP3 (D2D, N2N, MW2MW, AS2AS, IPSM, Security)** Building block: **INTER-FW** Dependency: **INTER-LAYER** Leading partner: **PRO** WP/Task: **WP4/T4.3, T4.4, T4.5**
Item #T8	Technology item: **INTER-FW SDK** Exploitable results: **INTER-FW SDK** Main Features: **A Software Development Kit to allow extensibility of INTER-IoT (new modules, integration of new platforms etc.)** Building block: **INTER-FW** Dependency: **INTER-LAYER** Leading partner: **PRO** WP/Task: **WP4/T4.3, T4.4, T4.5**
Item #T9	Technology item: **INTER-METH CASE Tool** Exploitable results: **INTER-METH CASE Tool** Main Features: **CASE tool for Automated Application of INTER-METH**

	Methodology Building block: **INTER-METH** Dependency: **INTER-FW** Leading partner: **UNICAL** WP/Task: **WP5/T5.2, T5.3**
Item #T10	Technology item: **INTER-LogP: Transportation IoT solution** Exploitable results: **Transportation pilot prototype** Main Features: **Services to be integrated in the platform consist of port logistics and passenger intelligent mobility services, among which: services for truck drivers, services connected to the local appointment system, services for planning and managing warehouse resources on the terminals as well as improved tracking systems for containers (e.g. IMO and Reefer), AGV or specific vehicles.** Building block: **INTER-LogP** Dependency: **INTER-LAYER, INTER-FW, INTER-METH** Leading partner: **VPF** WP/Task: **WP6/T6.2**
Item #T11	Technology item: **INTER-Health: m-Health IoT solution** Exploitable results: **m-Health pilot prototype** Main Features: **Services to be integrated in the platform consist of remote health-care services and wearable systems-based health-care services in mobility, among which: remote medical measurements, local mobile physical detection and processing, and on-line and off-line analysis of lifestyle data.** Building block: **INTER-Health** Dependency: **INTER-LAYER, INTER-FW, INTER-METH** Leading partner: **SABIEN** WP/Task: **WP6/T6.3**
Item #T12	Technology item: **Cross Use Case Pilot: INTER-LogP + INTER-Health** Exploitable results: **Cross-domain pilot prototype** Main Features: **Services to be integrated in the platform will consist of remote services and smart sensor system services in mobility, among which: remote measurements, local mobile physical detection, real-time analysis of different parameters and processing, and on-line and off-line analysis of meta-data.** Building block: **INTER-Domain** Dependency: **INTER-Health, INTER-LogP, INTER-METH** Leading partner: **NEWAYS** WP/Task: **WP6/T6.4**

Table 5: Technology

In this summary, we identify until twelve technological items INTER-IoT will provide at the end of the project duration. Observe that these items are directly related with some of the packages developed during the project. So that, items from one to six correspond to the directly obtaining of the work performed in work package 3, INTER-Layer. Items seven and eight are extracted form INTER-Framework developments, meanwhile nine correspond to the output of INTER-METH duties. Finally, the three last items are directly related with the pilots carried out in the work package six of the project.

Accordingly, each item will be monitored and build in different stages of the project being design developed and test in a frame and context according to the technology.

3.3.2 Candidate Products

After the previous description of the INTER-IoT detailed identification and description of the developed technology, the product definitions consider the potential of some of its components settled together, coordinated with market trends and competition analysis as described in D2.1, the next section and, in greater detail, in the following version of this deliverable for M30. The definition of the product has been influenced by discussions with key stakeholders from the application domains considered in the project, IoT-EPI, Advisory Board, and different inputs like the Open Call.

In the following table, we describe all the applied technologies identified for exploitation in the context of this project that will become an isolated product or service. This list of products is provided as it is in M18. During the second half of the project, new products as an application of INTER-IoT technology may come out, others may lose interest and some of them could be merged in a single product. The list of products and marketable assets is:

Products	
Solution #P1	**Exploitable result type**: Product, Academic **Features Overview**: INTER-IoT methodology **Modules and results used**: WP5 results **Exploitable results**: INTER-METH methodology book **Building Blocks**: INTER-METH **Responsible partner**: UNICAL
Solution #P2	**Exploitable result type**: Academic **Features Overview**: INTER-IoT methodology **Modules and results used**: WP5 results, INTER-METH CASE Tool **Exploitable results**: INTER-METH Training schemes **Building Blocks**: INTER-METH **Responsible partner**: UNICAL
Solution #P3	**Exploitable result type**: Consultancy, Training, Product, Academic **Features Overview**: CASE tool for Automated Application of INTER-METH Methodology **Modules and results used**: INTER-METH CASE Tool **Exploitable results**: INTER-METH CASE Tool **Building Blocks**: INTER-METH **Responsible partner**: UNICAL
Solution #P4	**Exploitable result type**: Product **Features Overview**: Providing interoperability and integration at device level - gateway-based. **Modules and results used**: Physical gateway **Exploitable results**: INTER-IoT physical Gateway **Building Blocks**: INTER-LAYER **Responsible partner**: UPV
Solution #P5	**Exploitable result type**: Product, Cloud service **Features Overview**: Providing interoperability and integration at device level - virtualization. Provided as product or subscription-based cloud service. **Modules and results used**: Virtual gateway **Exploitable results**: INTER-IoT Virtual Gateway **Building Blocks**: INTER-LAYER **Responsible partner**: UPV
Solution #P6	**Exploitable result type**: Product, Cloud service? **Features Overview**: Virtualisation of network services using SDN (Software Defined Network) approach and OpenFlow protocol: The services offered at this layer will include routing with QoS prioritization and variations for IoT traffic, topology discovery and storage, information about the state of the elements that compose the network and its management, packets statistics, to know information about the type of traffic, and security. **Modules and results used**: SDN Component **Exploitable results**: SDN Component **Building Blocks**: INTER-LAYER **Responsible partner**: RINI
Solution #P7	**Exploitable result type**: Product, Cloud service? **Features Overview**: (i) Virtualisation of network services by using SDN (Software Defined Network) approach and OpenFlow protocol: The services offered at this layer will include routing algorithms based on typical routing protocols (OSPF, RIP, etc.) and variations for IoT traffic, storage of the network topology and state of the elements that compose the network, topology discovery and management, host tracking, packets statistics to know information about the type of traffic and security. (ii) SDR (Software Defined Radio) component: This INTER-IoT SDR component

	will be developed to provide an additional entry point in the Access Network Controller Modules section of the physical plane of the INTER-IoT gateway. The flexibility of this technology means that the applications to utilizing this feature are still to be defined. It is envisioned that as the technology develops and becomes less expensive, specific use cases will become more apparent. **Modules and results used**: SDR component **Exploitable results**: SDR component **Building Blocks**: INTER-LAYER **Responsible partner**: RINI
Solution #P8	**Exploitable result type**: Product, Cloud service **Features Overview**: Provision of the middleware component as product to be deployed by users. It can also be provided as subscription-based cloud service. **Modules and results used**: INTER-IoT middleware + bridges for specific platforms **Exploitable results**: INTER-IoT middleware **Building Blocks**: INTER-LAYER Responsible partner: XLAB
Solution #P9	**Exploitable result type**: Product, Cloud service **Features Overview**: Making it possible to reuse and exchange heterogeneous services from the different IoT platforms and allow application developers to produce new added value services from existing IoT services. **Modules and results used**: Orchestrator for service composition, Flow based programming module and API to provide interoperability **Exploitable results**: Application services module **Building Blocks**: INTER-LAYER **Responsible partner**: UPV
Solution #P10	**Exploitable result type**: Consultancy, training, Product, Cloud service **Features Overview**: Common interpretation of data and information among different IoT systems and heterogeneous data sources, to achieve semantic interoperability. **Modules and results use**d: IPSM module **Exploitable results**: IPSM - semantic mediator **Building Blocks**: INTER-LAYER **Responsible partner**: SRIPAS
Solution #P11	**Exploitable result type**: Product, Cloud service? **Features Overview**: Definition of modules in progress. For now, we defined the need to implement security across all layers **Modules and results used**: INTER-LAYER security module **Exploitable results**: INTER-LAYER security module **Building Blocks**: INTER-LAYER **Responsible partner**: UPV
Solution #P12	**Exploitable result type**: Product **Features Overview**: Fundamental infrastructure and tools through which the integration of heterogeneous IoT platforms can be fully enabled. INTER-FW relies on modules produced in WP3 (D2D, N2N, MW2MW, AS2AS, IPSM, Security) **Modules and results used**: INTER-FW Engine, INTER-FW API **Exploitable results**: INTER-FW framework **Building Blocks**: INTER-LAYER **Responsible partner**: PRO
Solution #P13	**Exploitable result type**: Product, Cloud service **Features Overview**: Fundamental infrastructure and tools through which the integration of heterogeneous IoT platforms can be fully enabled. INTER-FW relies on modules produced in WP3 (D2D, N2N, MW2MW, AS2AS, IPSM, Security) **Modules and results used**: INTER-FW Web application, INTER-FW Engine + INTER-FW API+ INTER-LAYER **Exploitable results**: INTER-FW **Building Blocks**: INTER-LAYER **Responsible partner**: PRO

Solution #P14	**Exploitable result type**: Consultancy, training, Product **Features Overview**: A Software Development Kit to allow extensibility of INTER-IoT (new modules, integration of new platforms etc.) **Modules and results used**: INTER-FW SDK **Exploitable results**: INTER-FW SDK **Building Blocks**: INTER-LAYER **Responsible partner**: PRO
Solution #P15	**Exploitable result type**: Consultancy, training, Product **Features Overview**: Services to be integrated in the platform consist of port logistics and passenger intelligent mobility services, among which: services for truck drivers, services connected to the local appointment system, services for planning and managing warehouse resources on the terminals as well as improved tracking systems for containers (e.g. IMO and Reefer), AGV or specific vehicles. **Modules and results used**: Transportation pilot prototype **Exploitable results**: INTER-IoT Transportation support platform **Building Blocks**: INTER-LogP **Responsible partner**: VPF
Solution #P16	**Exploitable result type**: Consultancy, training, Academic **Features Overview**: This will be a service development work to deploy an integrated platform consisting of the remote health-care services and wearable systems-based health-care services in mobility, which will entail: remote medical measurements, local mobile physical detection and processing, and on-line and off-line analysis of lifestyle data. This won't be a product but a service for the integration of such technologies in clinical settings/services. **Modules and results used**: m-Health pilot prototype **Exploitable results**: INTER-IoT Health platform **Building Blocks**: INTER-Health **Responsible partner**: SABIEN
Solution #P17	**Exploitable result type**: Consultancy, training, Product, Academic **Features Overview**: The mobile application and the web dashboard to perform a remote management with the connected wearable sensors and with a direct streamline with the nutritional status health managers (doctors and nurses) in the ASLTO5 clinical centre. **Modules and results used**: m-Health pilot prototype **Exploitable results**: INTER-Health RemoteCare App **Building Blocks**: INTER-Health **Responsible partner**: SABIEN
Solution #P18	**Exploitable result type**: Product, Academic **Features Overview**: Drivers and logic layers developed to interconnect wearable sensors to the mobile app and the professional web tool. **Modules and results used**: m-Health pilot prototype **Exploitable results**: INTER-Health Connectors **Building Blocks**: INTER-Health **Responsible partner**: SABIEN
Solution #P19	**Exploitable result type**: Consultancy, training **Features Overview**: Services to be integrated in the platform will consist of remote services and smart sensor system services in mobility, among which: remote measurements, local mobile physical detection, real-time analysis of different parameters and processing, and on-line and off-line analysis of meta-data. **Modules and results used**: Cross-domain pilot prototype **Exploitable results**: INTER-IoT Cross-domain solutions **Building Blocks**: INTER-Domain **Responsible partner**: NEWAYS
Solution #P20	**Exploitable result type**: Consultancy, training, Product, Cloud service **Features Overview**: A complete interoperability solution to interconnect heterogeneous platforms. This can be provided as set of modules to be deployed by clients or as a cloud service **Modules and results used**: All INTER-LAYER

	Exploitable results: INTER-LAYER platform **Building Blocks**: All INTER-LAYER **Responsible partner**: UPV
Solution #P21	**Exploitable result type**: Consultancy, training, Product, Cloud service **Features Overview**: Can be provided as set of modules to be deployed by clients or as a cloud service **Modules and results used**: All INTER-IoT: LAYER, FW, METH **Exploitable results**: INTER-IoT platform **Building Blocks**: All Responsible partner: All
Solution #P22	**Exploitable result type**: Consultancy, training, Academic **Features Overview**: University course focused on IoT and INTER-IoT **Modules and results used**: All INTER-IoT **Exploitable results**: IoT course **Building Blocks**: All **Responsible partner**: Academic
Solution #P23	**Exploitable result type**: Consultancy, Training, Product, Academic **Features Overview**: Methodology and CASE tool to support the process to achieve semantic interoperability. **Modules and results used**: INTER-CASE tool, WP5 results **Exploitable results**: INTER-CASE tool for Semantic analysis **Building Blocks**: INTER-METH **Responsible partner**: SRIPAS
Solution #P24	**Exploitable result type**: Academic **Features Overview**: Design patterns for interoperable IoT Platforms. **Modules and results used**: INTER-METH **Exploitable results**: INTER-METH Design Guide **Building Blocks**: INTER-METH **Responsible partner**: SRIPAS
Solution #P25	**Exploitable result type**: Academic **Features Overview**: Reference Meta-Data Model for Interoperable IoT Platforms. **Modules and results used**: WP4 results **Exploitable results**: Reference Meta-Data Model **Building Blocks**: INTER-FW **Responsible partner**: SRIPAS

Table 6: Products

The solutions provided by this table will be further analysed in more detail under the context of the marketing analysis. These solutions are the immediate obtained from the technologies identified before but, in the duration of the project maybe some other solutions can be identified and added to the already obtained ones. All these improvements are presented in the following subsection.

3.4 Business development per product layer

Analysing the technologies and solutions obtained in the previous sections it is clear that they have a direct connection with the different layers of the IoT reference model. Even if some solutions are composed by more than one technology, they will affect specific layers of this stack. These layers correspond to different tiers of an IoT deployment, each one with its approach and technologies. Moreover, the target market and corresponding customers can be very different for each of these technology options setups into products and services. For these reasons, each one has a specific business model. These business models can be found on deliverable D2.2 and, together with D2.1 and D2.3, creating the whole marketing and business environment that this deliverable is based on. The different categories of IoT business models are focused to distribute different levels of adoption of IoT technologies. This business strategy is additionally, the one followed by Unify-IoT and the projects involved by IoT-EPI in their different assignments.

We have to keep in mind, that IoT ecosystems have a very intricate value chains due to its influence and repercussion on a large number of processes over the IoT architecture. However, in the following points we will try to establish the relationship between different layers of the IoT business model and the products that can be included in these models. Also, we will identify the exploitation carried out by each product depending on the business model layer.

3.4.1 Device Layer

This layer composes all physical hardware and the virtualization of this hardware that can be exploited with or without infrastructure. In this, is not mandatory to have cloud service but the first step is to build a whole interoperable structure. The business model on this layer is really tight to the market domain, due to the constraint that physical devices provide. Thus, the exploitation approach has to be in concordance with the use case. The products identified for this layer are:

- o #P4 - INTER-IoT physical Gateway
- o #P5 - INTER-IoT Virtual Gateway
- o #P7 - SDR component

3.4.2 Network Layer

In this layer the elements are identified that are needed for the communication between lower layers and upper ones, where the applications and cloud services are located. This layer, normally managed by telecommunications operators, can be also controlled by the client itself, creating a new business model where local networks have to compete and share resources with public ones. Due to the principal role of the communications on each one of the IoT deployments, the company value creation is most of the times an interaction between the physical/sensor layer and the network layer, trying to link the physical legacy system to modern IoT platforms that have fast-evolution and changing nature. For that reason, between the products identified at this layer we include the virtual part of the gateway together with the SDN network component as a main pillar of the communications system:

- o #P5 - INTER-IoT Virtual Gateway
- o #P6 - SDN Component

3.4.3 Middleware Layer

This layer composes the main sellable product that can compete with many other solutions due to its numerous services already implemented in distributed IoT platform. The main advantage of this solution is the addition of all these services in other platforms to be used in concordance with those implemented in the middleware. This product includes processing, storage, and data management utilities together with bridges that connect with several other utilities located in the platforms that are being interoperated. The business models corresponding to this layer are mainly focused in the revenue, having direct and indirect revenue. In the case of Open Source solutions, other revenues based on financing support for developers exist and are expected from the community management. Of course, the utilities provided by this layer fall into the distribution model *aaS* (as a service) - concretely PaaS (platform as a service) and IaaS (Infrastructure as a service) - locating the resources merely in the cloud and providing a distributed and remote interoperability and data support.

- o #P8 - INTER-IoT middleware

3.4.4 Semantic Layer

The semantic layer is one of those added values, basic for any IoT deployment. As ontologies and data models are needed for IoT device and data description and contextualization. Even if the data

bases and model used to be located are the top of the stack, within the platform, these data models are used in all layers and provide contextualisation to information from all tiers. The business model applied for the middleware layer can be used in this one but with the specification of competitors in the semantic and data fields. The product identified for this layer is:

- o #P10 - IPSM - semantic mediator

3.4.5 Collaboration/Transversal Layer

Collaboration and transversal layer: finally, the tasks related to security, configuration, access control, help tools, documentation, and some management function, are not tied to any specific layer but work within all of them. Those are transversal functions that are a must in any IoT deployment even if it does not encompass all layers. The products identified in these sections are:

#P11 - LAYER security module

#P12 - INTER-FW framework

#P14 - INTER-FW SDK

3.4.6 Application and Service Layer

Being one of the top layers on the IoT stack, it is the one who has less compromise with the underground technological elements but is still mainly focused in specific domains. Even if the technologies used in this layer are more homogeneous and can be used for IoT application and for general purpose applications, most of them are really use case specific. For that reason, even if the market to compete with is the general market of software applications, depending of the type and extension of the app, specific and potential competitors are identified. Over and above, the business model performed at this layer includes the transition from a conventional linear value model, to a value creation model where stakeholders provide the ecosystem and requirements to build these applications. Again, the utilities provided by this layer are normally located on the Cloud with the aaS distribution model, concretely: SaaS (software as a service). The product identified for this layer is:

- o #P9 - Application services module
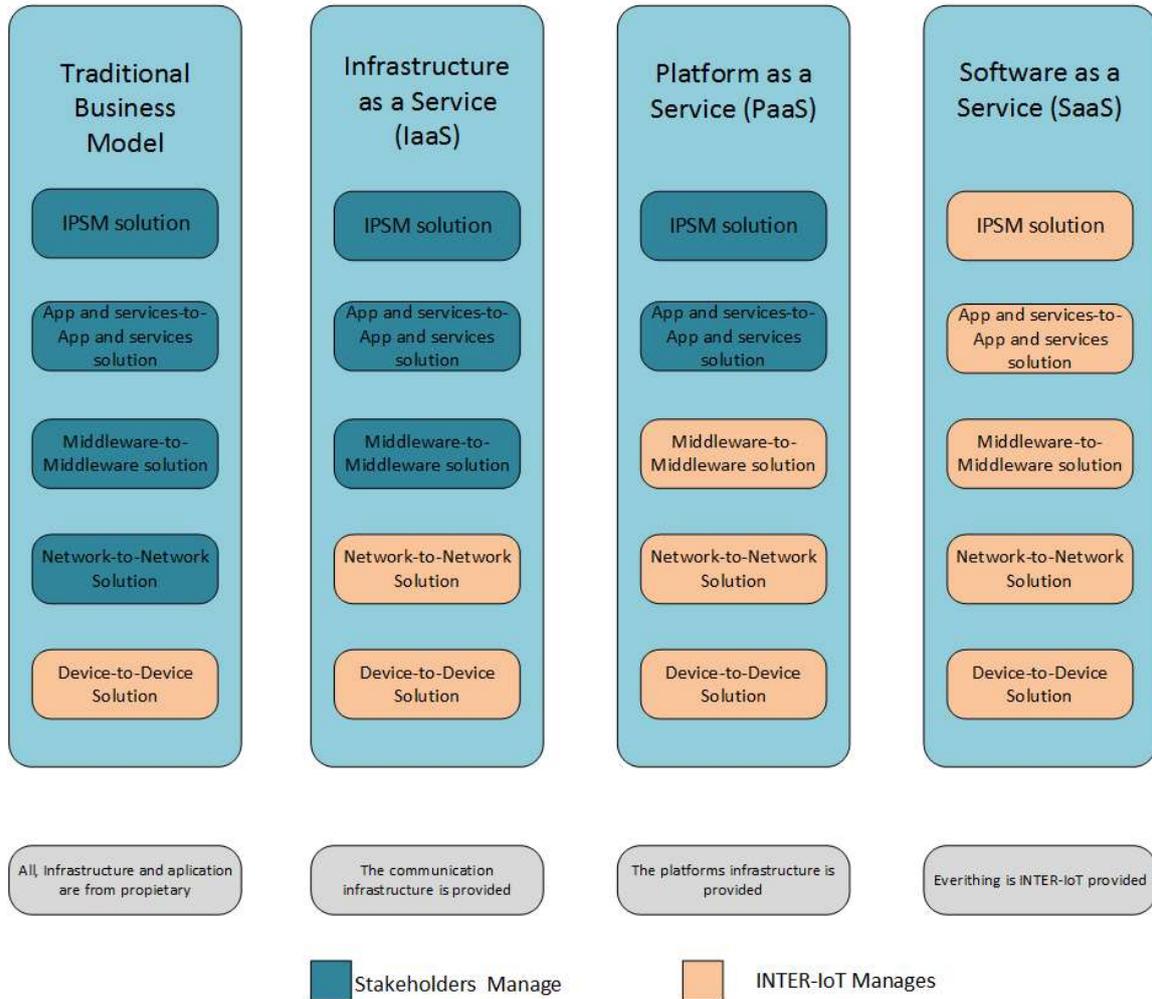
Figure 7: INTER-IoT as a Service.

An example of inclusion of INTER-IoT layered approach in the business model *as a service* can be observed in Figure 7. Furthermore, several solutions provide technologies from different layers, maybe not all of them but some, facing a market wider niche and with the combination of the business models previously defined. This layer combination solutions are the following:

- o #P15 - INTER-IoT Transportation support platform
- o #P16 - INTER-IoT Health platform
- o #P17 - INTER-Health RemoteCare App
- o #P18 - INTER-Health Connectors
- o #P19 - INTER-IoT Cross-domain solutions
- o #P20 - INTER-LAYER platform
- o #P21 - INTER-IoT platform

And finally, services not directly tied to any layer that provide added value in the adoption and implementation of INTER-IoT solutions are:

- o #P1 - INTER-METH methodology book
- o #P2 - INTER-METH Training schemes
- o #P3 - INTER-METH CASE Tool

Even though there are defined business models for each layer or even for each product, the increase revenue potential offered by complex multidisciplinary and technological heterogeneous IoT applications require that IoT stakeholders work together to deliver on the promise of IoT. All the solutions provided by the project pretend to overcome the vertical established market and attempt to exploit horizontal markets with different IoT business domains. In section 7, a market analysis will be performed to situate our solution within the market frame, research about the tendency and future trends and compare them with other competitors' solutions.

3.5 Product Development

In the following we focused on the four products selected by the INTER-IoT Consortium to be further explored. This decision was taken in January 2017 at the Plenary in Paris, due to their observed maturity and consequently smaller time-to-market. This will not only be a natural follow-up of Section 3.4, but it will also sync with the work developed over early business modelling at D2.2. We shall start by providing the adopted methodology for product definition, followed by the analysis of each of the four selected products.

3.5.1 Methodology

As mentioned above we focused on the product development of the items that according to the Consortium are soon to be market-ready. This development was guided by the following exploitation actions (lead by XLAB):

1. Define the candidate products based on IP, technology, dependencies, and exploitable results;

2. have the products in (1) reviewed, discussed, and approved by the Consortium;

3. assign product leads to each product and relevant component/sub-product (when applicable);

4. review existing details of exploitable results, IP, and product know-how;

5. prepare the interview template to be carried out with the product leads;

6. perform interviews with product leads through dedicated teleconference calls;

7. perform interviews with relevant component leads (e.g. IPSM and SDR);

8. transcript all interviews and submit them back to the interviewed for revision and approval;

9. extract and compile structured information for each product according to template (e.g. BMC, LLAVA Matrix, SWOT), and draw a representative schema;

10. request further info from interviewed by email/telco (e.g. focused market assessment update);

11. put together the bulk of product definition in line with the Inter-IoT exploitation strategy;

12. Have (11) approved by the Consortium and published in confidential deliverable;

The interviews with product leads where done in the following dates:

1. Giancarlo Fortino (UNICAL): 26.4.2018
2. Amelia del Rey, Miguel Ángel LLorente Carmona (PRO): 23.4.2018 and 30.4.2018
3. Flavio Fuart (XLAB): 23.4.2018
4. Carlos, Eneko (UPV): 23.4.2018 and 5.9.2018
5. Eric Carlsson (RINI): 30.5.2018
6. Katarzyna Wasielewska, and Pawel (SRIPAS): 1.6.2018

The reviewed transcripts of the mentioned interviews will not be released at this point but can be accessible per request.

The information extracted from these interviews, combined with the one from the project documentation, permitted us to build a representative high-level schema, and the specific BMC, SWOT. We also applied the LLAVA Matrix methodology, linking the obtained results with the global methodology proposed in this document. Furthermore, we have also applied the lean BMC retracting the lean product development nature in INTER-IoT.

3.5.2 INTER-IOT GATEWAY

Identification

- Name: INTER-IOT GATEWAY (Gateway)
- Lead: UPV
- Contact: Carlos Palau <cpalau@dcom.upv.es>
- Technical information source: https://docs2.inter-iot.eu/docs/hub/latest/
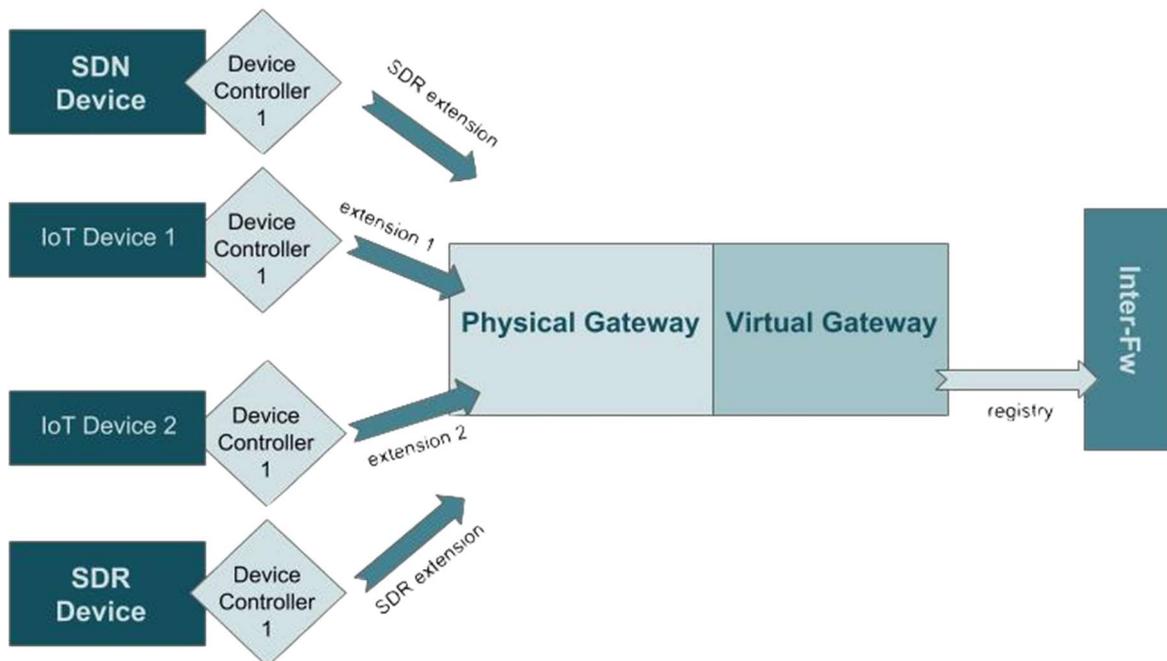
Figure 8: INTER-IoT Gateway

Technology highlights and key selling points

The INTER-IOT GATEWAY is divided in 2 components that the user must install (the version without SDN and SDR): the physical part and the virtual part (2 installers), and then opt to install all the extensions needed. There will be one installer (command line) to install the gateway (you can choose version, physical/virtual) and also the extensions (you list the extensions, version, etc.). But only one installer. There will be also the possibility of downloading a gateway distribution from a webpage. A feature of high potential is the ability to control from a single screen, assets from

different sources, connecting devices with services, services-services and so on. Essentially, it is asset management visualisation. This is very marketable and easy to explain to customer.

With INTER-IOT GATEWAY the market is huge, including every company that needs IoT interoperability at the device level (e.g. military, smart factories, smart agriculture, etc). There is potential in identified niche market segments that need to be closer to the developers, to provide the support and customization that the big players cannot provide. It is very difficult to put a price tag in the SDN component, relating to a new market, with price varying a lot (probably stabilizing in the following 3y).

The INTER-IOT GATEWAY can be run independently from any other Inter-IoT product, but if the user also acquires the Inter-FW (s)he can run the gateway from there, but with the same configuration, screens, etc. The Inter-FW enables the user to manage everything from the same place. Surely, the INTER-FW can also be used without the gateway.

Open Source Community

The user has extensions for each device controller, made available by the Inter-IoT team. There will be a repository of extensions feeding the user base, with the possibility of making new extensions. The customer can develop its own extensions if they are not available, in the context of OSS contribution through an open repository and an XML format. That will enable input of the Open Source Community. There are extensions common to both the physical and virtual part (e.g. the command line tool). On the other hand, examples of extensions of virtual components are the extensions to connect with the FIWARE or the Middleware, to have an API in the gateway, etc.

An SDK to develop Gateway extension is available as well, with which the user can generate specific templates (through maven archetypes) to develop extensions for the virtual or physical part or extensions that run on both parts. Both physical and virtual (cloud) can be deployed in premises. The cloud version can permit the notion of *gateway-as-a-service*.

If the gateway has the API extension loaded, a Graphical User Interface will be also available, and it can be connected to INTER-FW in order to have a single place to configure and manage the INTER-IoT environment. Documentation for installation and configuration will be available online as planned, by the end of the project.

In general, INTER-IoT aims to be independent of the hardware used by the customer. There is a command line installer and search extensions available, pre-package some configurations, etc. Not need of much expertise is required. With some expertise on Java one is also able to program an extension, supported by the archetypes and documentation developed within Inter-IoT. To develop extensions for common line tools or private APIs the developer needs consulting.

Commercialization and exploitation potential

There will be also the possibility of private repositories for premium extensions. The premium version of INTER-IOT GATEWAY will include the SDN extension deployment, where the user installs an extension to support the connection to SDN networks and to mark the priorities of packets and the SDN to recognize it. It could be extended to other "premium" extensions in the

future. Essentially, the SDN and SDR are extensions marking special the data in the networks giving it different priorities.

The SDN controller (premium) is designed to the stakeholder that needs an extension for an SDN controller to prioritise a sensor over all others, dropping packets that are marked as not important through an extension in the gateway. On the other hand, the SDR is as simple as having an extension that can recognize radio. There are very strong players in SDR throughout all Europe, making difficult the commercialization of the SDR component.

Main competitors and trends

Taking into account that there are no competitors (to our knowledge) to the Gateway + SDN concept, the following could still be considered in the competitor analysis:

Name	Open/Proprietary	Link
Ubiworx	Proprietary	https://ubiworx.com/
FogHorn	Proprietary	https://www.foghorn.io/
Bosch IoT Gateway	Proprietary	https://www.bosch-si.com/iot-platform/iot-platform/gateway/software.html
Eclipse Kura	Open	https://www.eclipse.org/kura/
AGILE	Open	http://agile-iot.eu/
IoTivity	Open	https://iotivity.org/

Table 7: Gateway potential competitors

The competitors that are commercial solutions, are very used in industry, while the ones that are OSS are still in development phase (but with quality).

Focus: SDR module commercialization

Essentially SDR is swapping some of the hardware components in the radio to software solutions optimizing efficiency, allowing better security, flexibility, etc. The contribution to the development of the SDR module is dependent on the user to have the specific hardware as development platform, and because of that it is not easy to get contribution from the general OSS community. The reason why we are developing it is because there are some RINI customers that expressed the interest on having an SDR solution (in the military, completely configurable).

The INTER-IOT GATEWAY is a nice addition to the SDR but for these customers the SDR is a much bigger product that the gateway. Having a connection into the INTER-IoT Gateway is a good add-on because if the customer has a desire to use the data transmitted via SDR in other systems connected to inter-IoT, the gateway provides this entry point. In the long run it is possible to implement in the SDR the INTER-IoT Gateway access network modules.

At the moment the SDR price is high, but in the long term with the prices going down the logistics are a good target market. But right now, due to configurability and budget, the military is the primary market. The SDR competition includes: Persistent Systems (persistent.com), TrellisWare (TrellisWare.com), SiLVUS (silvustechnologies.com), SeCom (SeCom.com.pl), Domo (domotactical.com) and Bittium (Bittium.com).

The documentation will include a block diagram showing the components available as open source, those that must be purchased or developed independently as they are commercially sensitive.

IP Foreground

Item	Owner	Dependency	IP Type	Protection	Confidentiality	IPR Exploitation Model
INTER-IoT Physical Gateway	Shared	PSM Module	Software	Copyright	None	Apache 2.0
INTER-IoT Virtual Gateway	Shared	INTER-Layer APIs	Software	Copyright	None	Apache 2.0
SDR component	RINI	None	Software	Copyright	None	Apache 2.0

Table 8: Gateway Foreground IP

Exploitable Results

Leading partner	WP/Task	Technology	INTER-IoT exploitable results	Main Features	Building block	Dependency
UPV	WP3/T3.4	AS2AS (Application Service layer interoperability)	Orchestrator for service composition, Flow based programming module and API to provide interoperability	Making it possible to reuse and exchange heterogeneous services from the different IoT platforms and allow application developers to produce new added value services from existing IoT services.	INTER-LAYER	
UPV	WP3/T3.1	D2D (device to device) interoperability: Interoperability at device level	INTER-IoT Gateway composed of INTER-LAYER physical gateway, INTER-	Interoperability at device level implies that (i) heterogeneous IoT devices are able to interact with each other; (ii) heterogeneous IoT	INTER-LAYER	

			LAYER virtual gateway	devices can be accessed through a unifying interface; (iii) heterogeneous IoT devices can be integrated into any IoT platform. Providing interoperability and integration at device level with two different approaches: gateway-based and virtualization. Ensuring reliability, security and trust.		
UPV	WP3/T3.2	N2N (network to network) interoperability: Interoperability at network level	SDR component	Virtualisation of network services by using SDN (Software Defined Network) approach and OpenFlow protocol: The services offered at this layer will include routing algorithms based on typical routing protocols (OSPF, RIP, etc.) and variations for IoT traffic, storage of the network topology and state of the elements that compose the network, topology discovery and management, host tracking, packets statistics to know information about the type of traffic and security.	INTER-LAYER	
RINI	WP3/T3.2	N2N (network to network) interoperability: Interoperability at network level	SDR component	SDR (Software Defined Radio) component: This INTER-IoT SDR component will be developed to provide an additional entry	INTER-LAYER	

				point in the Access Network Controller Modules section of the physical plane of the INTER-IoT gateway. The flexibility of this technology means that the applications to utilizing this feature are still to be defined. It is envisioned that as the technology develops and becomes less expensive, specific use cases will become more apparent.		

Table 9: Gateway exploitable results

LLAVA Matrix

Customer Segment	The INTER-IoT Gateway the market is huge, including every company that needs IoT interoperability at the device level: (1) military, (2) smart factories, (3) smart agriculture.
Common Need	Closer control of the IoT devices, sensors, and network
Value Promise	Enables the user to customize further the efficiency of the IoT devices to the specificities of their needs
Solution	A set of extensions connecting device controllers to the Inter-IoT physical and virtual gateway
Value Network	Inter-IoT Consortium
Alternatives	No direct competitor known, although some solutions are pointed out and need to be further analysed.
Willingness to Pay	Need or commodity, this is what still needs to be decided in the logic of acquiring the premium product.

Table 10: Gateway LLAVA Matrix

SWOT

Strength	Simplicity in integration of multiple IoT devices, facilitating their control
Weakness	Technology in development, no market assessment
Opportunity	No other solution in the market, OSS contribution

Threat	Lack of paying customers, overcome of tech giants

Table 11: Gateway SWOT

Lean Business Model Canvas

Problem	Get closer control of the IoT devices, sensors, and network
Unique Value Proposition	Enables the user to customize further the efficiency of the IoT devices to the Specificities of their needs
Solution	Physical/virtual gateway with IoT device extensions to get a closer and more controlled relation with the devices, including premium plugins for SDN and SDR
Channels	Inter-IoT marketing & sales, and OSS channels
Cost Structure	Pricing models not yet available
Revenue Streams	Commercialisation of SDN and SDR premium components, training, consultancy and customisation
Key metrics	Number of available and requested extensions, particularly for SDN and SDR, and consultancy requests
Unfair Advantages	Possible overcome of tech giants with the rising of IoT market

Table 12: Gateway Lean Business Model Canvas

3.5.3 INTER-MW

Identification

Name: INTER-MW (Middleware)

Lead: XLAB

Contact: Flavio Fuart <flavio.fuart@xlab.si>

Technical information source: https://docs2.inter-iot.eu/docs/intermw/latest/intro/architecture/
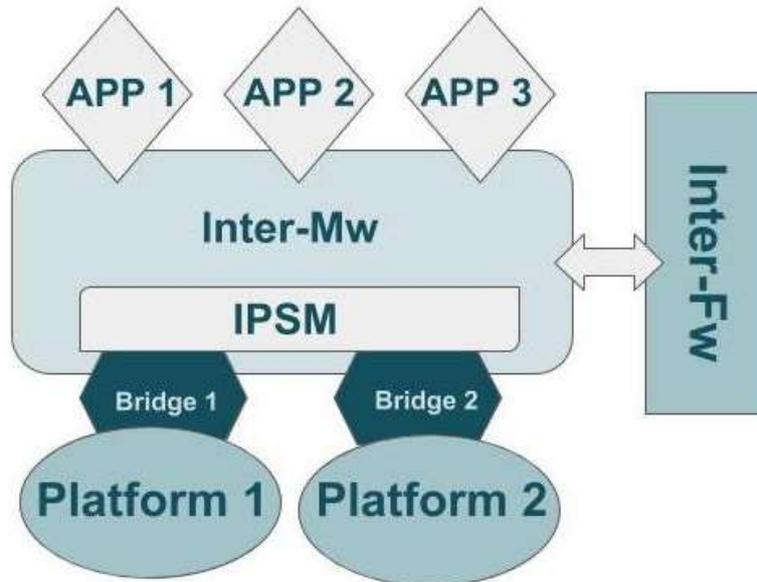
Figure 9: INTER-MW

Technology highlights and key selling points

The product helps to achieve the interoperability of heterogeneous IoT platforms, not the replacement of an IoT platform itself. It avoids the need of developing custom solutions each time we need to connect a new IoT platform, setting up things relatively easy (depending on aims). The middleware is a generic engine in Inter-IoT that allows this interoperability.

A bridge is the implementation of a low-level communication protocol, i.e., a specific piece of software that knows how to communicate with that specific platform through API and knows its protocol and data format. The IPSM is a semantic mediator, we can think of it as a translation engine between the platform (through the bridge) and the rest of the middleware. A semantic alignment defines the alignment between the ontology of the platform and the so-called global ontology of Inter-IoT (IPSM module). It is like a common language.

Besides the middleware we need 2 things of each platform: (i) to develop a bridge; and (ii) define a semantic alignment (IPSM module). If one is building an application on top of Inter-IoT (e.g. health or logistics appliances), the INTER-MW is the system that offers you a unified API to communicate with any platform. If you write your application once you don't have to redo it if you attach to it additional platforms.

The distinction between IPSM and Inter-Mw is due to the fact that INTER-IoT decouples syntax from semantics. Once the Inter-IoT use solves the issues with the low-level, then he/she needs to deal with semantics and that is where the IPSM has a fundamental role.

The potential customer is any company (or research institution) that wants to put together 2 or more IoT platforms.

Open Source Community

Including the open-calls, there are 6/7 bridges being developed, that will be available as pre-made bridges. That will also permit us to assess the level of difficulty and estimate the OSS community involvement. For IPSM is a bit different, as the user might have to change the alignments for the same IoT platform (same context but different semantics; e.g. an IoT platform deployed in a health context may have different semantic alignments than an IoT platform in manufacturing). This may require some work but if the client has the 6/7 bridges, so it should be straightforward.

Developing bridges needs some programming and knowledges in Inter-IoT but the documentation will be provided and made available online at the end of the duration of the project. A potential customer that does not see the bridge (s)he need can do it him(her)self through the OSS community engagement effort and technical documentation. It can also request the Inter-IoT Consortium to build it. Considering the bridges: some are generic (FIWARE, Eclipse OM2M are the bridges developed by the open calls); the bridges defined for the eHealth use-case are very specific (UniversALL and BodyCloud); and as such the bridges developed for the logistics use-case should also be specific.

Commercialization and exploitation potential

According to the point above there are 3-level access to a new bridge: (1) building it yourself using the documentation and framework provided to facilitate the OSS community contributions; (2) doing it with the (payed) support of the Inter-IoT Consortium (consultancy hour); and (3) requesting the Inter-IoT Consortium developers to do it (customization hour). Having the bridge, we can plug-n-play the platform and then we define the alignment with the IPSM (it is a fairly complex job, but SRIPAS made a lot of progress to provide a visual framework for that development).

We can present the available bridges through some kind of an online catalogue or marketplace, but this was not yet discussed. It is not yet clear if customized (payed) bridges are then made available open-source (in the sense of investment from the side of the commercial partner to make available the technology needed right away - agreeing with the Inter-IoT exploitation model/vision). By Apache 2.0 license we can do everything after an agreement with the customer.

To sell some open source bridges can also be done with double licensing. A bulk of bridges (e.g. eHealth focused) including new commercial bridges, can be sold as an eHealth product. This could also be provided as a service through cloud deployment over a paid subscription

Main competitors and trends

When searching for interoperability solutions at IoT Platforms level, reference to the six H2020 projects clustered under the IoT-EPI initiative (Including INTER-IoT) or a set of forecasts and "would be" frameworks are discovered, but no established or emerging products on the market. Nevertheless, the following are potential sources to identify competition and market trends:

- ○ https://www.rtinsights.com/in-2018-prepare-for-iot-interoperability/
- ○ https://www.networkworld.com/article/3204529/internet-of-things/interoperability-is-the-key-to-iot-success.html
- ○ https://www.rtinsights.com/iot-interoperability-and-connectivity-framework-iic/

- ○ https://www.computer.org/web/computingnow/archive/interoperability-in-the-internet-of-things-december-2016-introduction
- ○ https://ieeexplore.ieee.org/document/7819420/

Focus on IPSM

The IPSM is a component that can be used in the IoT domain as a semantic translator or RDF rewriter. The mechanisms inside it are wider than Inter-IoT and can translate between any two RDF graphs or semantics. The translation is message based, working in RDF with a few requirements, although being a quite generic tool. What is specific to Inter-IoT is the configuration of a set of alignments and the data put in. the mechanism and the tool itself does not depend on any Inter-IoT component

The general product IPSM becomes an Inter-IoT product in the context of this deployment specific runtime configuration, considering the Inter-IoT context of running the tool. The alignments of running the tool are different for eHealth and for ports, being case specific.

INTER-MW may require IPSM when the translation needs to be done. The INTER-MW is deployed together with IPSM under a single file in the new version, with already existing bridges and configuration to these. Having new bridges, the user needs to configure those new IPSM alignments. The time spent by the user depends on the level of expertise: need to specify the steps of the translation and understand the structure.

In WP5 is developing Inter-Case tool as a visual component to specify alignments. But it is hard to do in general. Though, several open call participants (Univ Trento and Univ Brussels) were successful, by themselves with simple instructions, but had RDF knowledge. The documentation that will be made available will also make it easier to develop your own alignments. There is a big potential for premium support and customization for building a specific alignment.

The IPSM module needs to be released open source under Apache 2.0, according to the INTER-IoT GA. The IPSM can also be used in apps done in the solutions and services layer. Some work has been done by SRIPAS in the exploitation of IPSM: SPRIPAS is already in contact with eHealth 7 and with one company that would like to collaborate to use or extend the tool (but no contract done yet). There is no confirmed plan of further exploitation but there is a clear intent of extension and further commercialization. Though, the medical domain is an already identified potential market. For every use-case with data integration at the RDF level, IPSM is applicable. Linked OpenData (very wide domain) is a clear case of usability for IPSM in general. The IPSM module is already prepared for that kind of work.

IP Foreground

Item	Owner	Dependency	IP Type	Protection	Confidentiality	IPR Exploitation Model
INTER-IoT Middleware + bridges	PRO (50%) XLAB SRIPAS VPF UPV	Dependency IPSM Module	Software	Intellectual Property		Apache 2.0? (XLAB) Exploitation agreement (XLAB) NO (VPF)

	UNICAL					
IPSM	SRIPAS	Software for the Inter Platform Semantic Mediator	Software	Intellectual Property		Apache 2.0

Table 13: IPSM Foreground IP

Exploitable Results

Leading partner	WP/Task	Technology	INTER-IoT exploitable results	Main Features	Building block	Dependency
XLAB	WP3/T3.3	MW2MW (middleware to middleware) interoperability: Interoperability at middleware level	INTER-IoT middleware + bridges for specific platforms	Interoperability at the middleware layer is achieved through establishment of an abstraction layer and subsequent attachment of all platforms to it. These attachments are established using bridges abstraction layer. This way we avoid the need to interconnect all platforms among themselves, instead connecting them directly to the abstraction layer and providing a mechanism for their communication within this layer.	INTER-LAYER	
SRIPAS	WP3/T3.5	DS2DS (Data & Semantic layer interoperability)	IPSM module (Inter Platform Semantic Mediator)	Common interpretation of data and information among different IoT systems and heterogeneous data sources, to achieve semantic interoperability.	INTER-LAYER	

Table 14: IPSM exploitable results

LLAVA Matrix

Customer Segment	The potential customer is any company (or research institution) that wants to put together 2 or more IoT platforms: (1) Private companies (2) IoT market (3) Smart Factory, (4) Smart City, (5) Smart Logistics, (6) Smart Hospitals
Common Need	The "plug-n-play" effect of connecting a new platform to a centrally integrated system making IoT platforms communicate with each other, and/or what they communicate to make sense when centralized
Value Promise	Interoperability and integration, connection of unconnected IoT platforms, access to multiple IoT Platforms, simplicity, OSS

Solution	IPSM module with 6/7 premade bridges, and a 3-level access to a new bridge: (1) building it yourself using the documentation and framework provided to facilitate the OSS community contributions; (2) doing it with the (payed) support of the Inter-IoT Consortium (consultancy hour); and (3) requesting the Inter-IoT Consortium developers to do it (customization hour)
Value Network	Due to its tech independency from other Inter-IoT products, XLAB (Inter-Mw + bridges) and SRIPAS (IPSM) are the partners with higher responsibilities in this business opportunity
Alternatives	Not known market and competitors
Willingness to Pay	Pricing models not yet available

Table 15: IPSM LLAVA Matrix

SWOT

Strength	Simplicity in integration of multiple IoT platforms, facilitating the communication between these platforms
Weakness	Technology in development, few bridges available, no market assessment
Opportunity	No other solution in the market, OSS contribution
Threat	Lack of paying customers, overcome of tech giants

Table 16: IPSM SWOT

Lean Business Model Canvas

Problem	To facilitate the "plug-n-play" of IoT platform interoperability
Unique Value Proposition	Enabling straightforward interoperability and integration, connecting unconnected IoT platforms, permitting the access to multiple IoT Platforms, with OSS contribution
Solution	IPSM module with 6/7 premade bridges, and a 3-level access to a new bridge: (1) building it yourself using the documentation and framework provided to facilitate the OSS community contributions; (2) doing it with the (payed) support of the Inter-IoT Consortium (consultancy hour); and (3) requesting the Inter-IoT Consortium developers to do it (customization hour)
Channels	Inter-IoT marketing & sales, and OSS channels
Cost Structure	Pricing models not yet available
Revenue Streams	Individual/bulk of bridges sold, consultancy and customization
Key metrics	Number of available and requested bridges, consultancy requests
Unfair Advantages	Possible overcome of tech giants with the rising of IoT market

Table 17: IPSM Lean Business Model Canvas

3.5.4 INTER-FW

Identification

Name: INTER-FW (Framework)

Lead: PRO

Contact: Amelia del Rey <adelrey@prodevelop.es>

Technical information source: https://docs2.inter-iot.eu/docs/hub/latest/
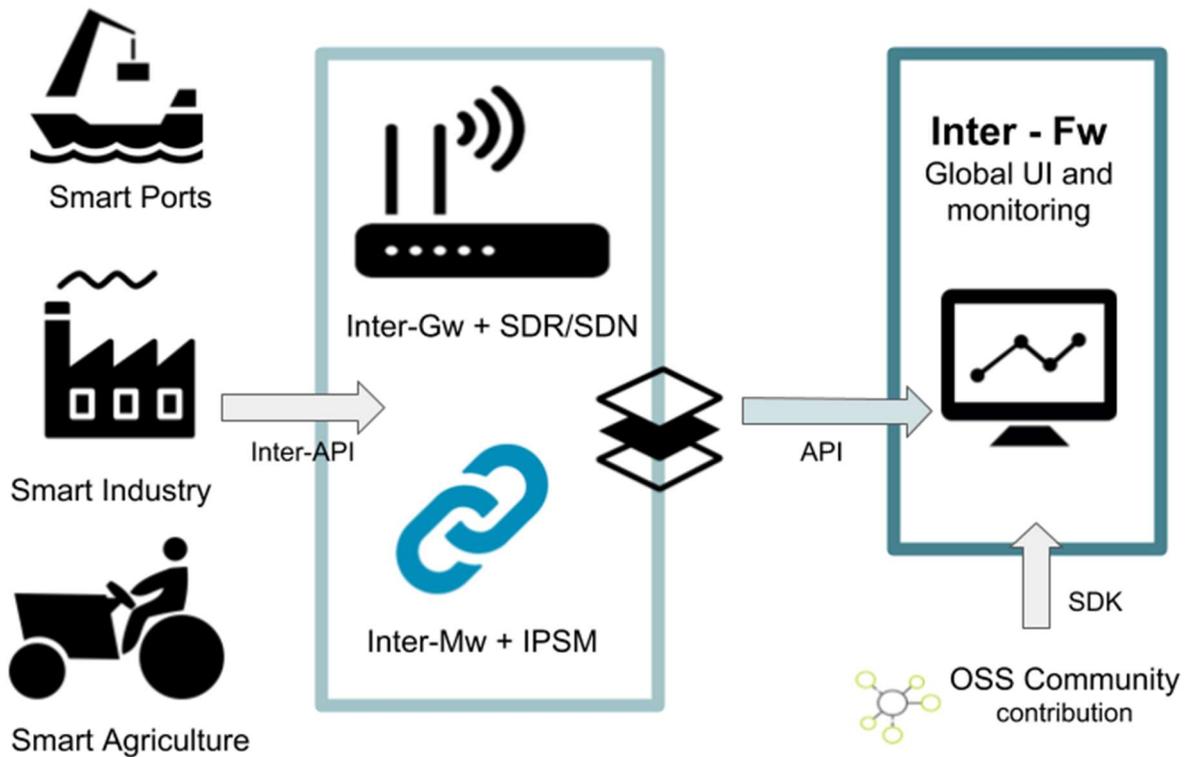
Figure 10: INTER-FW

Technology highlights and key selling points

The INTER-FW product is composed by two components: the core technology and the SDK, but the SDK is not a separate product. The current version of the INTER-FW needs the INTER-LAYER (there are dependencies from the technical point of view) but is independent from it and all others in the sense of its aims: aggregating all connected platforms in a single view. The INTER-IoT products can be used without INTER-FW but this is an enriched and global user interface including monitoring tools (and analytics at a further stage of development) with the possibility to use an SDK for development and OSS contribution.

The SDK is essential for the correct integration within the INTER-IoT technology and therefore cannot be considered separately. There is not yet a strategy or mechanism for updates (which

could mean update or upgrade). The only data that INTER-IoT stores is usage data and that is stored outside INTER-FW in a separate IoT platform in the customer's side. The TRL level is 6 by the end of the project and is planned to be developed until TRL 9 before getting to the market.

Commercialization and exploitation potential

The current IoT port commercial solution provided by PRO - Posidonia IoT (https://www.prodevelop.es/en/ports/posidonia/posidonia-iot) - is distributed through a payed license (Posidonia is fully commercial, no open source components considered). This is deployed on premises, but the same product can be extrapolated in the cloud, in a software-as-a-service model. The cloud can facilitate the port to provide their products directly to their clients, sharing with their customers and 3rd parties.

The focus of INTER-IoT inside the terminal, where all operations and managed and monitored can help solving problems such as: trucks waiting outside, traffic in port authorities (reputation), affecting the citizens (traffic jam). Base business models are centred in the IoT-interoperability - value of sharing the data - where trucks and port make a good case - predict when is the container arriving to the terminal (improving efficiency and reducing costs). The Port of Rotterdam understands this as a business opportunity with the sharing of data (with fully automatic terminals and ships sharing unknown data). Bundle security over it could be a very important added value, but now the port is covering the cybersecurity in conservative ways.

Open Source Community

PRO will integrate the technology developed in INTER-FW to Posidonia-IoT. The integrated technology is presented in D8.7 as *Port Interoperable Solution*, which will become an optional module of the Posidonia IoT. It can go to market independently from INTER-IoT partners but prefers to have partnerships with some of these partners. The Inter-Fw open source product will be maintained in parallel with the fully commercial Posidonia IoT product

Main competitors and trends

There are other companies selling IoT solutions and services but there is no direct competitor for Posidonia IoT. Potential markets aside from port authorities/terminals, are smart agriculture, smart industry and smart cities.

IP Foreground

Item	Owner	Dependency	IP Type	Protection	Confidentiality	IPR Exploitation Model
INTER-FW Web app Design	PRO(80%) XLAB SRIPAS UPV	None	Document	Copyright	Not confidential	Not exploitable itself
INTER-FW Web app Implementation	PRO(50%) XLAB SRIPAS UPV	INTER-LAYER APIs (Gateway, SDN, IPSM, AS2AS, INTER-MW), Identity Manager	Software	Copyright	Not confidential	ASL 2.0

		Configuration				
INTER-FW API Design	PRO(30%) XLAB SRIPAS UPV	None	Document + Software (Swagger)	Copyright	Not confidential	Not exploitable itself
INTER-FW API Implementation	PRO(30%) XLAB SRIPAS UPV	INTER-LAYER APIs (Gateway, SDN, IPSM, AS2AS, INTER-MW)	Software	Copyright	Not confidential	ASL 2.0
INTER-FW EXT Design	PRO(20%) XLAB SRIPAS UPV	INTER-LAYER elements	Document	Copyright	Not confidential	Not exploitable itself
INTER-FW EXT Implementation	PRO(20%) XLAB SRIPAS UPV	INTER-LAYER elements	Software	**Copyright**	**Not confidential**	**ASL 2.0**

Table 18: INTER-FW foreground IP

Exploitable Results

Leading partner	WP/Task	Technology	INTER-IoT exploitable results	Main Features	Building block	Dependency
PRO	WP4/T4.3, T4.4, T4.5	INTER-FW (INTER Framework): interoperable framework web application, API and engine	INTER-FW Web application, INTER-FW Engine, INTER-FW API	Fundamental infrastructure and tools through which the integration of heterogeneous IoT platforms can be fully enabled. INTER-FW is relying on modules produced in WP3 (D2D, N2N, MW2MW, AS2AS, IPSM, Security)	INTER-FW	API INTER-LAYER
PRO	WP4/T4.3, T4.4, T4.5	INTER-FW SDK	INTER-FW SDK	A Software Development Kit to allow extensibility of INTER-IoT (new modules, integration of new platforms etc.)	INTER-FW	API INTER-LAYER

Table 19: INTER-FW exploitable results

LLAVA Matrix

Customer Segment	(1) Port Authorities, (2) Smart Cities, (3) Smart Agriculture, (4) Industry 4.0
Common Need	Data integration of IoT platforms, global monitoring, management tools and

	smart analytics.
Value Promise	Enable an easy and reliable interoperability of unconnected IoT Platforms in an existing or new IoT deployment to facilitate the access to data in a single, homogeneous, and standard way.
Solution	Graphical, web based user interface to manage, configure and monitor multi-layer interoperability solutions in very heterogeneous scenarios with pre-existing or new IoT nodes.
Value Network	INTER-IoT Consortium and FIWARE Foundation
Alternatives	No identified alternatives in the market
Willingness to Pay	Already existing clients from Posidonia IoT (commercial product of current PRO's portfolio)

Table 20: INTER-FW LLAVA Matrix

SWOT

Strength	Technology built and tested close to user needs and requests
Weakness	Technology in development with dependencies, little market assessment
Opportunity	No other solution in the market, OSS contribution
Threat	Lack of existing paying customers which is overcome by tech giants

Table 21: INTER-FW SWOT

Lean Business Model Canvas

Problem	How to interconnect and monitor globally IoT platforms in existing or new industry scenarios.
Unique Value Proposition	Enable an easy and reliable interoperability of unconnected IoT Platforms in an existing or new IoT deployment to facilitate the access to data in a single, homogeneous, and standard way.
Solution	Graphical, web-based user interface to manage, configure and monitor multi-layer interoperability solutions in very heterogeneous scenarios with pre-existing or new IoT nodes.
Channels	PRO commercial channels (direct customers, strategic alliances), Inter-IoT and OSS channels
Cost Structure	Installation at customer, hosting, continuous evolution (technical staff).
Revenue Streams	License fee, customization (consultancy), training and support
Key metrics	Number of users, time of usage, data volume over the tool, number of systems connected.

Unfair Advantages	Tech giants provide generic – standard solutions. These solutions must be implemented by them or external parties. No degree of adaptation or customization is provided. INTER-FW has the advantage of being semantics-based, which ensures future compatibility with still not integrated platforms by adapting semantics in the IPSM module. Furthermore, INTER-FW provides support to build interoperable scenarios in a multi-layered approach, which ensures compatibility to virtually any possible scenario, existing or newly created.

Table 22: INTER-FW Lean Business Model Canvas

3.5.5 INTER-METH

Identification

Name: INTER-METH (Methodology)

Lead: UNICAL

Contact: Giancarlo Fortino <giancarlo.fortino@unical.it >

Technical information source: https://docs2.inter-iot.eu/docs/hub/latest/
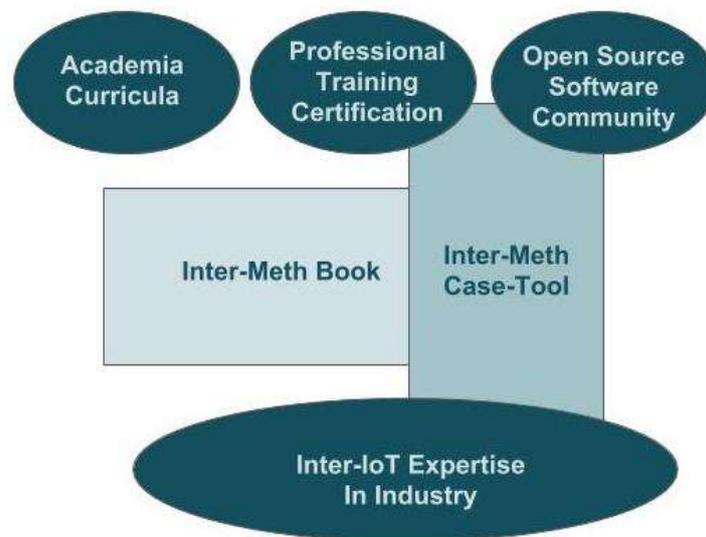
Figure 11: INTER-METH

Technology description and key selling points

INTER-METH is a methodology and therefore its products are much different than a software product. UNICAL plans to release a book on the INTER-IoT methodology (every methodology comes with a book where one learns how to apply the methodology). Associated with the methodology book, Inter-Meth also provides a case-tool (software) that facilitates the integrator of technology to the application of the methodology, involving the use of INTER-LAYER and INTER-FW.

This addresses the EC reviewers' concern to highlight more the role of the methodology. UNICAL will apply in task 7.3 the evaluation of the usability of the methodology with final key performance indicators, which is expected to continue after the duration of the project as a self-audit procedure.

Commercialization and exploitation potential

Methodology and case-tool should be sold together in a pack, because the tool supports and facilitates the application of the methodology. One can apply the methodology without the tool. The book on the methodology covers all the INTER-IoT technology and thus all its products. For now, there is only the deliverable, not yet defined the publisher of the book or its final format and content structure. We could provide the book for free (in an electronic format) for the customers who buy the Inter-IoT products.

The first natural market for this product is in Academia and professional training schemes, as well as in the Open Source Community where the coherent contributions will have to comply with the methodology and integrate the global picture of the technology. Also, this will prove useful for industrial partners who interact frequently with Inter-IoT technology and need to have a global vision of the methodology to reach the level of expertise required.

We can identify two clear channels in Academia: (i) selling IoT Master and PhD courses to students, enriching the curriculum excellence, and reducing the gap between university studies and industry; and (ii) the book that can be used at several levels of higher education (e.g. a consortium member will be the coordinator of a master degree course in the UNICAL and will be using the book and these materials).

Open Source Community

The usability of the case-tool by Academia is an added value in the systematic use and efficiency (in a similar sense as the existing support tools for UML drawing). The methodology is more flexible than software and can be used even if not using Inter-IoT, but can be used with other technology results coming from other projects and products, covering a wide area of applications within IoT

The case tool is based on Open Source technology and will be released through Apache 2.0 as agreed in the Consortium Agreement.

We can apply INTER-LAYER and INTER-FW without any methodology, but the expertise coming from it would make its implementation much more consistent. In particular, when the developer interacts with Inter-IoT technology in a systematic way, the methodology is an added value.

Main competitors and trends

There are no alternatives to the Inter-IoT methodology, nor other methodologies are available to IoT integration. Other integrations are done without the use of a stable methodology.

IP Foreground

Item	Owner	Dependency	IP Type	Protection	Confidentiality	IPR Exploitation Model
Inter-Meth Book	UNICAL	no	knowledge	To be defined	To be defined	To be defined
Inter-Meth Case-tool	UNICAL	no	Software	To be defined	OSS	To be defined

Table 23: INTER-METH foreground IP

Exploitable Results

Leading partner	WP/Task	Technology	INTER-IoT exploitable results	Main Features	Building block	Dependency
UNICAL	WP5/T5.2, T5.3	INTER-METH CASE Tool	INTER-METH CASE Tool	CASE tool for Automated Application of INTER-METH Methodology	INTER-METH	INTER-FW
PRO	WP4/T4.3, T4.4, T4.5	INTER-FW SDK	INTER-FW SDK	A Software Development Kit to allow extensibility of INTER-IoT (new modules, integration of new platforms etc.)	INTER-FW	API INTER-LAYER

Table 24: INTER-METH exploitable results

LLAVA Matrix

Customer Segment	(1) Academia, (2) OSS Community, (3) IoT industry
Common Need	Need of a stable methodology to apply in systematic IoT integration
Value Promise	Stable and usable methodology, Replicability, Extendibility, OSS
Solution	(1) Inter-Meth book, (2) Training certification, (3) Academia Curricula, (4) Case tool, (5) Consulting
Value Network	Inter-IoT Consortium, with more relevance to partners in Academia: UNICAL, UPV, SABIEN, TUE
Alternatives	none
Willingness to Pay	No defined pricing model is expected to be standard and decided by the selected publisher. Free for Inter-IoT customers of other products.

Table 25: INTER-METH LLAVA Matrix

SWOT

Strength	Stable methodology built together with developers, integrators, and end-user
Weakness	Book not structured yet, no selected publisher.
Opportunity	No alternative in the market, high need in Academia and Professional Training, as well as in the development of tech expertise in Industry
Threat	Methodologies often not used in industry, need of marketing

Table 26: INTER-METH SWOT

Lean Business Model Canvas

Problem	(1) lack of stable methodology, (2) no IT tool to facilitate its application
Unique Value Proposition	Stable and usable methodology, permitting easy replicability, extendibility, and enabling OSS community engagement.
Solution	(1) Inter-Meth book, (2) Training certification, (3) Academia Curricula, (4) Case tool, (5) Consulting
Channels	(1) University channels, (2) Training agencies, (3) Inter-IoT channels
Cost Structure	No defined pricing model is expected to be standard and decided by the selected publisher. Free for Inter-IoT customers of other products.
Revenue Streams	The book sales will depend much on the chosen publisher and its distributors, training and consulting are based on the price of commercial hour of partners engaged
Key metrics	Books sold, students listed, certifications received
Unfair Advantages	The raise of interest in the IoT market will bring tech giants probably with their own methodology.

Table 27: INTER-METH Business Model Canvas

4 IPR Management

IPR is term that refers to the ownership of a party with respect to an outcome (tangible or intangible) which is automatically generated at the moment of the outcome creation. IPR encompasses several different issues that are covered by different laws and practices at national and EU level. Generally, all issues related to *copyright*, *patents*, *licenses*, *joint ventures,* and *spin-offs* are collectively indicated as IPR and exploitation.

Even though the right is generated at the moment of the production, the extent to which this right is protectable and/or exploitable is a separate issue. Our overall vision on the IPRs is twofold: 1st) **To identify the parties with IPR on each of the project outcomes** and 2nd) **To identify which protection and exploitation model is applicable** to each of the project outcomes.

IPR management is paramount in any collaboration, but it is of high relevance in the INTER-IoT project as the outcomes generated within are being developed by Consortium Partners and external parties. Additionally, some of the developments will be free license. In order to grant parties these rights, we must be careful about the IPR distribution terms, building a transparent and non-conflicting strategy to allocate rights. IPR has been addressed in the Consortium Agreement, and also in the Collaboration Agreement with the Open Call Third Parties. IPR management is part of the exploitation strategy, and additionally is directly linked with the Open Source Strategy of the consortium that has been widely reported in D8.5 section 4. The consortium has done a strong effort regarding the definition of the value proposition and the definition of the OSS strategy as required by the reviewers.

INTER-IoT consortium is formed by research institutions and companies. Research institutions often see cooperation and management of Free / Open Source / Libre Software (FLOSS) as a natural aim of their activity, given their focus on creating and publishing knowledge. On the other hand, companies aim to create value for their shareholders, so cooperation and creation of FLOSS products are subordinate to value creation. Nevertheless, the internal relationships are managed by a cooperation model defined in the Project Gran Agreement which grants that any party will have access to development resources for the scope of the planned tasks and milestones until project termination, regardless the IPR distribution and the protection level. Once the project has ended, the access to resources will be granted on fair basis (i.e., market rates) according to the IPR distribution, which will remain in force unless the parties sign a special agreement.

4.1 IPR overview

4.1.1 Key objectives of INTER-IoT IPR Management Strategy

The INTER-IoT Management strategy has been conceived and will be implemented in pursuit of the following four key objectives:

- **Appropriation**: INTER-IoT partners need to capture and appropriate as much as is practical of the value of their solutions and ideas, bearing in mind any constraints.
- **Protection**: IP resulting from the project development has to be protected, fairly distributed and managed among the partners.
- **Freedom to operate**: INTER-IoT partners have to be sure to avoid infringements of third parties IPRs, as patents, or violations of trade secret protections, for lowering as much as possible the risk of litigation and related unnecessary costs.
- **Commercialisation**, including informing potential investors of INTER-IoT solutions added value: IPRs deriving from the project should be used to signal partners and developed assets value to investors, potential partners, competitors, and users for pursuing additional activities and investments. This is especially important after project end.

4.1.2 IP copyright licence

Choosing an IP licence is a matter of deciding the licencing model for the main project outcome (and subcomponents). During the project first year, the chosen licensing model for all scientific outputs is CC BY v2.0 and for all software related products is based on Apache v2, which means that (if not indicated) the outcome will be open license. Before the Ljubljana meeting in early Feb 2017 the chosen license was the <u>European Union Public Licence</u> but the Consortium realised its commercial restrictions and decided to move to Apache 2.0 for software products.

Below we can summarize the terms and conditions of each of the chosen licenses:

A third party…	Apache 2.0 License
is allowed to	- Commercial Use - Modify - Distribute - Sublicense - Private Use - Use Patent Claims - Place Warranty
is not allowed to	- Hold Liable - Use Trademark
is required to	- Include Copyright - Include License - State Changes - Include Notice

Table 28: Apache 2.0 License summary

A third party…	CC-BY License
is allowed to	- Commercial Use - Modify - Distribute
is not allowed to	- Commercial Use - Modify - Distribute
is required to	Include Copyright

Table 29: CC-BY License summary

4.1.3 IPR management

IPR management will be done for the software solutions and scientific outputs developed during INTER-IoT project. As long as software is concerned, we maintain a **Products directory**, which is under the responsibility of the Exploitation manager and is periodically updated according to the contributions of involved parties. The directory contains entries that are compiled by the Partners who own the intellectual property right on a given software artefact/component. Each partner delegates an IPR Manager to this purpose, which will be in contact with the Exploitation manager.

The procedure for entering and validating data into the Software IPR directory is managed by the Exploitation team, who supervises the introduction of new records and the proper fulfilment of the requested information.

During the project lifetime, any result (software, document or design) used and produced by the INTER-IoT consortium should be registered therein.

Items in the IPR Directory contain critical information about product name and type, copyright holder(s), protection level (if applicable), licensing model to be used, distribution terms and internal/external dependencies. Consequently, the IPR Directory contains important information, including commitments from the Partners. It is therefore critical that the data entered is reliable and non-refutable.

4.2 IPR Directory Structure

Entries should only be added by IPR Managers or Exploitation Team. IPR Managers are people officially entitled to do so, because the data in the IPR software database is a commitment on the Partner's side.

The IPR delegation database that contains the name of an IPR Manager for each Partner, who is responsible for adding entries to the IPR Directory on behalf of that Partner. In the case that more than one IPR Manager is nominated by a Partner, an entry per IPR Manager shall be created in the archive. IPR Managers should have access to the IPR Directory, so that they can add entries to the database.

IPR Directory should be updated as soon as any result is generated, indicating the Partners involved in the generation of the result and their level of contribution. Only significant contributions to the generation of the results should be considered.

IPR Directory must contain one entry per result or software artefact produced inside INTER-IoT or provided by a Partner as Background. IPR Managers will add entries to the first step, named Submitted. The Exploitation Manager will check it and progress it to the Verified status. Normally, entries will stay in this status for the whole duration of the project. Should an entry become obsolete, it is progressed to the Dismissed state.

Structure of the IPR Directory is: Name of the Item - Owner(S)/Copyright holder(S) - Dependencies- IP Type - Protection model - Confidentiality- Licensing/Exploitation Model

4.3 Joint Ownership Agreements

Joint Ownership Agreements (JOAs) are legal binding documents which stay the conformance of two (or more) parties on the co-owned responsibility on the generation of a result regardless of its nature.

JOAs are used to recognize the shared ownership of a result, provide a description and establish the level of ownership with respect to that result. JOAs is not, but may be, linked to an Exploitation Agreement, in which revenue shares are equal to the level of ownership of the result.

National Laws are applicable to the signature of a JOAs, therefore every single case will be studies in-depth with the legal departments/TTOs from the involved parties. A draft in included in ANNEX E: Draft Inter-IoT Joint ownership agreement.

5 Individual/Joint Exploitation Plan progress (M18-M33)

5.1 Overview

The goal of this section is to describe the individual and joint exploitation activities carried out by the Exploitation Team (ET) along the period M18-M33 within the Task T8.4 Exploitation by following the LLAVA Matrix Methodology previously commented in section 2. The activities carried out have helped the INTER-IoT consortium to define products/solutions and services derivate from the INTER-IoT results and to cement joint/individual exploitation perspectives and marketing actions to be done regarding their commercial and non-commercial goals, taking into account the updated market analyses and current competitors.

On the other hand, the third parties from Open Call as part of the INTER-IoT ecosystem have been asked by the ET to update their exploitation perspectives presented in D8.7a.

Finally, for impact creation analysis of the INTER-IoT project, this section also includes an analysis about main competitors of the INTER-IoT ecosystem identified by the INTER-IoT and third parties and an analysis about how INTER-IoT helps all the actors of the ecosystem to position into the IoT market, not only SME and industrial entities but also universities and R&D centres.

5.2 Actions executed during (M18-M33)

During this period (M18-M33) the Exploitation Team (ET) has been working in the progress of the initial individual and exploitation strategy plans established in the deliverable D8.7a. by following the roadmap of the INTER-IoT Exploitation Plan included in D8.3 (M4). This progress considers the execution of the third phase called "Second iteration of the joint and individual Exploitation Plans" that will run from M18 to M32 and the starting of the fourth phase "Go to market" as the following figure shows:
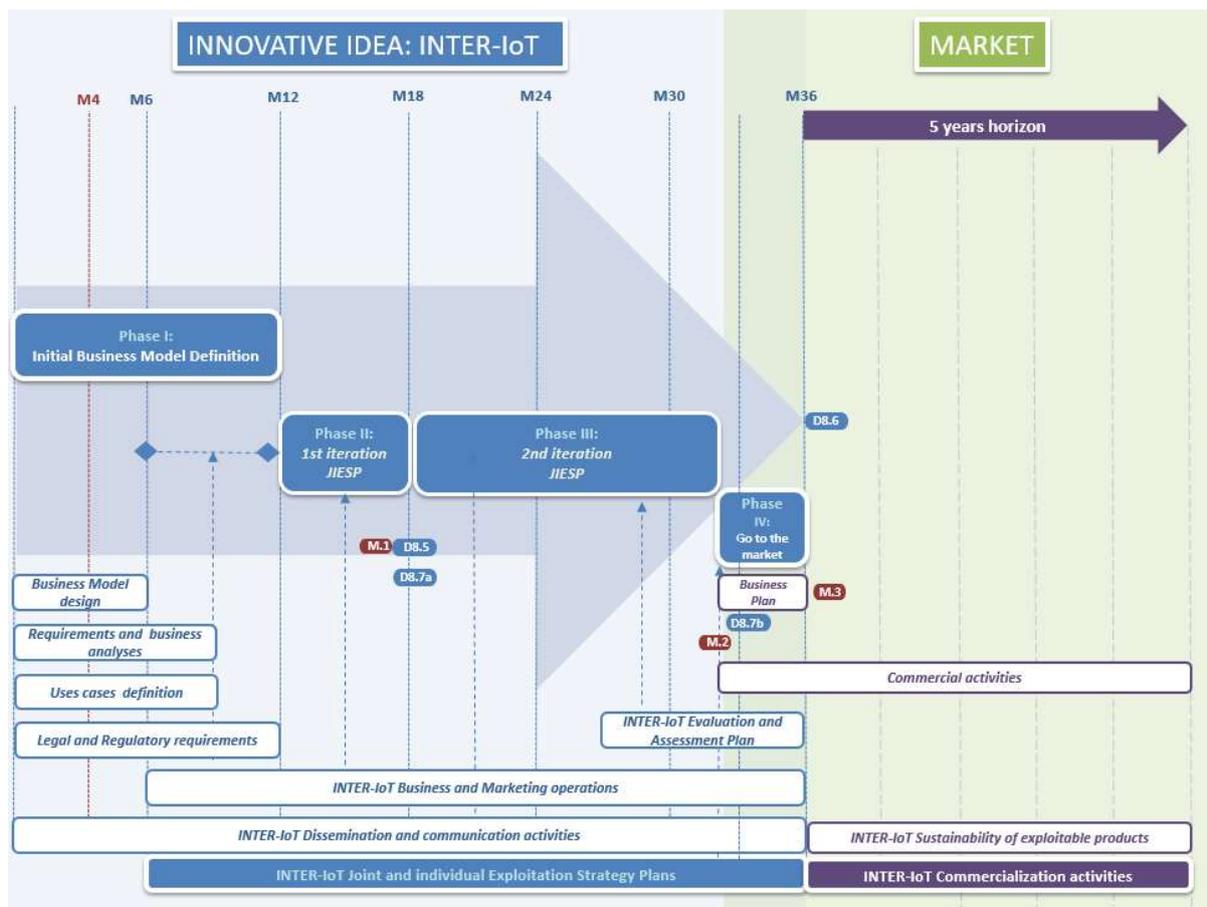
Figure 12: INTER-IoT Exploitation Plan

This period started with the delivery on time of the *D8.5 Report on Impact Creation* and the *D8.7a Business Models and marketing Operations* that contains the first iteration of the Individual/joint Exploitations plans of the INTER-IoT partners and the Joint Exploitation Plan for INTER-IoT based on open software.

During the review meeting in Athens (M21), the EU reviewers appointed the following recommendations regarding business impact and dissemination:

Business impact
R8. *Exploitation planning/impact creation has to be turned into concrete actions*
R9. *The already existing overview tables clarifying IPRs need to be further consolidated and completed.*
R10. *For the OSSW route planned to be taken and for the envisaged (OSSW) community/ecosystem building, the reviewers would like to reiterate their recommendation issued last time that it may be reasonable to e.g. team-up with existing communities (such as the Eclipse Foundation, FIWARE, OSGi, etc.) to quickly achieve momentum and gain visibility.*
R11. *Risks of conflicts between platforms/gateways owners/operators and INTER-IoT stakeholders, at exploitation level should be addressed. The corresponding business relationships should be clarified.*
R12. *The project should check that the data models include the necessary information to allow a correct monetization of the services exchanged between the different stakeholders at the operational stage.*
Dissemination
R7. *The dissemination of the project results and findings to industry stakeholders, in particular to the ones represented by the pilot sectors is to be reinforced.*

Table 30: Athens EU Review (M21) recommendations

On the 6th INTER-IoT Plenary meeting celebrated in Paris on November 29th-30th (M23), the ET celebrated an INTER-IoT Exploitation meeting to discuss and analyse the comments and recommendations of the EU reviewers from the table above, in other to improve the objective 7 of the project.

On January 2018 (M25), the ET participated in the following TF webinars: Strategy and stakeholder engagement, Marketplace mechanisms, Technology Inclusivity, Community support, Ecosystem Openness and Technology Advancement. Therefore, the ET participated in the IoT-EPI celebrated in London February (5th-7th) (M26).

In parallel, the ET had personal interviews with the third parties of the Open Call during the Evaluation Meeting of the Open Call celebrated in Valencia on (16th-17th) January (M25) in order to monitoring their exploitation activities.

Therefore, during M25 the ET prepared a workshop to conduct the activities to go on with the "Second iteration of the joint and individual Exploitation Plans", considering the previous inputs: recommendations of the EU reviewers, the TF inputs, and the contact with third parties of the open call.

The workshop was celebrated in Eindhoven on (13th -15th) February (M26) and the ET focused the attention in the following issues: exploitable products selection, map of individual exploitation leads and exploitation perspectives, IPR analyses, discussion about INTER-IoT as an open source project and Community Building.

During this workshop the ET from the initial INTER-IoT exploitable products presented on D8.7a (M18) selected the following five main products:

- INTER-IoT Gateway
- INTER-IoT Middleware + bridges
- IPSM Module
- INTER-FW Web app and SDK
- Master on Internet of Things

The INTER-IoT partners were asked to fill in the second iteration of their individual and joint exploitation activities through questionnaires from first iteration that were previously reinforced with questions to clarify aspects such as products definition, concrete exploitation actions, IPR vision and Joint exploitation perspectives. Therefore, they were asked to fill in the LLAVA Matrix Template of their individual exploitation plans to envision solutions/products based on the previous core INTER-IoT product selection.

The partners presented its individual and joint exploitation Plans and LLAVA Matrix that are included in the ANNEX A: Individual Exploitation Plans, ANNEX B: Joint Exploitation Plans and ANNEX F: Llava Matrix (2nd iteration).

As part of the OS Joint Exploitation Plan, further discussion about open source strategy was carried out. The INTER-IoT consortium agreed in the selection of the license Apache 2.0 and started the process to be an Eclipse project and also to be part of the FIWARE Foundation.

TALIS Capital (one of the venture firms specialising in investment into IoT sector), member of the Advisory Board, assisted to the workshop in order to update the INTER-IoT partners on the latest technological advances in IoT sector and to review the developed business models advising on potential exploitation paths.

On M27 the ET collaborated with the WP7 in the production of *D7.1. Evaluation Plan* by specifying Exploitation KPIs and methods to measure it, including the KPI previously commented on in D8.5.

From M28 to M32 the ET has been working in INTER-IoT product definition and IPR management in order to be prepare the effective Business Plan to go into the market at the end of the project. For that goal, the ET analysed the questionnaires of the second iteration and LLAVA Matrix models, to obtain the first iteration global map of individual and joint exploitation expectations followed by one-to-one interviews with INTER-IoT partners in order to consolidate the last global map.

5.3 Individual/ Joint plan perspectives

As it was commented on in D8.7a., one of the complex aspects to be considered in the Exploitation strategy of the INTER-IoT project is the heterogeneity of the consortium partners' profile: SME, Industry, Academic and Governmental institutions. Such a picture will lead to different types of individual and joint exploitation strategies which can be either non-commercial (academic/research), commercial goals (industrial) or a mix of both in case of Universities through spin-off creations and Research organization with commercial goals.

Thus, the INTER-IoT consortium aims to foster exploitation of INTER-IoT products and services proposed in section 5.3 at different perspectives according to the type of partner as follow.

The following figure shows the structure of the INTER-IoT consortium threefold: industrial, research and collaborations.
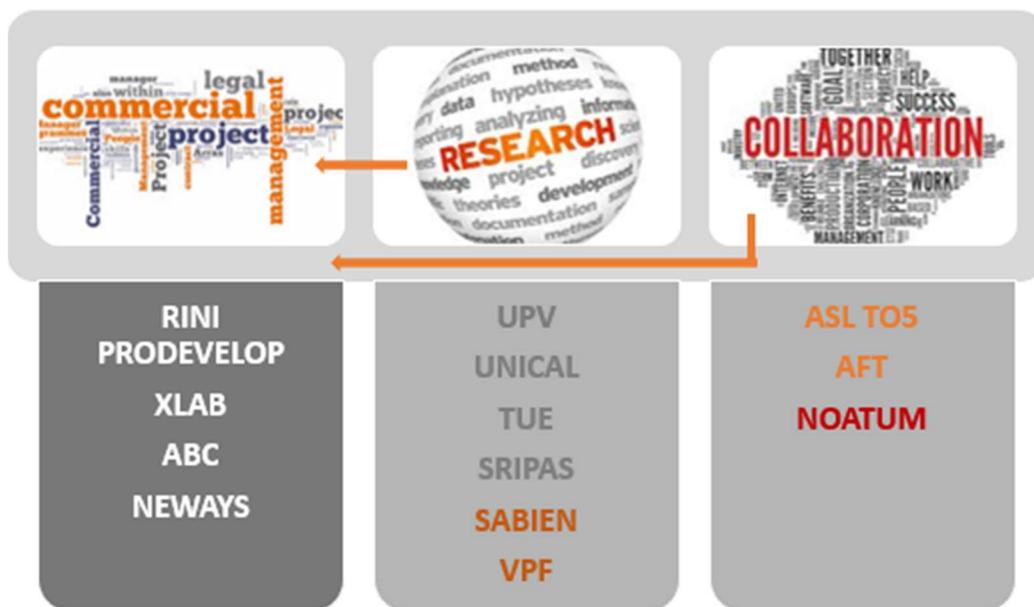
Figure 13: INTER-IoT consortium structure

5.3.1 SME, Industry and Research organization perspectives

The individual/joint exploitation perspective of the SME, Industry and some Research organizations partners aim to go into the market with new products/services based on INTER-IoT core products in order to position themselves as high IoT consulters, to increase innovation thus to be more competitive with the IoT add value and finally to increase their business results in consolidated commercial sectors ore new ones.

Entity	Type of entity
RINICOM	SME
PRO	SME
XLAB	SME
ABC	SME
NEWAYS	Industrial Organization
SABIEN	Research Group – Public Organization
VPF	Research Organization

Table 31: SME, Industry and Research organizations involved in business exploitation

Below it has been summarized the individual/ joint business perspectives of these seven entities.

RINICOM

RINICOM has created a Smart-Health care market-oriented product called PRIME IoT Gateway that is a modified version of the product INTER-IoT Gateway.

Thus, RINICOM aims to exploit the product PRIME IoT Gateway that is addressed to GP practices and care home through a business model based on B2B with a monthly/yearly subscription fee and will have an annual license. The price estimation is ~£2000 inclusive of ECG, temp, BP and SpO2.

RINICOM has a strong knowledge and experience in the Smart-Health market and the potential sell and competitors there.

During 2017 RINICOM concentrated its exploitation activities in UK, however in 2018 they have carried a demo to the Ukraine ministry of health. Although the target market is big (1000+), RINICOM has identified only three potential customers.

RINICOM plans to go into the market independently from other partners of INTER-IoT at Mid to late 2018.

RINICOM plans to establish a strategic alliance with external partners such as sensor and patient management platform providers but it is not clear if these strategy alliances are a must to put PRIME IoT gateway into the market.

As RINICOM has developed the INTER-IoT Gateway in collaboration with other INTER-IoT partners so IPR has to be managed before to go to market.

PRODEVELOP

PRO is an ICT company has a consolidate expertise and customer base in Port Sector both in national and international scenarios. Hence, PRO has a clear aim of exploitation of *IoT Port Interoperable Solution* taking into account the exploitable results of INTER-IoT based on the products: INTER-IoT middleware + bridges + IPSM and INTER-FW Web app and SDK.

The business model B2B proposed by PRO oriented to this sector is quite mature and has good perspectives to have a successful go-to market results. For instance, in Port Sector, 80% of PRO's customers have already chosen its product POSIDONIA SUITE ©: Port Solution Suite for Port Management and approximately 55% of them have showed interest in enriched it with *IoT Port Interoperable Solution.*

PRO envisions also the creation of the product *IoT City Interoperable Solution* focused on the Smart City sector where PRO expects to consolidate its expertise and presence in the market.

On other hand, due to existing projects (LIFE AGROGESTOR) and consolidate relationships with partners in the Smart Agriculture and Industry sectors, PRO envisions the exploitation of the *IoT Agriculture Interoperable Solution* and *IoT Industry Interoperable Solution.*

For these four products, PRO contemplates a B2B business model and they will be offered to be deployed on premise through a build to order and service bundle that includes customization of IoT Port interoperable, technical support and training services or in the cloud by a service bundle based on SaaS that includes the integration of the solution in the client, technical support and training services. The price model on premise is based on the payment of the license of the product plus support and training services and in the cloud is based on a monthly subscription fee. The price estimation is under analysis.

PRO plans to place IoT Port Interoperable and IoT City and Industry Solutions certificated and tested into the market around the first quarter of 2019 and the IoT Agri Interoperable, independently from other partners of INTER-IoT singing and IPR agreement with some INTER-IoT partners before going to market.

PRO will consider the consolidation of strategic alliances with cloud providers, standardization bodies and Smart Cities, to go into the market with the maximum trusted add value, thus the best quality.

PRO plans also to be a technology INTER-IoT provider by offering professional engineering services to other ICT companies and system integrators and is open to sign partnerships agreements with other INTER-IoT partners for a joint perspective.

XLAB

As a starting point for the INTER-IoT products' exploitation, XLAB proposes to provide customization and consultancy services through B2B, due to the proposed INTER-IoT products are not ready to be offered as an off-the-shelf solution.

The products/services are sold mostly over pilots (high customization products) and over the online channels (SaaS with a monthly/yearly subscription fee).

The prices differ in product/service but XLAB's commercial hour price is 60 EUR (for development, customisation, and consultancy).

XLAB obtained in September 2017 a new commercial IoT project with Messer Cutting Systems. XLAB also got involved in a new H2020 project that should start in May 2018. The goal of the project is to support development of Smart Ports and environmental efficiency of Smart ports through IoT technologies.

XLAB plans to go into the market at the end of 2018 but cannot do it independently from other partners of INTER-IoT.

XLAB has interest in a joint exploitation Plan due to the current maturity of INTER-IoT. Its optimal approach is to enter the market within a business opportunity made of some of the INTER-IoT consortium partners in a joint exploitation Plan. XLAB estimates that this will be possible at the end of 2018.

From an individual Exploitation perspective XLAB plans to further improve the exploitable results of INTER-IoT to offer them as products available at XLAB's portfolio, independently from partners.

Regarding IPR issues, XLAB is ready to approve a commercialization license without costs to business leading partners, under an appropriate revenue stream agreement.

NEWAYS

NEWAYS is an Industry Organization with activity in the Semicon, Automotive, Agriculture, Medical and Industry segments where customers awareness is growing for the potential of IoT applications.

NEWAYS puts emphasis on the exploitation of the INTER-IoT-Gateway and INTER-FW Web app and SDK products.

NEWAYS is actively approaching the market through the collaboration in projects and co-working with industry partners. There is an active approach via the NEWAYS sales force (Additional training and portfolio build-up is ongoing).

In the Agriculture sector, NEWAYS has 20 entities in its current customer base and is exploring business opportunities due to the huge potential and strong market position of Holland in the agricultural innovation business. Five of this twenty existing customers can convert into potential IoT related customers through machine weeding, cattle water quality monitoring and remote diagnostics on milking robots, among others.

The Semicon OEM market is mainly in the USA and Asia and few key players are located in Europe. Given the locations of NEWAYS factories main focus on EU OEM's is legitimate and the total number of relevant customers is approximately 20 in the EU. The equipment is capital intensive and the systems already have a high degree of automation and monitoring and are already connected to factory automation monitoring technology. Lessons learned from this industry can be applied in "normal" industries.

In the medical market, OEMs develop most of the equipment and has a high grade of automation already. Privacy is seen as a major hurdle in the medical business. From the NEWAYS customer base a small number of customers can become partners. The equipment is capital intensive and the systems already have a high degree of automation and monitoring and are already connected to health/hospital monitoring technology.

In Industry sector, NEWAYS has hundreds of industry customers where can promote the IoT capabilities and its customers are becoming gradually aware of the potential of IoT and are looking for applications within their market.

NEWAYS envisions IoT hard- and software development services addressed to the above commented sectors to be exploited through a B2B business model. The price model is based on a development fee and IP transfer to the customer after last payment and the price estimation will be based on hourly rates apply for development of IoT applications.

NEWAYS can approach the market independently due to NEWAYS has built up knowledge regarding IoT that can be commercialized. However, the NEWAYS sales force needs to get additional training to get more exposure of the NEWAYS IoT capabilities.

NEWAYS plans to have strategy alliance with strategic partners as cloud provides, database developers and official data providers in order to enrich their services with Complementary services from the strategic partner.

ABC

ABC is an ICT company that has interest on the following INTER-IoT products: INTER-IoT Gateway, INTER-IoT Middleware + bridges and IPSM Module.

ABC will not commercialize a specific product but provide "custom" manufacturing solutions for customers that have problems with legacy installations and connection services of different systems (warehouse, production, quality control) or heavy-duty machinery.

The main customer segment for ABC is the manufacturing companies, mainly in Germany and Italy that will be addressed through a B2B business model by offering on premise a build to order and service bundle, technical support and training services.

The price model is based on license for support and training services and the price estimation will be based on the cost of development –base price. Margin on service and support.

ABC plans to go into the market independently from other partners of INTER-IoT at second quarter of 2019. However, ABC considers that the cooperation with other partners that shared the same development will make the product better and especially cutting the time-to-market.

ABC needs to establish strategic alliance with solution developers to achieve more visibility, credibility and o offer support.

INTER-IoT helps to position ABC as a boutique consulting firm specialized in IoT architectures and INTER-IoT that will allow it to have a solution for specific industry problems.

SABIEN

SABIEN has worked in the integration of components of INTER-HEALTH Solution such as: INTER-IoT – bridge to uAAL, INTER-HEALTH Mobile Hospital App, and INTER-HEALTH Professional Web Tool. As SABIEN cannot directly commercialize these components it has interest in exploiting in the near future as inputs for new research projects and to enhance its portfolio by offering integration of INTER-Health components into existing commercial products or by branding new products/solutions after the end of the project independently from other partners of INTER-IoT.

For exploitation purpose SABIEN has selected the product INTER-HEALTH Professional Web Tool that is addressed to Large Companies and SMEs through B2B consultancy with public or private corporations who may want to deploy distributed systems for remote follow-up of patients and device management. Hence, there is no License and price estimation associated.

As public institution, SABIEN has does not have customers but partners in research and innovation projects and to go to market needs to create a joint venture or a spin-off, but currently it has yet not foreseen.

SABIEN's initial target market contemplates two domains within the Europe Ecosystem: eHealth-IoT and Medical devices where SABIEN has detected 30 potential customers.

SABIEN needs external partners for the business implementation such as private hospitals for testing, ICT SMEs and ATOS/AIRLIQUIDE for Incremental positioning of the products and services delivered.

Although SABIEN does not commercialize products it is high remarkable it plans to participate in e-Heath industry, IoT Industry Events during 2018.

VPF

VPF has interest on INTER-IoT Transportation support platform and INTER-IoT Middleware + bridges.

VPF is a research and development foundation with strong links to port stakeholders. Its main market segment is composed of inefficient LATAM Port Authorities that aim to improve their productivity and performance through the use of new technologies such as IoT.

VPF also addresses its value proposition to other agents that participate in the supply chain such as terminal operators, logistics centres, logistics operators, road or rail transport companies, piloting services, towage, mooring, container depots and any other administration or operator involved within the supply chain execution.

At the beginning of 2019, VPF plans to go to the market independently from other partners of INTER-IoT. Once the final pilot (INTER-LogP) is tested, VPF plans to extend the number of platforms connected to INTER-IoT to other companies in the Port.

The financing strategy is based on two branches: on the one hand, own resources for R&D project activity, and national and international projects. On the other hand, contracts of technical assistance for the implantation of the product. VPF is attending several Port and logistic Conferences during 2018.

The following table shows the global map of the SME Industry and Research organisations individual and joint exploitation perspectives considering that some aspects of the individual and joint "Go to market" strategy are confidential and cannot be part of this document

Entities	Market product/solution	Market services	Sector	B.M.	Price Model	S.A (*)	Time to market	How? (**)	Number customers in EU
RINICOM	PRIME IoT Gateway	-	Smart-Health care	B2B	Monthly/yearly subscription fee + annual license	N	Mid to late 2018	1	3
PRO	IoT Port Interoperable Solution	Customization and consultancy	Smart Port	B2B	On premise: License + support and training services	Y	First quarter 2019	1	5
					In the cloud: SaaS with a monthly/yearly subscription fee				
	IoT City Interoperable Solution	Customization and consultancy	Smart Cities	B2B	On premise: License + support and training services	Y	First quarter 2019	1	Not yet
					In the cloud: SaaS with a monthly/yearly subscription fee				
	IoT Agri Interoperable Solution	Customization and consultancy	Smart Agriculture	B2B	On premise: License + support and training services	Y	Last quarter 2019	1	1
					In the cloud: SaaS with a monthly/yearly subscription fee				
	IoT Industry Interoperable Solution	Customization and consultancy	Smart Industry	B2B	On premise: License + support and training services	Y	Q1 2019		Not yet
					In the cloud: SaaS with a monthly/yearly subscription fee				
XLAB	-	Customization and consultancy	Transport/ Logistics	B2B	SaaS with a monthly/yearly subscription fee	(***)	At the end 2018	2	(***)
		M-health			Customisation services				

			IT (cloud computing, HPC and cybersecurity.						
NEWAYS	-	IoT hard- and software development services	Industry	B2B	Development fee and IP transfer to customer	Y	Under analysis	1	Not yet
	-	IoT hard- and software development services	Agriculture	B2B	Development fee and IP transfer to customer	Y	Under analysis	1	5
	-	IoT hard- and software development services	Semicon	B2B	Development fee and IP transfer to t customer	Y	Under analysis	1	20
	-	IoT hard- and software development services	Medical	B2B	Development fee and IP transfer to customer	Y	Under analysis	1	Small num.
ABC		Customization of manufacturing solutions	Manufacturing companies	B2B	License for support and training services and cost on customization	Y	Q2 2019	2	3
VPF		Design and provision of solutions on INTER-IoT Transportation support platform and INTER-IoT Middleware + bridges.	Port companies	B2B	Consultancy services System design and deployment costs		At the beginning of 2019	1	20

| SABIEN | | Consultancy services on INTER-HEALTH Professional Web Tool | Large Companies / SMEs | B2B | Integration of interhealth components into existing commercial products or brand new products/solutions | Y | At the end of the project | 2 | 30 |
| | | | | | Consultancy services costs | | | | |

<center>**Table 32: SME, Industry and Research concrete individual/joint exploitation plans**</center>

(*) SA: Strategy Alliance: Yes (Y), No (N)

(**) 1 Independently from other partners signing IPR Agreements, 2 In joint exploitation

(***) Confidential

From the table above some conclusions can be extracted. On one hand, due to the picture of variety of know-hows and market sectors of these partners of INTER-IoT with different commercial goals, it can be noted that they are not competitors but excellent partners to find synergies for further joint exploitation business opportunities.

As Figure 13 shows, there are two Research organizations with commercial goals: SABIEN and VPF that have participated in the trial scales demos in INTER-Health and INTER-Log respectively.

In general terms, all of them envision individual B2B business models but with different pricing models based on product or services market-oriented sales. Only PRO and RINI plan to create market-oriented products to be placed from the end to 2018 till second quarter of 2019, with payment methods as license and SaaS with a monthly/yearly subscription fee. XLAB, ABC and NEWAYS aim to offer market-oriented professional IoT services based on customization and consultancy services and NEWAYS also offers hardware IoT services to be place from the end to 2018 till second quarter of 2019.

All the partners except XLAB consider that they can go into market independently from other INTER-IoT partners, taking into account IPR commercial agreements when necessary. All of them are also keen to build joint exploitation business in the near future but at the time of this deliverable there are not concrete identified joint opportunities.

On the other hand, all of them consider that the consolidation of strategic alliance with third partners is very important to go into the market with the maximum trusted add value. This fact is under analyses, being a confidential market issue.

Finally, all of them are carrying out marketing actions in order to attract the attention of existing and new potential customers in EU.

5.3.2 Universities and Research Organization perspectives

The Public Universities and Research organizations will use the INTER-IoT results to provide research support and disseminate scientific results and increase the reputation of the universities attracting more students through new masters and new Ph.D. program on IoT. However, there is also an industrial interest to attract companies in order to develop new market-oriented products or to participate in additional EU R&D funding projects. Hence, in the industrial area, the impact will be related with the attraction of more research funds, technology transfer and consulting and training activities offered to companies through spin-offs.

Entity	Type of entity
UPV	Public University
UNICAL	Public University
TUE	Public University
SRIPAS	Public Research Organization

Table 33: Universities and Research Organizations in Business Exploitation

Below the individual/ joint business perspectives of these four entities are summarized.

UPV

UPV as research group aims to lead research activity in IoT in the institution and in the different technical universities within Spain.

UPV focuses its attention to exploit and lead the INTER-IoT Gateway (open source) with premium version including SDN and SDR and the Academic Product leaded by UNICAL.

The main opportunity of the project will be a stand-alone solution of INTER-IoT and a cloud-based solution providing interoperability as a service and virtualization of gateways and connection with SDN and NFV components for the deployment of IoT services in telecom operator premises through the product INTER-IoT Gateway (open source) with premium version including SDN and SDR.

UPV plans to go into the market with the MSc related to the INTER-IoT Academic Product oriented to University students leaded by UNICAL and with the SaaS – Suite of IoT interoperability oriented to University students / Former students that used the tools by the end of 2018. UPV can do it alone but the MSc is strongly related with UNICAL and TUE master's programs, but there are no strong dependencies on them.

Expected impacts in the academic environment will be directly related with the increase in the number of students and the improvement in the national and international rankings.

From the industrial point of view, UPV foresees exploitation opportunities in vertical markets: smart cities together with city councils; transport and logistics with different stakeholders and operators; m-health with health agencies and safety and security with private and public agencies. Some market opportunities can be represented by consulting activities to enterprises and the creation of spin-offs by students. Additionally, collaboration with the industry, mainly stakeholders may develop in new products and further collaborations in the area of IoT interoperability. UPV envisions the possibility of starting a spin-off for assessment of services next year.

UPV has strong business links with the different partners of INTER-IoT (specially the Spanish partners with which has already participated in different business opportunities). In the academic area UPV has strong ties with UNICAL and different academic initiatives will be performed together with them.

UNICAL

UNICAL is an Italian Public University. UNICAL's role in the project is to provide research support and disseminate scientific results.

The UNICAL is the leader of the Academic Product together with UPV that it is based on the following INTER-IoT exploitable products: INTER-METH methodology book, INTER-METH Training schemes, INTER-METH CASE Tool and IoT Course (Master, PhD).

Research results will be used to attract more students with the founding of new masters, new Ph.D. program, new computer/electronics engineering courses or enriching the existing ones.

Moreover, technological advances obtained on the basis of INTER-IoT project results will be exploited for technology transfer, to regional/national industrial and academic community, and to increase the UNICAL reputation and the capacity to attract resources from competitive research programs.

Some market opportunities can be represented by consulting activities to enterprises and training activities.

TUE

TUE focus its attention to exploit the products: INTER-IoT Gateway and INTER-IoT Middleware + bridges. The main stream of exploitation is typically education and consultancy and in most of the cases, the exploitation of education is in the form of theoretical models rather than specific products.

TUE plans to launch an Education Kit at the end of 2019 that involves the INTER-IoT Gateway and, potentially the INTER-IoT Middleware + bridges. The target of the education kit would be to minimize the implementation time of end-to-end IoT solutions. Multi-disciplinary courses across academia can benefit from the easiness of IoT application testing and deployment.

It would allow the education to focus on the subject rather than the implementation. Though both bachelor and master's degrees are targeted, the latter would be more applicable until the maturity of the kit is improved.

For that goal, involvement of other partners is welcome but not necessary. TUE will collaborate with other partners who want to mature INTER-IoT products for educational purposes.

TUE, through education on IoT, is building new links with industry in the vicinity with joint education programs. Moreover, expertise built via INTER-IoT allows for creating new academia-industry partnerships in IoT domain.

SRIPAS

SRIPAS focuses its attention on exploiting the IPSM Module, being the responsible for, and add support to the exploitation of INTER-IoT middleware + bridges + IPSM together with XLAB and finally the INTER-METH as part of the Academic Product leaded by UNICAL.

As a public research organisation, there is no direct / explicit business-oriented exploitation strategy. However, based on the long-term strategy of the Institute, SRIPAS can state what follows:

SRIPAS runs a Ph.D. program, and the results of the project will be exploited within its scope: (a) within its curriculum, and (b) as a foundation for future research undertaken by Ph.D. students participating in the program.

SRIPAS is a member of 3 Industrial Clusters. Therefore, members of the SRIPAS team will undertake appropriate actions to disseminate results to the industry and seek collaboration, including consulting and joint business endeavours.

SRIPAS team will disseminate results of the project through industry-oriented conferences in Poland, seeking collaboration, including consulting and joint business endeavours.

The main way of SRIPAS for participating in the market will be through joint endeavours with businesses and through consulting activities. This includes providing support for IPSM deployment and customisation e.g. with alignment definition. IPSM can be used as standalone component or as part of the composed solution.

Placement on the market is planned to be done as part of joint ventures with industrial partners.

Preliminary discussions with potential partner - Eccenca (company from Germany, interested in usage of and integration with IPSM) have been done.

The following table shows the global map of the UNI/ Research organizations individual and joint exploitation perspectives.

Entities	Market product/solution	Market services	To whom?	B.M. (*)	Number students	Commercialization figure	Price model
UPV	Inter-IoT Gateway (open source) with premium version including SDN	-	Enterprises (Transportation, Logistics, Mobile health and Smart cities)	B2B	-	Spin-off	Consultancy services costs
	SaaS – Suite of IoT interoperability	-	University students / Former students that used the tools	B2C	20	University	SaaS with annual subscription
	Academic Product	IoT Master	University students	B2C	20	University	Master fee
UNICAL	Academic Product	IoT course (Master, PhD)	Students	B2C	Dec-25	University	Master fee
TUE	Inter-IoT Gateway (open source) with premium version including SDN ????	Education Kit	Students	B2C	150	University	Master fee
	INTER-IoT middleware + bridges + IPSM	Education Kit	Students	B2C	150	University	Master fee
SRIPAS	IPMS Module	Master	Students	B2C	-	Research Organization	Master fee
		PhD	Enterprises	B2B		Potentially spin-off	Consulting services costs
		onConsultancy services					
	INTER-IoT middleware + bridges + IPSM,	Consultancy services	Consultancy services and	B2B	-	Joint ventures with industrial partners.	Consulting services costs
	IPMS Module and Academic Product (INTER-METH)		PhD (				
			INTER-METH)				

Academic Product (INTER-METH)	Master IoT	Students	B2C	-	Research Organization	Master fee

(*) Business Model if any

Table 34: Universities and Research Organizations concrete individual/joint exploitation plans

From the table, it can be observed that all the entities have interest on exploiting the Academic INTER-IoT Product leaded by UNICAL. However, each of them envisions also others academic services such as SaaS (UPV) or Education Kit (TUE). The business models associated to this product is a B2C model where the consumer are the students.

From the industrial perspective, all of them offer consultancy and training services offered to companies through the generation of spin-offs or joint ventures with companies.

5.3.3 Collaborators

Within the INTER-IoT consortium there are three stakeholders that support the project but do not have interest on commercialization but in promoting the exploited tools among e-Health and Transport ecosystems and to offer add value to its end- customers.

Entity	Type of entity
AFT	Research Organization
ASL TO5	Public Body Organization
NOATUM	Logistic Company

Table 35: Collaborators in Business Exploitation

Below the individual/ joint business perspectives of these three entities are summarised.

AFT

AFT is a Research Organization, semi-public body and has strong links with transport and logistics undertakings. AFT benefits from the firm trust of French hauliers as it has played a pivotal role in the information, training and counselling of transport professionals for over half a century. AFT will be providing relevant transport stakeholders in France with information and insight in the use of interoperable IoT solutions tested in the framework of the project, especially in INTER-LogP.
AFT's main market segment is composed of the near 9,000 transport companies and other institutional actors. Beyond this figure, AFT estimates –considering the need for innovative IoT solutions expressed during interviews, its market could potentially reach the 20.000 figures.

AFT has no technology-level requirements and will bring to the market advice/assistance in understanding and where to purchase project solutions.

Once the exploitable products of INTER-IoT will be placed on the market, AFT will communicate with its stakeholders, probably through the organization of a workshop, with the objective to identify the first batch of transport companies willing to integrate the products.

AFT receives public funding and funding from its members to assist its sector stakeholders. It can therefore not charge its stakeholders whenever carrying out its mission. It will therefore not be charging its "clients" for any assistance that does not go beyond presenting stakeholders with project products and assisting them in integrating them.

By assisting French transport companies in acquiring new interoperable and efficient IoT solutions, INTER-IoT will strengthen AFT's position as a valuable facilitator and counsellor of the industry.

AFT envisions a B2B business model oriented to French transport companies taking into account joint exploitation with the INTER-IoT partners.

AFT will assist to the SITL Conference that will take place in Paris on September 2018.

ASL TO5

The Hygiene Nutrition Unit of the Complex Unit of Food and Nutrition Hygiene is a public body organization that works in the Preventive Department of a Local Health Centre in the National Health System. This Unit works promoting appropriate eating habits and practice of physical activity to prevent the development of chronic degenerative diseases; it works performing nutritional counselling and educational interventions on the population.

ASL TO5 is involved in the development of the Mobile Health use case concerning monitoring of lifestyles "Decentralization and monitoring of lifestyles" in collaboration with UNICAL, XLAB and SABIEN. The system will be built using a new IoT platform, called INTER- Health (INTER-FW Web app and mobile app), obtained by integrating two existing heterogeneous and not interoperable IoT platforms: UniversAAL and BodyCloud providing us devices and platform to collect and storage the data for testing interoperability. ASL TO5 needs technical support, to ensure the management of the pilot and needs ethical support, to guarantee privacy and security issues at all level: detection from device, collection on database; sharing for dissemination activity.

As public health entity, ASL TO5 refers to the service offered thanks to the product and not to the product developed itself.

ASL TO5 will offer the INTER IoT web tool to the end user through a C2C business model by the promotion of the offered service and its functionalities to other potentially end users without not profit.

NOATUM

Noatum is owned by institutional investors, the majority of which are pension funds, advised by J.P. Morgan Asset Management Infrastructure Investment Group, and the Dutch Pension Fund Stichting Pensioenfonds ABP.

Noatum Ports: Investor in strategic terminals offering efficient handling services managed by an experienced team of professionals: Bulk terminals, Container terminals, Multi-purpose terminals, Rail terminals, Ro-Ro, and vehicle terminals.

NOATUM as a logistic company offers a perfect environment to test INTER-IoT developed products. Hence, NOATUM is making available the execution of them, allowing communication with the existent systems and platforms doing and making the required tests.

NOATUM aims to take advantage of INTER-IoT potential by offering the connectivity of its logistic operations with their clients as a unique operation chain giving them a visibility of their cargo to its customers. Additionally, NOATUM plans to use the IoT platform to offer value-added services such as reefer container monitoring, parking spaces information and just-in-time operations. The data provided by INTER-IoT can be used to enhance the systems to be more efficient and environment friendly.

NOATUM does not sell the product, it will use it with their clients.

The following table shows the global map of the collaborators individual and joint exploitation perspectives.

Entities	Market product/solution	Market services	To whom?	B.M.	Commercialization figure	Price model
AFT	INTER-LogP	Advice/assistance services	Transport Companies	B2B	Research Organization	Free of charge

| ASTLO5 | INTER-Health Remote Care App | Promotion between users | Health end users | C2C | Research Organization | Free of charge |
| NOATUM | INTER-LogP | To give add value to its clients | Customers | - | - | - |

Table 36: Collaborators concrete individual/joint exploitation plans

The ASTLO5 and AFT collaborators aim to take advantage of the INTER-IoT results in order to become reference advisors in e-Health and Smart Transport respectively, but they do not have a concrete exploitation business plan, due to its public nature.

NOATUM as a Logistic Company aims to offer add value to its end customers and it has not either a concrete exploitation business plan.

5.4 Third parties' exploitation

Third parties' ecosystem will allow to enlarge the INTER-IoT ecosystem and create more impact in the European IoT sector through business model development based on the exploitation of results of INTER-IoT project.

In order to measure this impact, the third parties from Open Call have asked by the ET to update their exploitation perspectives presented in D8.7a. through the second iteration questionnaires.

This figure shows the third parties ecosystem structure threefold: SME, research organizations and universities.

Figure 14: Third parties from Open Call

5.4.1 SME perspectives

The following table list the five SME that have participated in the Open Call of INTER-IoT.

Entity	Type of entity	PROJECT Name
INFOLYSiS P.C.	SME	SOFOS: A software-defined end-to-end IoT gateway with virtualization capabilities
NEMERGENT SOLUTIONS SL	SME	Mission Critical operations based on IoT analytics (MiCrOBIoTA)
IRIDEON, S.L	SME	SENSHOOK
AvailabilityPlus GmbH	SME	SecurIoTy - security for the IoT
e3tcity S.L.	SME	E3Tcity Smart City Platform and Devices Integration

Table 37: SME involved in Business Exploitation

Below the individual/ joint business perspectives of these five entities are summarised.

INFOLYSiS

INFOLYSiS proposed service is the provision of an IoT virtual Gateway (IoT vGW) with SDN/NFV functionalities which will solve IoT interoperability issues due different IoT protocols being used within the framework of SOFOS project. Through the use of INTER-IoT infrastructure the proposed software-defined end-to-end IoT addition with SDN/NFV capabilities on the INTER- IoT GW will be tested under real conditions and it will be further improved.

Within the INTER-IoT project, the proposed advances are aiming at enhancing the INTER-layer of the INTER-FW by adding SDN/NFV orchestration capabilities. In specific, INFOLYSiS proposed service focuses on integrating SDN/NFV Controller/Orchestrator (such as OpenDaylight SDN Controller and OpenBaton NFV Orchestrator) at the INTER-IoT GW, allowing the unified management of the INTER-IoT virtual network by appropriate service chaining between physical smart objects and virtual functions

INFOLYSiS, based on the experimental results of SOFOS, will further improve the performance and the stability of the proposed mapping/proxy VNFs (virtual network functions) and the best performed will be further exploited in 1-3-year plan for bringing them to the market in a SaaS business model.

INFOLYSiS plans to go to market through direct sales independently from other partners of INTER-IoT due to it is a standalone service provided upon sales of licenses under different price packages (based on the type of company/use and required IoT functions) following the VNFaaS model paradigm.

The IoT vGW SDN/NFV Manager will impact the industry and the research community to innovate, experiment and demonstrate the advantages of the integrated software-based interoperable IoT networking leading to novel services and technological benefits in the industry. INFOLYSiS estimates that a 30% of the current customers could become potential customers of the novel solution.

INFOLYSiS is active in commercial dissemination of the product detecting several leads and concentrated it is efforts in conferences that took place in Athens.

INFOLYSiS already has a range of business partners from other commercial activities. A special need for further specialized expertise of a partner has not been spotted up to now.

NEMERGENT SOLUTIONS S.L

The NEMERGENT business idea is to support the upgrade of technologies around the mission critical communications in three main areas: citizen-to-authority communications, professional communications and IoT-based decision making and emergency handling.

Currently, NEMERGENT is in the initial phase, developing the product and making the feasibility analysis and plans to go into the market in 2019-2020. They can go independently for the general concept but not for the specific implementation. They are making dissemination to T other companies, e.g. in EENA Conference 2018.

NEMERGENT plans to offer two products with different associated business models:

- Nemergent Back-end: it is an integrated unified communication component, which includes adaptors to NG112, MCPTT and IoT. In this case, the IoT connector is the MC-IoT module under development in INTER-IoT. In our case, the MC-IoT component is using the INTER-MW. B2B with licensing.
- Nemergent Front-end: it is an implementation of the GUI for unified communications. B2C as a product.

NEMERGENT has assisted to the Critical Communications World and Mobile World Congress during 2018 and has detected 25 leads and estimates that 5 of their existing customers can be potential customers of this product.

NEMERGENT seeks to set up a Strategy Alliance with a Critical communications company and has conversations with some of them.

NEMERGENT is an external user of the INTER-IoT technology and needs a mature status of the solution. The own development is still in the early stages.

IRIDEON S.L

IRIDEON has concluded that to meet their customer needs, and to unlock the full commercial potential of their Senscape® products and services, they need to develop our own middleware: SENSHOOK.

SENSHOOK will allow IRIDEON to deliver an open, interoperable, disruptive, standards-based tool for the development of end-to-end IoT applications according to the INTER-IoT framework.

IRIDEON plans to exploit the following products and services:

- Senscape® licenses to third party developers, with a yearly fee for updates and support, with SENSHOOK always provided as an open-source software.
- The provision of services, e.g. to develop custom solutions, with SENSHOOK installed as a component of an in-house or private cloud or b) as-a-service.
- Provide a Smart Mosquito Trap based on Senscape®, with SENSHOOK installed as a software component of the final solution.

IRIDEON plans to go to market through distributors in 18 months independently due to the SENSHOOK component developed under INTER-IoT is technically independent from other partners and will be provided as an open-source software solution, available in GitHub for free downloading.

IRIDEON plans to have Strategy Alliance with Universities and Sensor manufacturers in order to gain added value by leading users of our product in the academic community and by the development of plug&work sensor solutions and joint plans to develop new products based on Senscape.

IRIDEON has assisted to IoT Solutions World Congress 2017, Smart City Expo World Congress, 12th edition of INTO – International Tourism Innovation Seminar and Mobile World Congress detecting more than 150 leads.

IRIDEON has collaborated with NEWAYS and UPV in the development SENSHOOK.

IRIDEON Key IPR items are: 1) the SENSHOOK open tool, 2) SENSOS operating system, and 3) the design of their baseboards. IRIDEON has carried out a freedom to operate analysis and does not foresee any IPR conflicts.

The Senscape® framework (source code) will be protected as a trade secret and enjoy copyright protection as original work under the Directive 2009/24/EC on the legal protection of computer programs. Design documents on our hardware platforms will be distributed, under a Creative Commons license or under an open source hardware license with the same effect.

SENSHOOK will be provided as an open-source software and available in GitHub for free downloading

The Senscape® framework will comply with IEEE 802 IoT standards, IEEE 1451 (Smart Transducer Interface Standard) and IEEE 11073 family of standards for medical-device communication. IRIDEON will follow the IEEE P2413 working group, responsible for designing the standard for an Architectural Framework for the Internet of Things (IoT). The Senscape® hardware will comply with the required EC Directives including the EMC and LVD Directives.

AvailabilityPlus GmbH

AvailabilityPlus GmbH plans to put into the market the products derived from the SecurIoTy project called DocRAID, that will solve data privacy and protection issues as well as security concerns, thus reducing a major barrier for the successful proliferation of the Internet of Things.

SecurIoTy can be used standalone or as a component within the larger framework and uses INTER-IoT to address the problem space.

AvailabilityPlus GmbH has been already launched the standalone product offering B2B standalone versions of the product. Additionally, they offer a B2C version of the product, which can be bought online in a self-service setup. AvailabilityPlus GmbH works with channel partners to distribute to customers. Their entrance into the market has been independently from other partners because they offer a standalone version which can be operated without integration into adjacent systems.

DocRAID covers three modalities: Enterprise, SME and Datarooms and it is offered as a SaaS. The two firsts have a license per seat (10€ per seat and month) and the last one named licenses (10€ per data room and month).

Their target market is very big because security is cross vertical and international. The fact is that any corporation, SME and private individual needs to store and transport protected data.

AvailabilityPlus GmbH has signed up sales channels partners in January an April 2018 in Germany, Poland and Greece in sectors such as Healthcare, defence, and advisory. They have also detected commercial leads.

AvailabilityPlus GmbH has been very active during 2018 in commercial industrial events such as: PnP Singapore, Viena WeXelearte, NFK Summit, Pioneers, Thechdays Munich, VivATech.

AvailabilityPlus GmbH is using INTER-Framework from INTER-IoT where SecureIoTy is a secure storage and transportation layer within the INTER-Framework.

e3tcity S.L

e3tcity manufactures devices adapted to IoT concept called e3city controllers and focuses on Smart City and Smart Facilities markets. The e3city controllers are:

- LS40: Outdoor streetlight controller with enhanced sensor capabilities. Turns streetlights into a Smart point of the city or facility, improving existing services and giving new ones.
- LB40: Indoor central controller that can measure and control a whole facility
- LC40: Outdoor streetlight controller designed to be cost effective.

e3tcity has already place the product e3city controllers into the market through a B2B business model oriented to big integrators and municipalities offering technical services associated (installation, maintenance, support, cloud, etc.).

These devices can be sold independently because e3city provides a small working platform with devices independently of INTER-IoT.

They are very active in exploitation actions with visits to Municipalities and its participation in Mobile World congress that helped them to detect leads. They plan to assist in the next year's Smart City Expo World Congress with a booth.

They already work with partners such as telecom operators and installers to offer a better add value to their services.

Currently an investor has entered the company to push it and get revenue. This fact is expected for 2019 due to the current raising of sales and product maturity.

The following table shows the global map of the SME from Open Call individual and joint exploitation perspectives considering that some aspects of the individual and joint "Go to market" strategy are confidential and cannot be part of this document.

Entities	(o) (U/I)	Market product/solution	Market services	Sector	B.M.	Price Model	S.A (*)	Time to market	How? (**)	Number customers in EU
INFOLYSiS, P.C.	U	IoT vGW SDN/NFV Manager	-	IoT related Industry, Businesses, research communities and stand-alone customers	B2B and B2C	No OSS Annual licenses under different price packages (following the NFVaaS model)	N	1-3 years	1	-
NEMERGENT SOLUTIONS SL	U	Nemergent Back-end:	-	Control Room Mission critical Operations	B2B	No OSS Licensing	Y	1-2 years	1	-
		Nemergent Front-end	-	Control Room Mission critical Operations	B2C	No OSS Product	Y	1-2 years	1	-

IRIDEON, S.L	U	Senscape®+ OS SENSHOOK	-	Cross domain IoT sensors	B2B	Sales of hardware and license 50€ HW unit and 200 € annual license	Y	18 months	1	-
		-	Consultacy services about SENSHOOK	Cross domain IoT sensors	B2B	Consultancy cost	Y	18 months	1	-
		Smart Mosquito Trap + SENSHOOK based on Senscape®+	-	Cross domain IoT sensors	B2B	Sales of hardware and license	Y	18 months	1	-
AvailabilityPlus GmbH	U	DocRAID	-	Cross domain IoT sensors Security	B2B and B2C	Enterprise, SME a license per seat (10€ per seat and month) DataRooon named licenses (10€ per data room and month)	Y	Already in market	1	3
e3tcity S.L.	U	E3city controllers	Devices sales and technical services	Big integrators and Smart Cities	B2B	Devices sales and supporting costs	Y	Already in market	1	-

Table 38: SME individual exploitation plans

(o) Uses or Improves INTER-IoT (U/I)

(*) SA: Strategy Alliance: Yes (Y), No (N)

(**) 1 Independently from other partners signing IPR Agreements, 2 In joint exploitation

(***) Confidential

From the table above some conclusions can be extracted. On one hand, all the SMEs use INTER-IoT and envision individual B2B business models and also B2B/B2C like INFOLYSiS, AvailabilityPlus GmbH and Nemergent based on market-oriented products oriented to very diverse sectors such as: IoT Industry, Business research communities, stand-alone customers, Control Room Mission Critical Operations, Cross domain IoT sensors, Big Integrators and Smart Cities. E3city and AvailabilityPlus GmbH have placed their products into their respective markets and other plans to put their products within an average of one and a half year from the end of the project.

There are no OS prices models and all of them consider the need of having strategy alliances to reinforce their products but INFOLYSiS and all of them can go independently from INTER-IoT partners to the market having on mind that IPR issues should be previously analysed.

The fact that two market-oriented products have been already placed into markets and that the start-up AvailabilityPlus GmbH has achieved three potential customers in EU is a good indicator of impact creation of INTER-IoT.

5.4.2 Universities and Research Organization perspectives

The following table lists the seven entities from University and Research Organization that have participated in the Open Call of INTER-IoT.

Entity	Type of entity	Project Name
Athens University of Economics and Business	University	ACHILLES: Access Control and autHenticatIon deLegation for interoperabLE IoT applicationS
University of Twente (UT)	University	Interoperable Situation-Aware IoT-Based Early Warning System
TU Wien	University	INTER-HINC: Interoperability through Harmonizing IoT, Network Functions and Clouds
ITIA CNR	Research organization	A Semantic Middleware for the information synchronization of the IoT devices
Vrije Universiteit Brussel	Research organization	INTER-OM2M
CEA	Research Organization	Integrating sensiNact platform with INTER-IoT Framework
Universitat Pompeu Fabra	Research Group – Public Organization	INTER-HARE platform: Integration of multiband IoT technologies

Table 39: Universities and Research organization involved in Business Exploitation

Below the individual/ joint business perspectives of these seven entities are summarized.

TUE-Wien

TUE-Wien provides a toolkit called INTER-HINC rsiHub for supporting dynamic interoperability solutions. This toolkit could be the basis for performing their service consultancy, including architecture design, solution development and training. Our product improves INTER-IoT components.

TUE-Wien plans to go independently into market on October 2018 making the toolkit available as open source and actively search for possible consultancy business. This toolkit can be used to interface other INTER-IoT components from other partners, but it is independent from other partner work.

TUE- Wien has detected a lead to work with Ericsson R & D Bangalore (India) as potential user of the toolkit and is working with the Da Nang University of Science and Technology in Vienna on integration of our product for smart city video analytics. TUE-Wien has collaborated with UPV and PRO.

Athens University of Economics and Business – Research Centre (AUEB)

AUEB provides the ACHILLES concept that is that IoT service providers store access control policies in Access Control Provides (ACPs) and in return ACPs generate secret keys which are stored in the virtual gateway. Additionally, the gateway is configured with pointers to the access control policies that protect sensitive resources. Every time a client requests access to a protected resource the gateway uses a secure hash function to generate a session key.

ACHILLES improves INTER-IoT's virtual gateway to provide "access control delegation" by offering three commercial products: ACP (open source), ACP professional and ACP for companies through B2C and B2B business model with a clear price estimation.

AUEB plans to setup a spin-off that will act as an ACP and will provide customized ACP services at the end of the project.

AUEB can go independently into the market because the operations of an ACP are orthogonal to the INTER-IoT platform, but they need IoT OS manufacturer to make their product a "de-facto" security solution.

AUEB plans for the first 18 months of the proposed project lifetime to depend mainly on research funds that will allow them to develop initial prototypes and thus start seeking right afterwards external funds (angel investors) and first market adopters. Through this process AUEB expects to relay from year 3 and onwards on market revenue and further investment funds.

University of Twente

The University of Twente (UT) business exploitation plan includes the exploitation of a commercial product and professional services related to it. The product is the IoT solution, an Early Warning System, that they are building to improve interoperability of smart emergency services. The solution is leveraged by the integration of an e-Health wearable (an ECG device), which provides an open-source mobile app (Shimmer3 ECG), with a logistics-enhanced existing mobile app (MyDriving), which is the official (open source) use case of MS Azure IoT platform.

This solution IoT EWS is targeted for the market segments of transportation (haulier) companies and port authorities through a B2B open source business model with MIT license. The prices will be different according to specific algorithms for accident detection.

The professional provides by them contemplates the deployment, operation and maintenance of this solution offered by SaaS and subscription on top of MS Azure subscription.

A start-up company was already created (semiotics-iot.eu) as a spin-off of the University of Twente.

The product uses and improves the INTER-IoT components: uses the IPSM/INTER-MW components to integrate the data collected by the sensors with the cloud solution and improves IPSM by adding new semantic translations, especially regarding the translation of the 2 most notorious standards for the IoT: W3C SSN/SOSA and ETSI SAREF.

The UT plans to go into the market on November 2018 independently from INTER-IoT due to if IPSM is not available, they can implement the semantic translations with another approach.

Vrije Universiteit Brussel

VUB is developing a bridge between the INTER-IoT and a OneM2M system. Those efforts are documented and will be communicated to a group of SMEs and larger companies. Knowledge transfer to Flemish and Brussel's companies is their first goal when it comes to valorisation of results. Second goal is to use the obtained knowledge in new R&D projects with SMEs or larger companies.

The VUB plans to offer a Course on OneM2M and Interoperability oriented to SMEs and larger companies I IT and ICT with local funding. The idea is to sell it through technology transfer projects such as TETRA projects.

The VUB plans has organized the user committee meeting in framework of ongoing project Horizontal-IoT in June 2018, during which the results obtained in Inter-OneM2M have been presented. In November, they will organize the Cloud computing conference (Cloudtech2018) presentation of our results via posters and scientific publications and in October 2018 they will actively participate into the ETSI IoT week Standards & Technologies for the Smart World, ETSI, Sophia Antipolis, FR

VUB seeks collaboration with SMEs and larger companies in technology transfer projects, H2020, Marie Curie, ITN, but also through local R&D funding.

Universitat Pompeu Fabra

HARE Monitoring reefer container, is a platform that creates synergies between LPLANs (Low-Power Local Access Network) and LPWANs, based on an IoT platform easily scalable and flexible.

The possible commercialization of HARE will be firstly evaluated by UPF's innovation unit. The product developed is not still in a high level of TRL and hence a previous maturation phase it is necessary to be developed.

UPF bases its commercialization to the market through licenses agreements or the generation of a spin-off.

UPF can go to the market independently because their solution could be adapted to other platforms that could also offer the interoperability of the INTER-IoT platform.

UPF has carried out several commercial presentations and have been very active in commercial events such as IoT solutions world congress (2017), Smart City expo (2017) and Mobile World Congress (2018), detecting several leads.

UPF has collaborated with UPV for implementation of the communication between their gateway and the INTER IoT platform.

CEA

CEA is using INTER-IoT components in order to ensure the interoperability of the sensiNact platform with the other platforms using INTER-IoT (Inter-IoT API and data models).

As CEA is a research institution, CEA does not commercialize its platform. However, its mission is to bring the research outcomes to industry via bilateral collaborations with its industrial partners.

They also will continue adding new features coming out from current and future collaborative R&D projects.

CEA plans to offer mainly in the Smart City market support, maintenance and training services plus specific developments on sensiNact platform to integrators, through an open source model within two years with CEA's industrial partners.

Currently they have about 15 potential customers in short terms (cities, integrators, SMEs).

CEA has participated in industrial events such as Smart City Expo (Taipei), Industrial Internet Consortium and Smart City Expo (Barcelona) and will assist in 2018 to Smart City Expo (Barcelona) and the Urban Technology Alliance (Barcelona).

CEA considers important to have integrator partners to Integrate their platform to the solutions they provide to their customer and Software editors partners to adopt and enhance our platform and contribute to its open source code.

CNR-ITIA

CNR-ITIA is a research institute oriented to the Transport/ Logistics sector and has developed the Semantic Middleware (SM), which aims to enable near real-time signalling capabilities to all the devices connected with the SM.

The key feature of SM is that it allows to express all the information exchanged among the connected resources under the form of semantic model. Thanks to the development of a bridge, SM is also connected with INTER-IoT-MW, thus allowing the integration of SM with other IoT platform connected with INTER-IoT.

SM is using three components of INTER-IoT: INTER-MW, IPSM and the Global Ontology.

CNR-ITIA plans to place into the market SM at the middle of 2019 independently from INTER-IoT partners because this product is an independent stand-alone application which does not depend from other components.

Its industrial exploitation plan includes the following actions:

- The evaluation of the possibility to register the trademark Semantic Middleware
- The definition of a marketing strategy to bring the final product to a large group of end users, exploiting various channels. During this stage CNR-ITIA will be supported by a marketing company or alternatively CNR-ITIA will provide its framework to companies interested to follow this strategy and then sell the product. Being the CNR-ITIA an RTO we do not have skill and competences for this stage.

- The release an updated version of Semantic Middleware as a finished product and is fully functional (TRL 9), supported by other companies.

CNR-ITIA will address SM to IoT platforms owners/providers, IoT devices owners/providers and IoT platform integrators through a B2C business model based on a subscription type license model.

CNR-ITIA target market is concerning the software applications enhancing the semantic interoperability where it has 2 or 3 partners interested.

CNR-ITIA plans to participate after the project in different commercial industrial events such as: Conference Semantics 2018 (Vienna, Austria), 9th International Workshop on Formal Ontologies meet Industry (Nantes, France) and Internet of Things Week 2019 (Aarhus, Denmark).

CNR-ITA would like to establish a strategic alliance with a cloud provider in order to investigate the potential of the Semantic Middleware in dedicated cloud server it would be easier to investigate the potential of the Semantic Middleware.

As CNR-ITA is willing to cover for this product SM the entire supply chain of innovation, from industrial research to engineering, and industrialization, thanks on one hand to the skills acquired and on the other to collaboration with numerous industrial, scientific, and academic partners.

The activities envisaged by SM are already part of the CNR-ITA's investment plan and they will in any case be implemented even without any financial assistance. The CNR-ITA's ambition is to integrate synergistically with the initiatives of the Italian research project CasAware and with the fabric of local / national companies, through the strengthening of collaboration between companies and research.

The following table shows the global map of the UNI/ Research organizations individual exploitation perspectives.

Entities	(o) (U/I)	Market product/solution	Market services	To whom?	B.M. (*)	Commercialization figure	Price model
Athens University of Economics and Business	I	ACHILLES ACP	-	Developers	B2C	Spin-off OSS	It will be offered for free 0€
	I	ACHILLES ACP professional	-	Companies	B2C	Spin-off	5€/month/user
	I	ACHILLES ACP for companies	-	Companies	B2B	Spin-off	1000-5000€/year
University of Twente	U	IoT-EWS	Services: deployment, operation, and maintenance	Transportation (haulier) companies and port authorities	B2B	Spin-off Start-up: semiotics-iot.eu	OSS (MIT license) Different prices according to specific algorithms for accident detection.
TUE-Wien	U /I	INTER-HINC rsiHub	Service and Consultancy	IoT Cloud Developers and Operators, Software vendors, IoT industries, Researchers	B2B and B2C	University OSS pay-per-service Consultancy	Consulting services costs

Vrije Universiteit Brussel	U	Course on OneM2M and Interoperability		SMEs and larger companies I IT and ICT	-	Local funding	-
CEA	U		sensiNact: Support, maintenance, training services + specific developments	integrators	B2B	OSS EPL (Eclipse Public License	Confidential
Universitat Pomepou Fabra	U	HARE protocol		Logistics: Companies that offer solutions based on the use of Wireless Sensor Networks	B2B	OSS Exploitation of results by third parties: license agreement or the generation of a Spin	-
CNR-ITIA	U	Semantic Middleware (SM)		IoT platforms owners/providers; IoT devices owners/providers; IoT platform integrators;	B2C	License agreement with third party companies of by their own	Payment of a License by Subscription type. Price is not decided yet

Table 40: Universities and Research Organizations concrete individual/joint exploitation plans

(o) Uses or Improves INTER-IoT (U/I)

(*) SA: Strategy Alliance: Yes (Y), No (N)

(**) 1 Independently from other partners signing IPR Agreements, 2 In joint exploitation

(***) Confidential

Some conclusions can be extracted from the table above. First of all, it is very remarkable that four of the seven listed entities have not only used INTER-IoT but also have improved it. This fact is very important for community building around INTER-IoT and for INTER-IoT OS business model engagement. For instance, AUEB, UT, TUE Wien, CEA, and UPF have envisioned part of their business models B2B/B2C based on OS.

It is also remarkable that almost all of them have oriented their business models based on product market strategy with associated professional services. Even VUB has contemplated the exploitation of the results through a course oriented to professionals like SMEs and larger companies. The appearance of two spin-offs from AUEB and UT is also an important issue to create impact in business growth around INTER-IoT.

5.5 Extracted market and competitor analysis

As the LLAVA Matrix indicates, the market trends research and the competition analysis helps in the definition of individual exploitation B2B or B2C solutions (products and services) oriented to solve the specific needs of selected client types from the market sectors where the INTER-IoT partners foster to achieve market share.

The INTER-IoT partners and the third parties from the Open Call were asked to identify their main competitors and to analyse how they differ from them answering the question: WHY YOU?

These two tables show the results of the collection of data from second iteration questionnaires (Annexe C and D).

5.5.1 INTER-IoT consortium competitors

Entities	Type	COMPETITORS	WHY YOU?
RINICOM	SME	RINICOM has clearly identified its main competitors in the e-Health sector: Phillips ECAR COORDINATOR/COMPANION, Infinium medical and Bionetus BM3.	RINI also includes an ECG and the direct connection to the GP system. The wireless sensors are more aesthetically pleasing. Much longer battery life for day long usage and lower price
PRO	SME	PRO has identified its main competitors in Smart Port sector: Emetel System (Spain) with AGATA, Balticon S.A (Poland), SAAB (Canada), ORBCOMM Inc. (New Jersey. In Smart City sector: INDRA and Telefonica.	There are no existing frameworks and apps in the market to achieve interoperability between IoT platforms. There are no existing tools that make possible to integrate devices and systems taking into account the semantic aspects.
XLAB	SME	As XLAB has not created a specific market-oriented product, XLAB cannot identify direct competitors. Though, there are several unlabelled middleware and integration developers that could be considered competitors in steps ahead.	-
ABC	SME	The main competitors of ABC are the consulting companies and the small developers.	ABC differs from the consulting companies offering boutique consulting more tailored to specific needs and much higher value. Regarding small developers, ABC has a deep specific knowledge on this particular sector

NEWAYS	Industry	NEWAYS competitors are Prodrive, Zollner and Kimball.	INTER-IoT will help to differ from them by NEWAYS enabling the manufacturing companies to fill in the role of lifecycle partner for the IoT NEWAYS customer.
SABIEN	Research Organization	SABIEN has detected three main competitors Philips (FocusPoint), Everis (ehCOS) and General Electric (prediX) that are offering high degree of novelty solutions with few real deployment cases.	INTER-HEALTH Professional Web Tool differs from all of them by terms of standardization, interoperability and the use of wearable sensors.
VPF	Research Organization	The VPF's competitors are the consultancy firms which develop or implements new technologies in Port environments.	VPF offers better relationship with the stakeholders.
ASL TO5	Public Body Organization	It is not applicable	It is not applicable
AFT	Research Organization	Not applicable.	It is not applicable
NOATUM	Logistic Company	Others big groups of terminals that are in the process to digitalise their company as APM or TIL.	The data provided by INTER-IoT is used to enhance the systems to be more efficient and environment friendly.
UPV	Public university	In Spain there are only three official masters of IoT imparted by UPC, Salamanca University and Alcalá University. At European level, different universities and research centres are competitors of UPV.	None of them is very focused on major concerns in IoT, such as interoperability and security. None of them offers practical exercises (they are mainly theoretical) and an interoperability suite to interconnect systems. This ability can be critical to understand how to implement and how to fully exploit the benefits of IoT systems. The SaaS interoperability tools allow a practical use of platform-to-platform interoperability and interconnection in IoT at different levels.
UNICAL	Public university	UNICAL identified as competitors other Public University or Research Organization.	UNICAL has the largest student campus in Italy. UNICAL is the first, among southern universities, for technology transfer performances, eighth nationwide (evaluated 58 universities) and third among medium-sized universities (23 in total).
TUE	Public university	The main competitor are the University of Twente and Delft University.	TUE differs from them because its Education Kit delivers expertise for end-to-end IoT Engineering and it is better positioned in Brainport Area with more IoT-related industry in vicinity
SRIPAS	Public Research Organization	SRIPAS is in competition with other Institutes of Polish Academy of Sciences.	SRIPAS is the only one that is directly involved in IoT research.

Table 41: INTER-IoT consortium competitor analysis

Third parties from Open Call competitors

Entities	Type	COMPETITORS	WHY YOU?
INFOLYSIS.PC	SME	The main competitors are OCF-AllJoyn and PTC-Axeda Machine Cloud	INFOLYSIS.PC offers cloud-based services, seamless interoperability to the user, pay as you go and emphasis on smart home solutions with chatbot interface.
NEMERGENT SOLUTIONS SL	SME	Not identified	NEMERGENT SOLUTIONS offers diversity of communications, expertise and availability for SW licensing.
IRIDEON, S.L	SME	Proprietary development kits from semiconductor manufacturers (Incl. TI, Atmel, Microchip, etc.)	Less significant technical skills required, with a shorter steep learning curve, easy system validation before use, integration with mobile apps and Cloud software solutions provided.
		Open source hardware platforms (Incl. Arduino, Raspberry Pi, BeagleBone, ARM mbed, etc.)	Flexible design, extensive firmware library, Plug&work supported, appropriate for small and large-scale projects.
		Mobile based applications (Incl. AllSeen Alliance, Alljoyn, Open Data Kit, etc.)	Use of international standards to facilitate publication and sharing of data, with data protection and security. Smart devices and sensors do not have to be integrated by the user. Targeted companies of all sizes: small, medium and large companies
AvailabilityPlus GmbH	SME	Amazon, Azure or Symantec	Unlike data encryption services from cloud application service providers such as Amazon, Azure or Symantec, SecurIoTy is based on crypto proxy technology. AvailabilityPlus GmbH protects data at rest and in transit. AvailabilityPlus GmbH even has a zero-knowledge policy, i.e. the user defines the level of security needed up to the point where they a service provider have no chance to look at cleartext data (the user gets to keep and manage the encryption key material). Corporations benefit from SecureIoTy in the following ways: - Use benefits of cloud services without compromising security, compliance and data protection -Protection against physical-, cyber-, and legal threats - Data protection during transport and storage - Distribute data across multiple jurisdictions - Protect IoT, file exchange, email and other use cases -Fast roll-out, keep legacy infrastructure
e3tcity S.L.	SME	The direct competitors are: 1.-Libelium, 2.-IoTSens and 3.-Wellness Telecom.	1: More customer and product focused 2: Product more mature 3: HW self-made

Athens University of Economics and Business	UNI	The competitors are: 1.- Onelogin, 2.- Facebook connect, Google login, etc. 3.- Eclipse Keti	1: Easier integration with IoT devices 2: Not integrated with business environments 3: Not bound to a particular technology
University of Twente (UT)	UNI	The competitors are: 1.- Nevon projects: IoT heart attack detection 2.- FocusCura: cAlarm Personal Alarm 3.- Sense4care: fall detection 3.-Others: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5334130/pdf/hir-23-4.pdf	1: Complete solution considering both the ECG device and the cloud infrastructure with IoT platform. 2: Focus on automatic accident detection, integrating health data with vehicle data. 3: Focus on cardiac monitoring. 4: The UT solution does not focus on the ECG device itself (as the majority), but in the integration of this data with logistics data to automatically detect accidents and risks of accidents.
Universitat Pompeu Fabra	UNI	Their direct competitors from the public sector are the different research groups focused on similar research areas, such as: GRCM-UPC, WNG-UPC, and WINE-UOC.	We have in common, as university research groups, our long-term capacity of research. Nonetheless, we offer, as a differentiation, the combination of two important aspects for us: research and technology transfer. We try to be balanced as we are interested in adapting our research results to the societal challenges. Moreover, our research unit comprises different and transversal research fields, that allows us to offer more services compared to our competitors.
TU Wien	UNI	Not identified	-
VUB	Research Institute	Any other research institute or training institute in Belgium or even EU, dealing with interoperability and networking as well as security aspects.	VUB organizes hands-on sessions for SMEs, as well as demo sessions, exploring the practical problems that can arise when building OneM2M and Interoperable systems. They have been very actively experimenting with different platforms and their corresponding bridging possibilities to offer interoperability. Moreover, they have a concrete use case running, showing the potential of applying an interoperable service layer architecture.

CEA	Research Organiztion	1.- ESF: a communication framework for heterogeneous IoT devices; cloud infrastructure for data analysis 2.- FIWARE Orion CB: specified way of communication between devices and applications 3.- IoTSens: Data collection platform and tools for visualisation of data (dashboards, reports, etc.) 4.- Kaa: cloud platform for interconnecting and managing IoT devices; device management and real-time data monitoring	1: CEA ads support for additional protocols and platforms from the smart city domain. CEA also provides a well-defined data and service model which is not the case in ESF. 2: CEA is not only providing support for FIWARE NGSI protocol but also other publish/subscribe and client-server type of protocols (MQTT, XMPP, OneM2M, HTTP, etc.) 3: CEA is providing more advanced data (processing complex event detection) as well as providing possibility of programming applications that would run on the platform with actuation possibilities, while IoTSens stays mainly on the sensing side and actions. 4: While Kaa does the processing in the cloud, CEA has, not only data analytics in the cloud, but also processing at the edge side
ITIA CNR	Research Centre	Providers of publish/subscribe middleware	The solutions of publish/subscribe middleware currently available in literature well adapt to the needs to synchronize the changing information among decoupled physical and virtual components distributed within an IoT platform. However, they lack mechanisms to express both the data requests from the devices and the notifications events in a flexible and expressive way, obligating the subscriber to know the topic offered by the publisher and to be able to process natively the published messages. Indeed, solutions currently available in literature support only static mechanisms of selection of the data to be exchanged, which are based on predefined syntactical subjects, while they do not consider different expressivity requirements normally needed in the definition of complex scenarios such in the AAL domain.

Table 42: Third parties competitor analysis

From the above market analyses extracted both the partners from INTER-IoT and the third parties from open call have clearly identified their main competitors and their key value in front of them. These two issues are very important in order to compare their prices models with the competitors and find the right marketing message to differentiate from them.

The table shows that competitors are there but the innovative aspect of interoperability of INTER-IoT allows all actors involved to highlight this aspect in front of their competitors giving added-value to the final potential customers.

5.6 Position into the market

The positioning in the market of the SME and other entities from the INTER-IoT consortium and third parties from the Open Call that have concrete exploitations plans based on the sale of products/services based on results of INTER-IoT is a key factor to measure the impact of INTER-IoT. It is said, a greater number of exploitation actions leads to more market impact creation and a better ROI.

The following table shows how the market-oriented products/services related in tables Table 32 and Table 34 contribute to the position of the companies and organizations into the diverse customer market segments with IoT demands.

5.6.1 INTER-IoT consortium

Entities	Type	POSITION OF YOUR ENTITY INTO MARKET
RINICOM	SME	The exploitation of the PRIME IoT Gateway product will help RINICOM to increase its presence in the Smart-Health care market increasing its reputation as a provider of state of the art healthcare technology and increase company valuation.
PRO	SME	The four products obtained from INTER-IoT: IoT Port Interoperable Solution IoT City Interoperable Solution, IoT Agri Interoperable Solution, IoT Industry Interoperable Solution, position PRO as high skilled technological IoT provider into the Smart Maritime/ Port and Smart City sector and opens the entrance to the Smart Agriculture and Industry sectors.
XLAB	SME	With the products/services derived from XLAB's effort, it aims to position itself in the Industry 4.0 market, with interest in IoT enablement of industrial processes.
ABC	SME	INTER-IoT helps to position ABC as a boutique consulting firm specialized in IoT architectures and INTER-IoT that will allow it to have a solution for specific industry problems for manufacturing companies
NEWAYS	Industry	INTER-IoT helps to position NEWAYS enabling the manufacturing companies to fill in the role of lifecycle partner for the IoT NEWAYS customer.
SABIEN	Research Organization	The knowledge of the INTER-IoT platform, components, and the implementation of the connection bridges with existing solutions (uAAL and other) positions SABIEN as a reference research group with capabilities and know-how on the integration of Health IoT systems and deployment of tools for managing and visualizing devices and data.
VPF	Research Organization	VPF has an international recognition in port and logistic research. This new knowledge in IoT systems, will improve the position of the company.
ASL TO5	Public Body Organization	INTER-IoT positions ASL TO5 as promoter of INTER-Health Remote Care App between potentially end users.
AFT	Research Organization	INTER-IoT positions AFT as advisor of French transport companies in acquiring new interoperable and efficient IoT solutions that will strengthen its position as a valuable facilitator and counsellor of the industry.
NOATUM	Logistic Company	NOATUM aims to take advantage of INTER-IoT potential by offering the connectivity of its logistic operations with their clients as a unique operation chain giving them a visibility of their cargo to its customers. NOATUM plans to use the IoT platform to offer value-added services such as reefer container monitoring, parking spaces information and just-in-time operations.
UPV	Public university	The Academic product and SaaS service positions UPV as a modern university that includes the latest IoT technologies in UPV course offer.

UNICAL	Public university	INTER-IoT outcomes will be fundamental for UNICAL to further increase its visibility in the IoT research area, specifically in the convergence of body area networks, mobile-Health, and interoperability methodologies.
TUE	Public university	TU/e, through education on IoT, is building new links with industry in the vicinity with joint education programs. Moreover, expertise built via INTER -IoT allows for creating new academia-industry partnerships on IoT domain.
SRIPAS	Public Research Organization	INTER-IoT results will help to SRIPAS to increase its visibility in the IoT research area

Table 43: INTER-IoT consortium position analysis

In case of SME and Industry, on one hand it can be distinguished the SME that have envisioned a market-oriented product by improving their existing products portfolio as PRO (Smart Port, Cities, Industry and Agri sectors) and RINI (e-health sector). In both cases, the envisioned exploitation results allow them to be more competitive in front of their current competitors offering add value in their products with IoT capabilities. Both will consolidate their presence into their existing target markets and open their entrance in new ones positioning themselves as specialized consultors in IoT.

On the other hand, for SME such as XLAB and ABC and Industrial partner NEWAYS that have not envisioned a product-oriented market strategy but services, INTER-IoT will help them be more visible into the Industry 4.0 market offering IoT enablement of industrial processes, solving industry problems for manufacturing companies and enabling manufacturing companies to fill in the role of lifecycle partner for the IoT NEWAYS customer, respectively.

From the research perspective, it can be differentiated into three types of positioning. On one side, the Research Organizations that have envisioned a clear market-oriented strategy like SABIEN (e-health sector), VPF (Port and Logistics sector). In this case, INTER-IoT positions research groups as reference research groups in EU on interoperability IoT and to have more visibility with industrial partners and customers in diverse sectors. This is the case of SRIPAS (ICT sector), SABIEN (e-health sector), VPF (Port and Logistics sector), where INTER-IoT positions both of them as reference research groups with capabilities and know-how on IoT having more visibility with industrial partners and customers.

On the other side, the Universities such as UPV, TUE, UNICAL and will have more visibility in the IoT research area and with the exploitation of the Academic Product and professional services

In case of AFT, ASL TO5 and NOATUM named as collaborators, the INTER-IoT project brings to AFT and ASL TO5 the possibility of increase its visibility as promoters of cutting-edge technologies between end users and advisors in logistic-transport and e-health sectors respectively. For NOATUM, it will help them to offer added-value services such as reefer container monitoring, parking spaces information and just-in-time operations.

5.6.2 Third parties from Open Cal

Entities	Type	POSITION OF YOUR ENTITY INTO MARKET

INFOLYSIS.PC	SME	INFOLYSiS, based on the experimental results of SOFOS, will further improve the performance and the stability of the proposed mapping/proxy VNFs and the best performed will be further exploited in 1-3-year plan for bringing them to the market in a SaaS business model, contributing in this way to the establishment of INFOLYSiS as a core market player in the IoT market/industry for the provision of interoperability services.
NEMERGENT SOLUTIONS, SL	SME	NEMERGENT is well positioned internationally as a technology provider in the area of MCPTT and keeps contacts and relationships with different solution providers and service providers all over the world. The position of NEMERGENT in the field of IoT systems is similar to other mission critical components already available (or in progress) in the portfolio of products. NEMERGENT wants to be active in the early stages of interoperable IoT systems, acting as a link between innovation actions and pre-commercial activities. Therefore, NEMERGENT will continue with innovative developments and early proof of concepts, reinforcing the company as one of the reference providers to accelerate third party developments and deployments.
IRIDEON, S.L	SME	The development of SENSHOOK according to the INTER-IoT framework will allow IRIDEON to address a wider range customers and applications, and to grow their revenue and the company, via more customer projects, via licensing of Senscape® platform, and exploitation of SENSHOOK as an open tool to easily integrate Senscape® hardware products in an in-house or private cloud solution, or as-a-service.
AvailabilityPlus GmbH	SME	They are a start-up in the cyber security area. As such, the project SecurIoTy and the resulting product DocRAID is very important to them to position them into the market.
e3tcity S.L.	SME	e3city controllers are their core business, some of the devices are cutting edge technology regarding communications (NBIoT)
Athens University of Economics and Business	Research Centre	The Athens University of Economics and Business (AUEB) is a dynamic institution of higher education in Greece. Although AUEB, and in particular the department of informatics, is producing high quality research results, there is a very weak track record of commercialization and exploitations of these results. The team anticipates that through the business exploitation of the project's outcomes, it will pave the path for other researchers to pursuit similar achievements. Without doubt, this will improve AUEB's ranking, thus it will become an even more attractive institution.
University of Twente (UT)	UNI	The product and related services are the core elements for the business model of the spin-off company. Therefore, they will be essential for the positioning of the company in the e-Health market.
Universitat Pompeu Fabra	Research Group	The UPF product is a key component that connects the final application market through the fundamental research performed by research institutions. The UPF visibility to the market makes UPF a potential actor in the technology transfer of new applicable research to multiple application scenarios. UPF tries to be balanced as they are interested in adapting their research results to the societal challenges. Moreover, their research unit comprises different and transversal research fields, that allows us to offer more services compared to our competitors.

TU Wien	UNI	This project is very important. It reflects their novel research contribution to position their organization in this direction.
VUB	Research Institute	VUB is a research institute with a large amount of different specializations. VUB promotes collaboration national and international, among other institutes and companies in all different domains.
ITIA CNR	Research Centre	Thanks to the innovative nature of the solution realized, endowed with some distinctive and exclusive features (interoperability of smart objects, artificial reasoning to extend knowledge on data collected by sensors, technological architectures capable of supporting Big Data), it is expected the project results will be able to respond effectively and efficiently not only to the weaknesses of current competitors' products on the market, but also to future evolutions in demand driven by technology trends.
CEA	Research Institute	CEA's mission is to bring innovation to industry, create jobs and increase the competitiveness of its industrial partners. With an open source IoT platform, we are in particular targeting SMEs, which do not have large investment capacities, to leverage their innovation with open platforms and tools.

Table 44: Third parties consortium position analysis

In case on SME, there are two start-ups such as e3City and AvailabilityPlus GmbH and the rest are more consolidated companies such as INFOLYSiS, IRIDEON and NEMERGENT SOLUTIONS, SL. For all of them, INTER-IoT will help to position themselves into their respective markets with new IoT solutions or improving the current portfolio solutions with IoT capabilities improving the revenue of the companies.

For the five research institutes, CEA, ITIA CNR, VUB, AUEB in the INTER-IoT project will help to improve the ranking of all of them and to bring innovation to industry and increase the competitiveness of its industrial partners.

In case of the three universities UPF, TU Wien and UT, INTER-IoT will allow them to be technology transferrers in the IoT technologies and in the case of AUEB and UT, the creation of a spin-off respectively.

5.7 Conclusions on sustainability after M36

This section highlights the main actions to be undertaken by the INTER-IoT project's consortium in order to ensure the sustainability of the project after the end of the project in December 2018.

Three axes have been identified to ensure the sustainability of INTER-Io. First of all, the joint exploitation reflected on common project development base on OSS is a solid base toward the sustainability of INTER-IoT. Second, the boost of the commercial already existing scenarios will assure the development of new services and products based on the core results of INTER-IoT. Finally, the boost of academic products will assure the engagement of students and developers to the INTER-IoT community thus boosting the development of new tools and knowledge with further R&D projects.

5.7.1 Boosting commercial existing scenarios

One of the key aspects to boost existing commercial scenarios is the active participation of the INTER-IoT's consortium and third parties from open call in industrial dissemination events to attract the attention of existing and new potential customers in EU.

The boost of the commercial already existing scenarios will assure the development of new services and products based on the core results of INTER-IoT that will attract to new actors thus increasing the INTER-IoT business ecosystem.

From the above analyses there are 19 from 26 entities both INTER-IoT consortium and Open call their parties with existing clear commercial exploitation purposes. They are not only SMEs/ Industry but also Universities and Research Organizations that envision individual B2B/B2C business models based on product or services market-oriented.

During this period these entities have participated in individual commercial industrial events in the existing commercial scenarios more like attendees and speakers than as exhibitors.

INTER-IoT consortium must present the final results of the project and the ecosystem around it in the most important commercial industrial events in order to create awareness of it. Therefore, after the end of the project, these 26 entities should enforce their commercial activities through its active participation as exhibitors o their final products/services based on INTER-IoT project.

5.7.2 Bosting of Academic products

An important element for the success of the INTER-IoT project after the end of the EU funding will be the strong links and interactions between the project and the academia. The INTER-IoT consortium is working closely with the academic sphere to integrate INTER-IoT's results in their pedagogic materials and curricula boosting the creation and exploitation of the Academic INTER-IoT Product leaded by UNICAL, spreading the knowledge among their or external students (companies, integrators, etc.).

On the other hand, the universities involved in the project ought to team up and create new partnerships to raising the profile of INTER-IoT and promote the project findings among other academic institutions and academic stakeholders, thus increasing the community building around INTER-IoT.

For further sustainability INTER-IoT's consortium must target and explore synergies and mutual interests with the following academic institutions or stakeholders: universities, researchers and young practitioners; teachers; students; teacher unions or associations; and other H2020 projects.

6 Open Source Software Community

6.1 Roadmap for community creation

The further development of the Freemium product beyond the project completion will rely on the maintenance and development of the INTER-IoT code base and supporting documentation. The partners in the INTER-IoT consortium are committed to the long-term success of INTER-IoT and the associated products that have been created and discussed above. In order to grow INTER-IoT, the community of users and developers must extend beyond the project partners. As such, establishing and maintaining an OSS community is a goal of INTER-IoT as it offers a path of sustainability and improvement of the project outputs beyond the end of the project. The project has decided to conduct four primary actions to grow and support a community:

- Integrate with current open source platforms
- Seek partnership with current open source projects
- Promote academic courses to increase adoption of INTER-IoT among students and academic staff
- Run an open call

6.1.1 Community engagement

Establishing and maintaining a community is a challenge. Leveraging existing communities by integrating with open source platforms is one key way to get the attention of developers in the OSS community. This has been highlighted by the reviewers. The current open source platforms integrated are:

- FIWARE
- UniversAAL
- Eclipse OM2M
- Sensinact

Integrating with the FIWARE and One M2M platforms also offers a route into some established projects. As part of our effort to engage with current open source projects, we have started the processes of INTER-IoT becoming an Eclipse project, and we have also begun the process to be part of the FIWARE Foundation.

6.1.1.1 FIWARE

Prodevelop as one of the consortium members, is a current FIWARE foundation gold member. They have explored the routes to adoption. The two primary options when engaging with FIWARE are to improve existing code or to provide something completely new. We believe that the gateway and framework could be good additions to the FIWARE code base and have a strong chance of being adopted. In this case, the contributor must sign a Contributor License Agreement before adding new files to the codebase. A full progress report in this area will be provided in D8.6.

6.1.1.2 Eclipse

Becoming an eclipse project is a challenging but rewarding prospect. With over 1500 committers and 270 member companies in 2017, it is one of the largest open source communities. The process of integration is long and demanding.
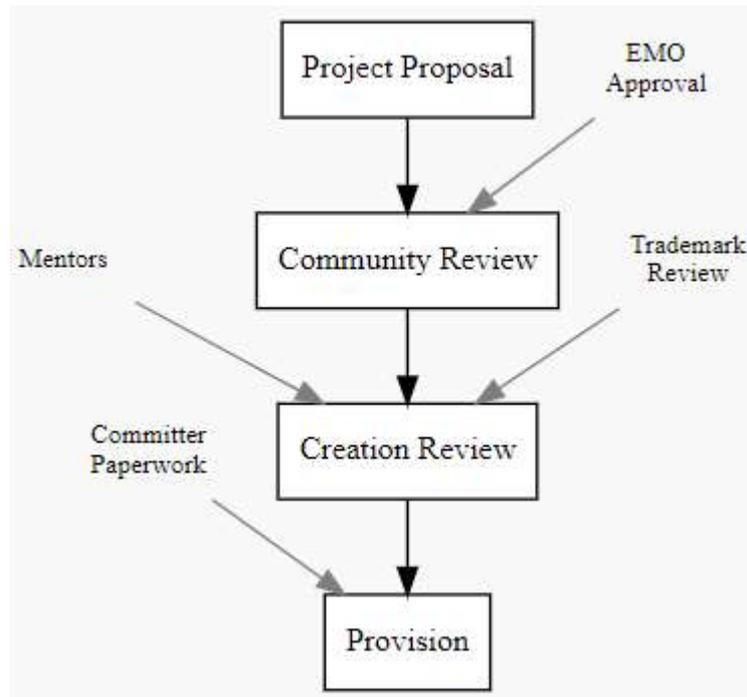
Figure 15: Eclipse project creation process

Efforts to create the proposal are under-way. This proposal will be submitted to the eclipse management organization with a request for it to be made available to the public for review.

Because of our consortium's closer engagement with the FIWARE foundation, primary efforts will be put on this with Eclipse being a secondary avenue for community creation.

6.1.1.3 Academic

On top of the work done to engage with existing OSS communities, university courses based on the technology of INTER-IoT are being developed and will expose both students and staff to INTER-IoT. Details of these courses are available in section 5.3.2 and 5.4.2.

6.1.2 Community resources

INTER-IoT has taken the following steps to improve the chances of community establishment and maintenance. The INTER-IoT consortium has established a repository with the latest code and a documentation server[4] which are available for developers. This is currently available to Open Call participants and consortium partners. This will be opened to the public in M36 of the project. This step is an important method of ensuring that INTER-IoT develops in the open. Avoiding barriers between in-house developers and the broader community encourages community development.

Providing this resource to the winners of the Open Call has been a great trial of how this will be utilized when fully open. It is remarkable that four of the Open Call partners have not only used INTER-IoT but also have improved it. This fact is very important for community building around INTER-IoT and for INTER-IoT OS business model engagement. For instance, AUEB, UT, TUE Wien, CEA, and UPF have envisioned part of their business models B2B/B2C based on OS.

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[4] https://docs.inter-iot.eu/

6.1.3 Open Call

Engaging with third parties has the added benefit of allowing users outside of the original development team to utilize the INTER-IoT code base. INTER-IoT open call selected twelve third parties, which are receiving funds from the consortium, in order to validate the results of the project in the framework of a collaboration agreement. The entities additionally are the cadre for the INTER-IoT ecosystem, and may benefit adapting and validating their products with an H2020 RIA. The call was open to individual European SME's, Universities and Research Centers that can contribute to the INTER-IoT paradigm.

The financial support to be provided to the third parties corresponds to a total of 850.000€. The third parties involved in the Open Call are funded through two types of contributions: large and small contributions.

- Large contributions correspond to a maximum of 125.000€, the provision of new IoT Platforms to be integrated in both the application domain and the INTER-DOMAIN use case pilots, following the INTER-IoT methodology and associated tools.

- Small contributions correspond to a maximum of 60.000€, new devices, protocols, middleware and services development integrated in the ecosystem, and also applications from end users and stakeholders that may interact with the interoperable INTER-IoT ecosystem.

In deliverable D8.5: Report on Impact Creation at M18, there is the information related with the Open Call, the evaluation Process, the funded collaboration and the selected proposals. The following figure explained in this deliverable represents the time line of the evaluation process. The results provided by the third parties in the different evaluation phases are not only technical but also related with exploitation and business analysis. By the time of the release of this deliverable the small contributions have passed the first evaluation phase and they provided the preliminary individual and joint exploitation questionnaire. As the third parties work more with INTER-IoT and they are able to interact with the products, the questionnaires will be updated.
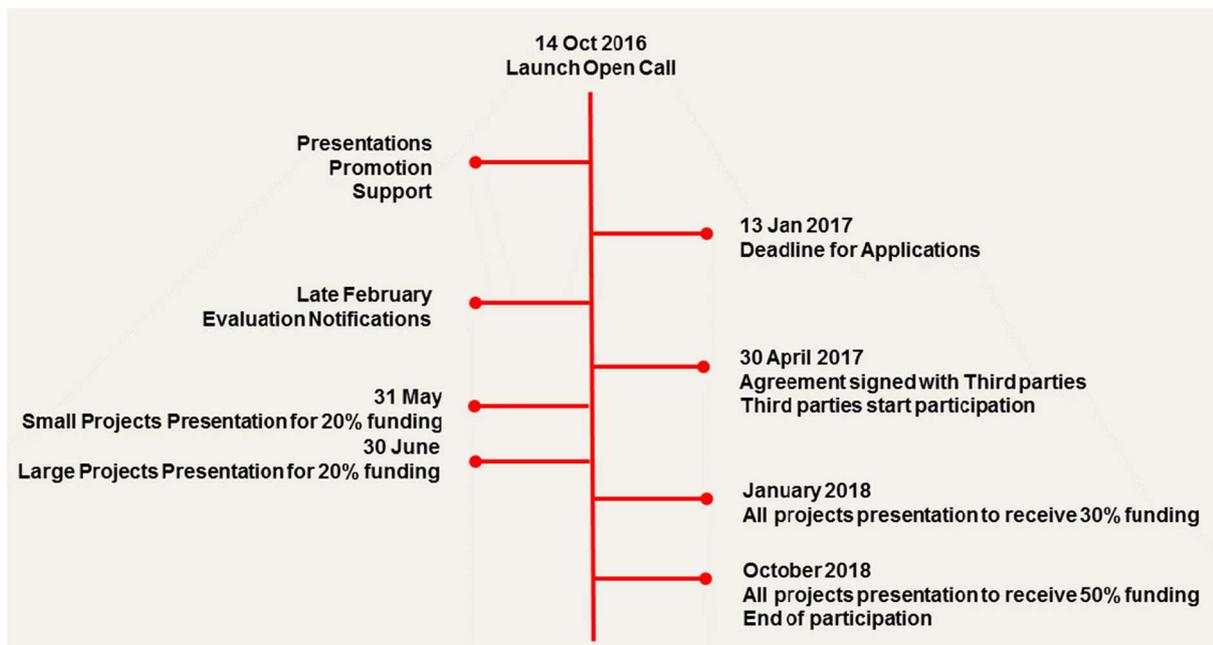
Figure 16: Time line of the Open Call process

On the other hand, the information about the exploitation plans of large contributions has not been received yet, because the date of "Large Projects Presentation for 20% funding" is after this deliverable. For that reason, we will show the information corresponding to the individual and joint exploitation of the small contributions in Annex C and D.

The following table shows a summary of the third parties' responses to the questionnaires attached in Annex C, with their promised value, strategy purpose, business scenario selected, type of business model and the expected impacts of their business idea. The responses to the questionnaires are complemented with the presentations the Third Parties performed in their first review.

The table shows the benefits expected from Third Parties to the INTER-IoT consortium and its individual partners. Third parties are focused on extending the solutions or collaborating with the tools provided by INTER-IoT. Some Third Parties target their interest in the pilots, because their interest is related with these areas. They can provide an impact in the health, logistic or environmental areas.

In addition to their collaboration with the INTER-IoT environment, obviously, they expect to obtain benefits for themselves and usually, third parties expect that their results eventually can be incorporated into other products/services. Those who are related to academia expect a high scientific impact, with advancement in science and technology. Those who are related with the SME focus more on the benefits to industry and society. And in general, every partner is interested in the benefits of a secure IoT

Finally, third-parties have in common the desire for their improvements to impact on the progress of the IoT technologies and they are interested in being well positioned inside the IoT European projects and Market frame.

Third Party	Value promise	Strategy purpose	Expected impacts
TU WIEN	Extensible framework, easy-to-use programming APIs, simplification of IoT cloud engineering	Maximize the utilization of their techniques, bringing them to university research, industries and education activities. Attract further funding to carry out in the research direction of interoperability for IoT, network functions and clouds slices	TU WIEN mainly focus on research community (academics and industry). We expect a high scientific impact in terms of citation and reputation in research as our results will be used by other researchers and students. We expect that their results eventually can be incorporated into other products/services through simply the development of complex IoT applications by introducing the concept interoperability for resource slices as a foundation.
INFOLYSiS P.C.	The proposed advances are aiming at enhancing the INTER-layer of the INTER-Framework by adding SDN/NFV orchestration capabilities.	INFOLYSiS through its collaboration with INTER-IoT project will further develop its SDN/NFV Manager solution (currently in TRL6) in order to be suitable for	- Extents the set of tools, components, mediators of INTER-IoT. - Contributes to the design, implementation and integration of interoperable networking layer components (in the

		commercialization and reach TRL9. In terms of commercialization for the IoT SDN/NFV Manager,	form of VNFs) - Implements an NFV-based virtualization mechanism for smart objects and platform of smart objects - Implements NFV orchestration and cloud support mechanisms.
Universitat Pompeu Fabra	To design and implement a unified LPWAN and LPLAN solution for the IoT based on a hierarchical network structure and multiband support, thus adding a new level of flexibility to IoT solutions and facilitating their implementation in multiple/heterogeneous scenarios.	Their business scenario refers to the use case Monitoring reefer container. This scenario is focused on tracking and monitoring the container's temperature along its route, in order to obtain faster responses in front of any issue with the container's temperature.	A remote control of the temperature of the containers will prevent in real time from any failure that can occur inside the monitored asset. All the companies involved will take profit of the real-time information. With the automation of the control process any failure on the temperature that could damage the content of the container can help on reducing economical losses. Moreover, an end-to-end vision of the whole transport process will be very valuable in order to control the conditions in which the goods in the container have been transported
NEMERGENT SOLUTIONS, S.L.	Homogenized treatment of heterogeneous IoT data from different platforms. Understandable metrics from massive IoT data for different vertical markets related to mission critical communications.	Nemergent has identified the following items as more relevant for the proposed contribution: INTER-LogP/Health scenarios:Accident at the port area Health Monitoring System INTER-LogP scenarios	The expected impacts of the proposed collaboration are categorized in four items: 1) Benefits to Nemergent Solutions, in the area of adding the new IoT-driven mission critical operations support component to its applications framework. 2) Fostering the need for an interoperable IoT market, by disseminating the pilot results. 3) Benefits to industry and society. 4)Benefits to INTER-IoT consortium and its individual participants.
IRIDEON, S.L	SENSHOOK will allow IRIDEON deliver an open, interoperable, disruptive, standards-based tool for the development of end-to-end IoT applications	Sale of Senscape® licenses to 3rd party developers, with a yearly fee for updates and support, with SENSHOOK always provided as an open-	The expected impact of the proposed collaboration are categorized in the following items: a) Economic b) Social

	according to the INTER-IoT framework.	source software. The provision of services, e.g. to develop custom solutions, with SENSHOOK installed as a component of an in-house or private cloud or as-a-service. Provide own products based on Senscape®, with SENSHOOK installed as a software component of the final solution	c) Advancement of science and technology d) European market e) Standards f) Environment/Health
Athens University of Economics and Business – Research Center (AUEB)	Accelerate the development process, provide better security to IoT products, and will allow the development of products with high interoperability. By enabling the reuse of existing user management system, ACHILLES will provide cost reduction, easier security policy management, and faster deployment	ACHILLES results will be exploited towards the further improvement of the innovation capacity of this start-up and will improve its portfolio. Moreover, the ACHILLES project will pursue the adoption of the ACHILLES approach by other initiatives, such as research projects, open platforms, and open IoT operating systems.	ACHILLES will: Improve the security of the INTER-IoT platform. Contribute to maturing and integrating IoT interoperability. Facilitate the overall spreading and expansion of the INTER-IoT ecosystem Foster innovation and will create new business opportunities
University of Twente (UT)	Innovate by integrating semantic technologies with syntactic interoperability standards and big data technologies (SOA, REST, pub-sub cloud and local brokers, rule-based CEP).	Accidents in the port area	Research: beyond the state-of-the arts, including a PhD thesis.
Consiglio Nazionale delle Ricerche - Istituto di Tecnologie Industriali e Automazione (CNR-ITIA)	The idea behind the proposal is that an approach integrating different IoT devices, networks, platforms, services and applications also at a semantic level, with a domain agnostic middleware provides a new model of collaboration among the involved IoT data sources, regardless their information representation formats.	Find scalable technological solution to answer the continued growth of objects connected to the IoT network. SM enables the involved Smart Objects to cooperate synergistically based on a shared semantic model. A prototype of the platform will be implemented and validated to prove the correctness of the approach. Finally, the evaluation of its quality of service requirements in terms of latency, efficiency, and scalability will be conducted in a real case study by	The impact will be on the research as the main contribution of the project is a prototype, as the resulting product of the project can be framed between the values 5 and 6 of the Technology readiness levels (TRL). After the completion of the project, the idea is to take the actions needed to get it to TRL 9, which allow to realize a finished and fully functional product in the real environment

		means of a defined benchmark	
AvailabilityPlus GmbH	SecurIoTy supports all security dimensions: Confidentiality, Integrity, Availability, thus providing the basis for expansion of IoT in general and of the INTER-IoT ecosystem in particular	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	Security of such a INTER-IoT framework is paramount for the safe and reliable operation of IoT connected devices. It is, in fact, the foundational enabler of IoT. Security at the device, network and application levels is critical to the operation of IoT. SecurIoTy will provide an interoperable transparent security layer
e3tcity S.L.	Offer a reliable product focused on deployment, with real manufacturing capabilities	Provide InterIoT environment with real devices so that the platform can show its real power	E3tcity technology will allow SW platforms to reach offline sensors and systems for many applications and use cases.

Table 45: Third parties' responses to the questionnaires attached on Annex C

Following the INTER-IoT open call for proposals, the small contributions addressed any of the different layers provided by the architecture. Then the joint exploitation plans from the third parties provided in Annex D are very focused to their layer interest. The positioning of the different collaborations is positioned in different places of the INTER-IoT architecture. Table 29 and Figure 17 provide the description of such positioning and facilitate the understanding of the different exploitation and business interest of the third parties.

The following table explain the offered services in the project for each third party:

Third Party	Type of entity	Offered services	INTER-IoT Area
TU WIEN	University	INTER-HINC as a framework implementing techniques for IoT interoperability at resource slides. TU WIEN offer consulting services and training for IoT engineering and for how IoT can be interoperable with cloud services and network functions	Network Middleware
INFOLYSiS P.C.	SME	Design and implementation of an Open Cross-Layer Framework for Interoperability of IoT Platforms through the agility brought by the combination of NFV and SDN, which allow software defined interoperable modules that map IoT protocols (such as 6Lo, CoAP, DICE, ACE, etc) to standard IP networking to be automatically deployed and programmed at the INTER-IoT platform, bridging/providing interoperability at the	Network

		underlying heterogeneous IoT platforms.	
Universitat Pompeu Fabra	University	Design a new LPWAN technology flexible enough to transparently encompass both the LPWAN devices and multiple LPLANs while ensuring overall system's reliability.	Device
NEMERGENT SOLUTIONS, S.L.	SME	Nemergent Solutions S.L. aims at integrating a new "IoT monitoring and analytics" component in its mission critical product portfolio, and especially into the Nemergent Control Room application. Nemergent will provide access to different specialized equipment endowed with the corresponding SW: • Nemergent cloud system • 3x Rugged LTE smartphones for field units (first responders, port staff) • 1x Rugged LTE tablet for first responder (e.g., ambulance)	Application
IRIDEON, S.L	SME	Firstly, Senscape® licenses to 3rd party developers, with a yearly fee for updates and support, with SENSHOOK always provided as an open-source software. Secondly, the provision of services, e.g. to develop custom solutions, with SENSHOOK installed as a component of an in-house or private cloud or b) as-a-service. Finally, provide a Smart Mosquito Trap based on Senscape®, with SENSHOOK installed as a software component of the final solution.	Middleware
Athens University of Economics and Business – Research Center (AUEB)	University	ACHILLES project extends the INTER-IoT platform to provide gateway/Thing mutual authentication, user/gateway (or Thing) mutual authentication, and access control. The ACHILLES project provides software for Things, end-user applications, Java OSGi modules for the INTER-IoT gateway, and it will leverage INTER-FW API and Tools so that end-users will be able to create, modify, and access protected services. The ACHILLES OSGi modules will target the D2D layer of the INTER-LAYER	Security
University of Twente (UT)	University	IoT Early Warning System (EWS) to detect and alert accidents with trucks at the port area Ontology alignment (semantic translations) of SSN x SAREF	Application
Consiglio Nazionale delle Ricerche - Istituto di Tecnologie Industriali e Automazione (CNR-ITIA)	Research Organization	The CNR-ITA offer a software application (product) enhancing semantic interoperability	Middleware Data & Semantics
AvailabilityPlus GmbH	SME	SecurIoTy is a smart cyber security	Security

		solution based on our DocRAID® crypto proxy technology to secure the internet of things, addressing all security dimensions: confidentiality, integrity and availability. SecurIoTy will provide an important building block for the establishment of safe, reliable and large scale IoT systems.	
e3tcity S.L.	SME	Devices included in the proposal: • LS40: Outdoor streetlight controller with enhanced sensor capabilities. Turns streetlights into a Smart point of the city or facility, improving existing services and giving new ones. • LB40: Indoor central controller that can measure and control a whole facility • LC40: Outdoor streetlight controller designed to be cost effective	Device Middleware

Table 46: Offered services for each third party

As we can see in the table, the most important benefits expected for third parties are related with the new features and components that will be released by the consortium: Methodologies, tools, protocols and APIs have now been released as open items available to develop new applications and services.

The variety and cross availability of the results is going to be used to build and integrate services and platforms at different layers according to the needs of the stakeholders and developers. The availability of more and new data will stimulate the creation of new opportunities and products. In relation with this purpose, the following figure summarizes the INTER-IoT areas covered by the Small Contribution third parties:
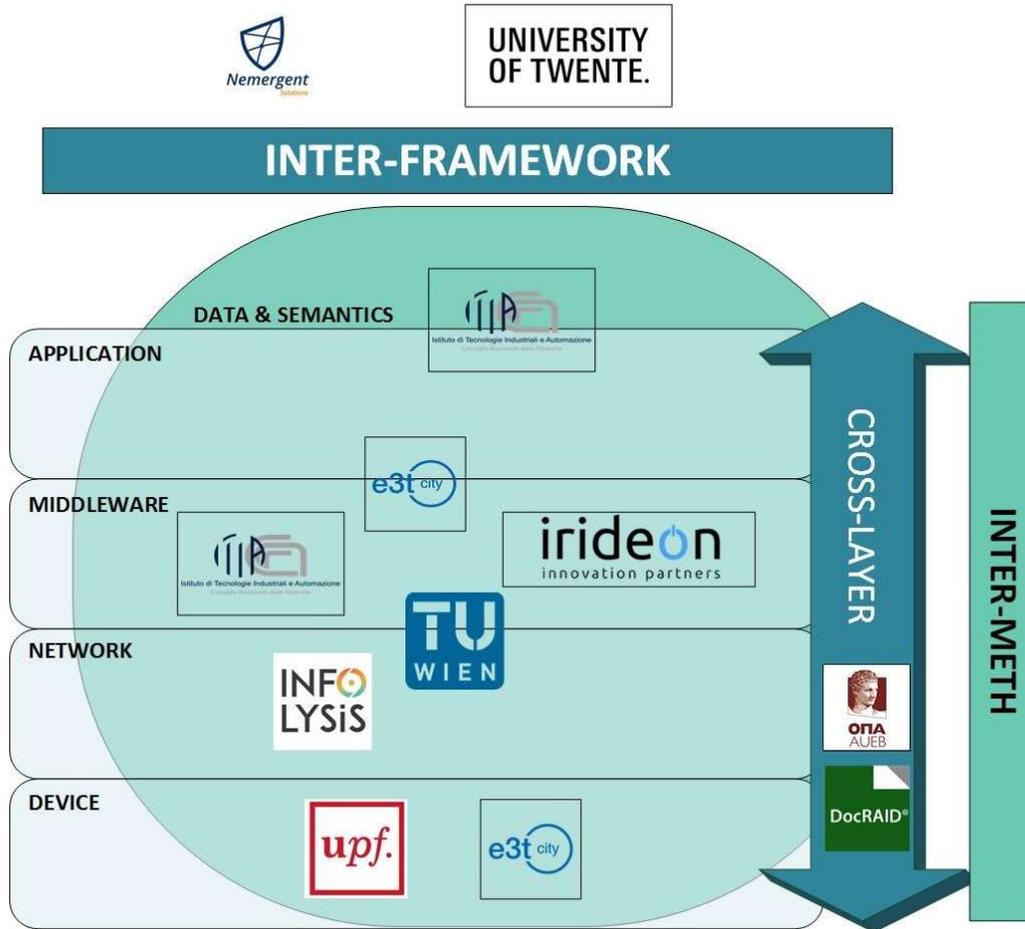
Figure 17: INTER-IoT areas covered by the Small Contribution third parties

7 Marketing processes

7.1 Market analyses

The IoT market has been estimated to be as high as $11.1 trillion per year in 2025[5]. Interoperability of IoT systems is key to realising this potential with around 50 % of the potential value a result of cross-platform IoT integration. The IoT platform market itself is predicted to grow from $100 billion in 2015 to $315 billion in 2021, a compound annual growth rate (CAGR) of 21%[6]. This will be driven in large part by platforms released by industrial companies, which are raking in billions from IoT applications. For example, GE, which owns Predix, generated $5 billion from its analytical applications and software business in 2015, and the unit is growing 20% annually.

The market for IoT platforms is largely tied to the increased usage of IoT solutions. The BI Intelligence Internet of Things 2017 Report forecasts that 22.5 billion IoT devices will be deployed by 2021, with nearly $5 trillion in total spending. These devices will require platforms to grow to accommodate new IoT projects and expand existing ones.

Each platform is meant to help the end user achieve one of five stages of the IoT evolution, which include connecting devices, managing devices, analysing device data, creating interoperability between devices, and automating devices. An exclusive BI Intelligence survey found that while companies are analysing their data, very few can automate portions of their workflow or have enabled devices to communicate with each other.

INTER-IoT aims to leverage this opportunity by developing connecting platforms and facilitate the connection of new devices and applications.

This section will explore some of the market segments where INTER-IoT can be utilised and reveal information about the current market situation on which we can base strategic decisions for the future of the project and resulting products.

After review of the project partners' initial business models, the exploitation plans contained in Annex ANNEX A: Individual Exploitation Plans and ANNEX B: Joint   Exploitation   Plans, and the areas covered by the third parties from the open call, five market segments have emerged where opportunities for INTER-IoT to enter the market are viable for the project partners. These are described in Table 7 below.

Market segments	Opportunity	Priority
e-Health	Partners have extensive experience working with health care providers both publicly and privately funded. This has highlighted the need for interoperability in the domain. INTER-Health use case will provide a clear opportunity for real exploitation.	1st
Transport and logistics	INTER-IoT has end users and solution providers positioned in the transport and logistics environment with a particular focus on port processes. The INTER-LogP use case creates a clear opportunity for real exploitation.	1st

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[5] J. Manyika, M. Chui, P. Bisson, J. Woetzel, R. Dobbs, J. Bughin und D. Aharon, "The Internet of Things: Mapping the Value Beyond the Hype," McKinsey Global Institute, 2015.

[6] P. Newman. "The IoT Platforms Report: Examining the wide variety of software that holds the IoT together." Business Insider. 2017.

Smart cities	Consortium members have experience with consultancy and open software development services which have highlighted areas where IoT system integration can be foreseen in this sector.	2nd
Smart Agriculture	Many legacy systems are operating in this area currently. The need for modernisation has highlighted the possible niche market for INTER-IoT to assist with next generation farming.	3rd
Academic	Conducting leading edge research in IoT will attract both new students interested in the latest technology and institutions which require training in IoT interoperability.	1st

Table 47: Market Opportunities

Utilisation of the Freemium product by end-users will be immediately exploitable in the e-Health and Transport and logistics markets upon successful completion of the planned pilots. This is due the maturity of the INTER-IoT solutions being used in the pilots. Access to full documentation will enable faster deployment. There will also be training opportunities for users less familiar with INTER-IoT. These will be provided by INTER-IoT partners. Consultancy services associated with the Premium products are possible in all the identified market segments. Further work in M18-M30 will needed be to define these additional opportunities and further clarify the business opportunities available in each market segment.

In the following section, we will explain the aspects of the market identified for the target segments:

- Market definition: explanation of the situation of the market for a specific segment.
- Market division: the subdivision into clearly identifiable market segments including relevant sub-segments.
- Market challenges: the situations, products, trends or companies that aggressively works to obtain the market we are working in and we have to compete against to obtain market share.
- Market driver: can be defined as the underlying forces that push the clients to purchase products or services. In this case, to find market drivers we can describe these forces using the STEEPLE model: Social, Technological, Economic, Environmental, Political, Legal and Ethical factors.
- Market opportunities: these are defined as the current need, desire or demand trend that the project can exploit to sell a product. Additionally, efforts will be made to identify markets not being addressed by any other competitor.

7.1.1 e-Health

7.1.1.1 Market definition

The e-Health market segment is large and growing, as it accounts for any type of technology (hardware or software) applied in any domain of health (management and care delivery). With an aging population and constant advances in treatment and management technology, it is set to continue to grow. For the purpose of this analysis, the e-Health market will be defined as the intersection of the communications, technology, and healthcare markets where the work pertains to the processes and procedures needed to maintain a healthy lifestyle, to prevent and treat diseases and factors affecting diseases. As any other market, at first glance the segments are defined by the type of technology used, the type of services and the type of end-users. Nevertheless, the health ecosystem is wide and heterogeneous accounting for consumers, providers, governments, insurers, international and national organizations, start-ups to large manufacturing companies and pharmacological companies etc. All these stakeholders are deeply linked; for instance, it is not uncommon to find cases of joint ventures between pharma companies and patient associations, and their relationships are blossoming with the constant emergence of new technologies and networks. According to a report published by Allied Market Research, the IoT

healthcare market will reach $136.8 billion by 2021 and the patient remote monitoring application segment is expected to maintain its lead position with $72.7 billion by 2021[7].

For the purpose of this market analysis, we will simplify the e-Health sector into four market segments as shown in Table 8 below.

MARKET	DESCRIPTION
Professional Software Tools	Development of software applications to manage patient lists, follow up treatments, analyse clinical data and access evidence containing databases.
Mobile Apps for monitoring patients	Software applications, especially mobile applications devoted to performing self-management of a disease, manage appointments, and empower patients with educational tools.
Devices	Medical devices for diagnosis and treatment. This segment is linked to the mobile apps segment.
Services related to IT	Storage, data mining, security, cloud-based applications, etc..

Table 48: e-Health markets

7.1.1.2 Market division by geography

Geographically, the e-Health market is divided into North America, Europe, Asia-Pacific, and Latin America, the Middle East, and Africa. This is primarily driven by regulatory considerations. North America dominates the overall industry with over 38.0% share, which can be attributed to the availability of supportive infrastructure and the widespread use of technology among the population. Europe is the second region pushing to improve the healthcare delivery through the use of better care by exploiting decision support systems and patient remote monitoring services. National and transnational regulations are very strict in these two regions, mainly dominated by the North American Food and Drug Administration (FDA) and the Medical Devices Directive (MDD) in Europe 2007/47 (now under revision). Asia-Pacific is expected to increase its market share during next years and governments have already started to support improvements to healthcare infrastructures.

However, geographical analysis alone should not drive a strategic decision as the level of technological development and technology acceptance by end-users is highly heterogeneous all around the aforementioned market regions.

7.1.1.3 Market segment challenges

The challenge for tackling each market segment will vary dependent on the type of application, the type of end-user and their characteristics and the type of technological infrastructure. Existing solutions and domains are gathered into the IoT paradigm. Every type of applications such telemedicine, clinical information systems, Electronic Health Records (EHRs) and Personal Health Records (PHRs), electronic prescriptions, mobile health, clinical decision support systems and big data is an opportunity in the exploitation of IoT paradigms, and, more concrete, on the INTER-IoT approach to build interoperable and fully integrated architectures and software-hardware development ecosystems.

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[7] Internet of Things (IoT) Healthcare Market by Component (Implantable Sensor Devices, Wearable Sensor Devices, System and Software), Application (Patient Monitoring, Clinical Operation and Workflow Optimization, Clinical Imaging, Fitness and Wellness Measurement) - Global Opportunity Analysis and Industry Forecast, 2014 - 2021

Segment	Challenges
Professional Software Tools	● Each clinical centre or corporation of clinical centres is used to exploit a custom software and only uses external software for compatibility issued with hardware. ● The selection of the type of software to use depends on public boards and open contests. ● Software tools should be tailored for the type of users, avoiding a functional overload. ● Such systems should be fully integrated with EHRs, Management and accounting software solutions in the clinical centre.
Mobile Apps for monitoring patients	● Maintenance of the mobile apps ● Compatibility with professional software tools and integration of these apps as part of the treatments. ● Business models to support the cost structure of a mobile app ● Regulations regarding medical devices ● Privacy issues ● GDPR
Devices	● Easy to use devices ● Fully easily integrated devices with mobile apps and professional software tools ● Security and safety issues
Services related to IT	● To provide a value for an unmet need ● Extracting knowledge from highly heterogeneous data sources ● Data quality and reporting ● Availability, speed, and efficiency.

Table 49: e-Health challenges

7.1.1.4 Market drivers

The major market drivers are focusing on social, technological, economic and legal factors, we have identified the following key drivers:

- Improving cost-effectiveness of treatments
- Disease prevention
- Reduction of hospitalization costs
- Evidence-based medicine for individuals based on their own historical data
- Operational efficiency towards profitability (IoT is a very good solution to support such a driver)
- Increasing regulations and compliance requirements (The U.S. and EU are very active in this area currently)
- Tax reforms or rebates for medical technologies

7.1.1.5 Market opportunities

The gradual shift to digital healthcare systems for analysis and management of patient health has resulted in the rapid growth of this market. With the application of technology in healthcare, everyone can get access to a high standard of care. However, this is dependent on infrastructural support with better internet services and electronic systems, both of which are required for the IoT solution to be put into full-fledged use.

The rapid increase of chronic diseases and the progressive ageing of population are supporting the idea of using technology as a way to mitigate problems in the middle and long term. e-health solutions have the ability to provide cost-effective healthcare services, research, public health, and health-related activities.

One of the major problems, but at the same time, one of the better opportunities is the way in which the market is distributed. The major players in the e-Health market such Boston Scientific Corp., IBM, Motion Computing Inc., GE Healthcare, Epocrates Inc., Telecare Corp., CompuMed, Medisafe, Set Point Medical, Doximity, Lift Labs, Proteus Digital Health and Apple are global corporations which have delegates and representatives all around the world and the market can be easily reached through them.

7.1.1.6 Conclusions

Increasing awareness amongst people about e-Health and rising acceptance level amongst healthcare professionals coupled with evidence of the efficiency of using this technology is anticipated to result in substantial growth for this industry. The many distinguished advantages of the e-Health inclusion in the modern life makes this sector one of the most exploited in the market, thus, is one of the markets with more competitors in the IoT environment. However, to overcome this competition, INTER-IoT products will provide added value to the sector due to its interoperability main objective. This objective was demonstrated and tested in the pilots of e-health and, even more, in cross-domain, creates the bridge between e-Health vertical market and other markets, avoiding former to be an isolated island and creating an ecosystem where e-Health solutions can be used in other domains. Examples of this interconnection are the case of cross-domain with e-Health elements utilized in transport and logistics, or e-Health in smart agriculture to monitories animals' diseases or the state of the food in a warehouse.

7.1.2 Transport and logistics

7.1.2.1 Market Definition

The transport and logistics market is divided into four markets with its specific characteristics and applications.

MARKET	DESCRIPTION	Feature
Shipping	Vessels (container and bulk)	Oligopoly
Train	Trains (container and bulk)	Oligopoly
Trucks	Road trucks	Very atomized traffic
Hubs	Ports, dry ports, interchange areas	Usually with a regulation of a port authority but most of them under the control of the shipping lines.

Table 50: Transport and logistics markets

7.1.2.2 Market division by cargo

The transport and logistics market can also be divided by the type of cargo, each with specific IoT demands. There are two main groups: container and bulk.

Considering that technologies developed for containers will be easy to introduce, adoption will not depend on of the type of cargo. On the contrary, the bulk technology depends exclusively of the cargo type.

7.1.2.3 Market segment challenges

Each market segment has specific challenges that could be solved with an IoT solution. So, it is advised to look for solutions for these specific challenges. In general, it can be stated that the biggest added value of IoT in the logistic market is to connect the entire logistic chain from "door to door".

Segment	Challenges
Shipping	Planning Cargo position Cargo status Container status Vessel status Labour cost reduction Fuel cost reduction Storage optimization
Train	Planning Cargo position Cargo status Train status Labour cost reduction Energy cost reduction Storage optimization
Trucks	Planning Cargo position Cargo status Truck status Route optimization Fuel Cost reduction
Hubs	Planning Predictability Storage optimization Cargo position Cargo status Container status Labour cost reduction Track & trace Emission reduction

Table 51: Transport and logistics challenges

7.1.2.4 Market drivers

The major market drivers are:

- Planning
- Labour cost reduction
- Energy reduction
- Track & trace for the entire logistic chain (from door to door even more from the order-factory-door 2 door)

7.1.2.5 Market opportunities

The future of the globalised market will be the "click" (online purchase) to door package, where an online seller will connect the customers with the suppliers. There will be a total integration of the supply chain to send the product to the client with the minimum time and the minimum stock and supply chain failure rate. The key indicator of success is not to reduce the delivery time, but to reduce to zero the uncertainty. At the same time, it is important to do it under a competency framework to guarantee the flexibility and the adaptability of the market to continuous changes.

To accomplish this goal, it is mandatory to integrate all the systems while insuring the ability to include multiple platforms and technology suppliers as the supply chain is heterogeneous. The market demands a way to interconnect all of these platforms and all devices, and currently, it does not exist.

Transport and logistics are central to every product and market. The below figures demonstrate the scale of cargo moved each year on container ships and trains. The last mile of all cargo is always move by truck, and all the local cargo is always move by truck, so the figures are huge.

Figure 18: Number of TEUS moves per year on container ships by country
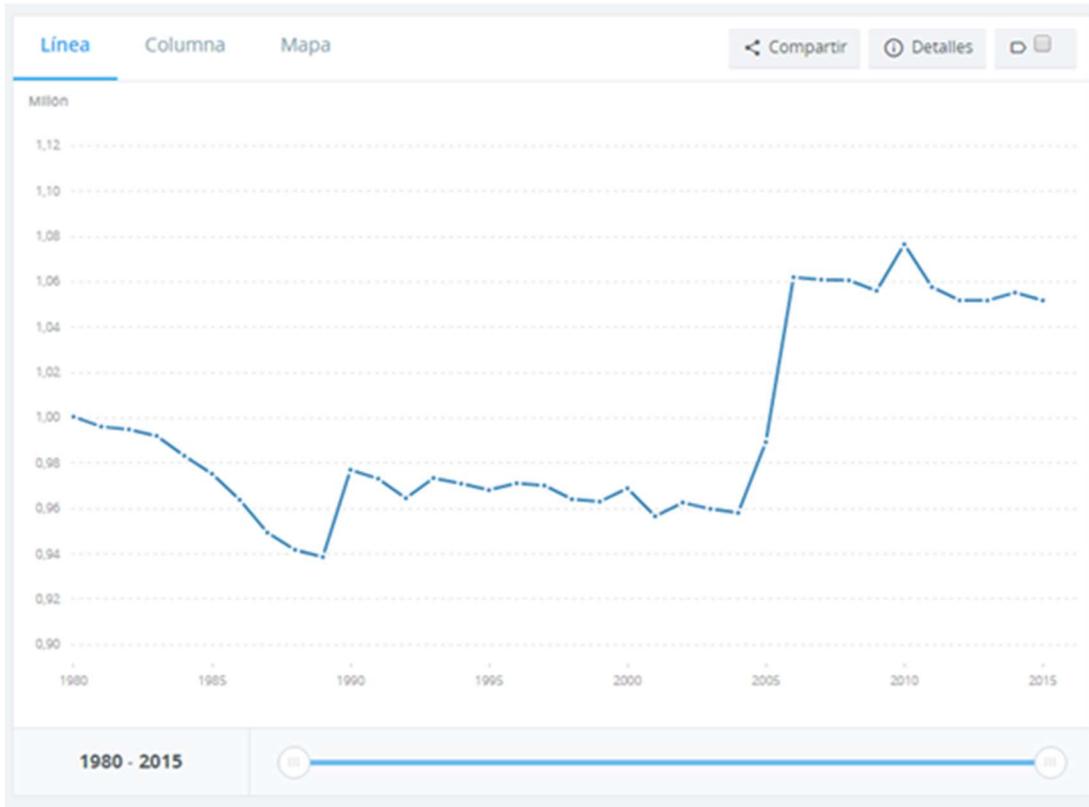
Figure 19: Rail route-kilometres per year

Figure 20: Rail route-kilometres per year by country

The maritime traffic of goods maintains a growing trend over the years, at both national and international levels. At present, the levels leading up to the international financial crisis of 2008

have been vastly exceeded. The trend is still rising in all kinds of goods presentation with special relevance in container transport.

One of the key factors for this fact is the growing trend in international trade, the improved capacity of ships and the high competitiveness of maritime trade with respect to other means, such as road traffic, rail and air.
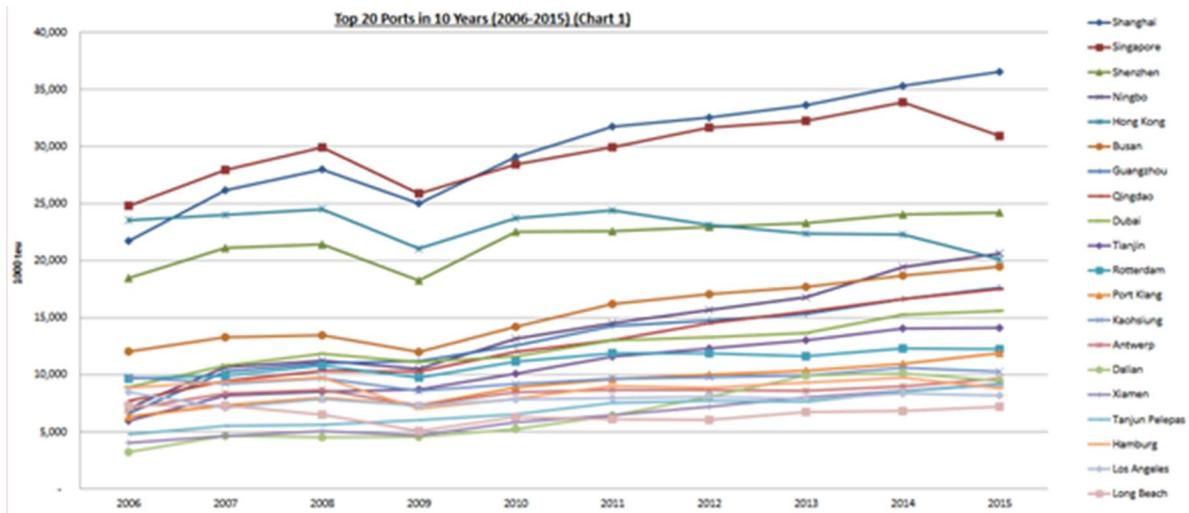
Figure 21: Evolution of container traffic in the 20 largest world ports. Source: IAPH (International Association of Ports and harbours)

In contrast to this upward trend, there is the low modernization of logistical processes in port terminals, which in many cases continue to work with procedures established decades ago.

The level of automation and optimization in the port authorities is very low if compared with other type of industries, or even with other phases of the chain logistic closest to the distribution process.

The international market size is about 10,000 ports, where only a small part of them analyzes the information from the classical descriptive systems (SCADA, HMI, MES, MOM). Thus, the potential growth in this area is high, mainly in geographical areas like Africa and Latin America where an increase in maritime trade is especially noticeable in recent years.

The figure below illustrates the rising expectations of global shipping demands for 2035; Requiring ports an effort to increase their efficiency.
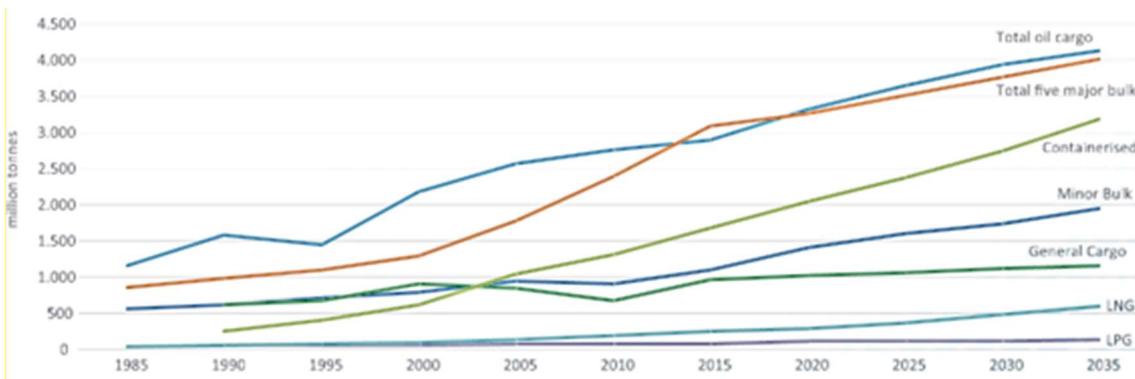
Figure 22: Shipping expected demand

In particular, at European level, predictions point to an increase of 50% of the volume by the year 2030. This growth is a great opportunity to sustain significant increases in the economy and

employment: the European Commission estimates that for 2030, between 110,000 and 165,000 jobs in this sector will be created. However, European ports need important adaptations in order to manage all this traffic.

Spain is one of the countries of the European Union with more ports with container traffic, with a total of 46 ports. Among them, the two most important ports of the Mediterranean such as the port of Algeciras and the port of Valencia.

7.1.2.6 Conclusions

Logistics and ports will be a very big market for IoT solutions. Globalization will require a "standard" to unify the supply chain.

As has already been mentioned, international maritime trade is growing steadily annually, introducing improvement and optimization needs at the terminals of major commercial shipping routes, thus interoperability issues.

INTER-IoT can facilitate this unification. The major impact will be from "click" to door and will force the integration of the shopping platforms with factories and logistic requiring additional cross platform interoperability. Also, as this market is fragmented, and periodically volatile, maybe new transport systems will be developed and integrated in the supply chain (e.g. delivery using drones). INTER-IoT has to be aware and prepared to include these new elements in the transport chain to be compatible with legacy chains. Additionally, the inclusion of these new shopping platform or factories and the communication between these platforms is a must for our products to conquer the market.

7.1.3 Smart cities

7.1.3.1 Market Definition

A smart city can be defined in numerous ways, but in its most basic sense, it leverages available technologies and innovations to enhance the living conditions of its residents. It necessarily focuses on integrating infrastructure, social and human capital, and disruptive technologies to build a sustainable economy and participatory governance.

Driven by recent technological advances in domains such as healthcare, transport, energy, governance, and intelligence gathering, the market is anticipated to expand at a healthy CAGR in the coming years. The market is propelled by growing adoption of technologies such as Internet of Things (IoT), cloud computing, big data, cognitive computing, and open data.

The Internet of Things segment of smart cities refers to the nowadays human emplacements but with the addition of smarter utilisation and deployment of available resources. The smart cities market overlaps with many areas. It can be divided into multiple markets with its specific characteristics and applications.

Market	Description
Smart Energy	Smart grid is the electrical traditional grid with an improved data communication mechanism to know the state of the grid. Between this information we find a variety of operational and energy measures and the tools to obtain the data comes from smart meters, smart appliances, renewable energy resources, to energy efficient resources elements.
Smart Security	Inclusion of new mechanism to address security within the smart city, as are: alarms, video surveillance cameras, secure information data bases etc. But also

	compress the illegal access to city or citizen's critical information and attacks causing physical disruptions in city service availability. This is of growing importance as digital citizens are increasingly instrumented with data available about their location and activities.
Smart Building	Buildings will be active nodes in thermal and electric energy systems, providing energy generation, load shifts, and energy storage capacities beside their main functionalities.
Smart Transportation	See above full section
Smart Healthcare	See above full section
Smart Water Network Systems	Smart water networks are the collection of data-driven components helping to operate the data-less physical layer of pipes, pumps, reservoirs, and valves.

Table 52: Smart cities markets

7.1.3.2 Market division by geography

Presently, North America is the largest market for IoT in smart cities platforms. However, cities across the world are increasingly adopting smart solutions for their various sectors, such as buildings, transportation, utilities, and citizen services, in order to achieve better living standards, increased efficiency, economic stability, optimization of energy, and higher environmental protection based on the technologies: IoT, cloud, mobile, and sensors.

7.1.3.3 Market segment challenges

The smart city segment challenges are many and plenty different, because the several sub-markets that compose this segment. To simplify the picture, a table with the main sub-segments challenges of the smart cities is presented:

Market	Challenges
Smart Energy	Customer relations Carbon reduction Cost Access
Smart Security	Illegal access to information Service disruption
Smart Building	Increasing data Cost Access Legal compliance
Smart Transportation	Planning Predictability Labour cost reduction Emission reduction
Smart Healthcare	Availability, speed, and efficiency. Privacy Standardisation Legacy system incorporation Legal compliance
Smart Water Network Systems	Customer relations Carbon reduction Cost Access

Table 53: Smart city challenges

7.1.3.4 Market drivers

Smart Cities and Internet of Things (IoT) are on their way to transform modern life. Smart Cities make effective use of IoT. IoT instils the required intelligence into basic building blocks of the city and helps make it smart. In 2017, Smart Cities occupied major share in IoT. Smart Cities is expected to utilize IoT to monitor energy usage, traffic flows, and water levels etc. The effective use of IoT in Smart Cities is totally reliant on the infrastructure development, and smart supply chain.

The increasing adoption of IoT is driving this market; the IoT platforms segment is expected to grow higher than the IoT solutions segment during the forecast period. The major market drivers are:

- Gradual shift in urbanisation
- Demand for reduced energy consumption
- Rise in technological innovations

7.1.3.5 Market opportunities

Ericsson's former CEO, Carl-Henric Svanberg, said nearly eight years ago, that there would be 50 billion connected devices by 2020.

The fact is that IoT is the fastest growing technology paradigm and strongest candidate to shape business processes and consumer lifestyle in the following decades.

Based on the IoT Analytics (see figure below), one of the most popular areas for developing IoT applications are Smart Cities that are ranked 3th and Smart Cities IoT projects are ranked 1st .
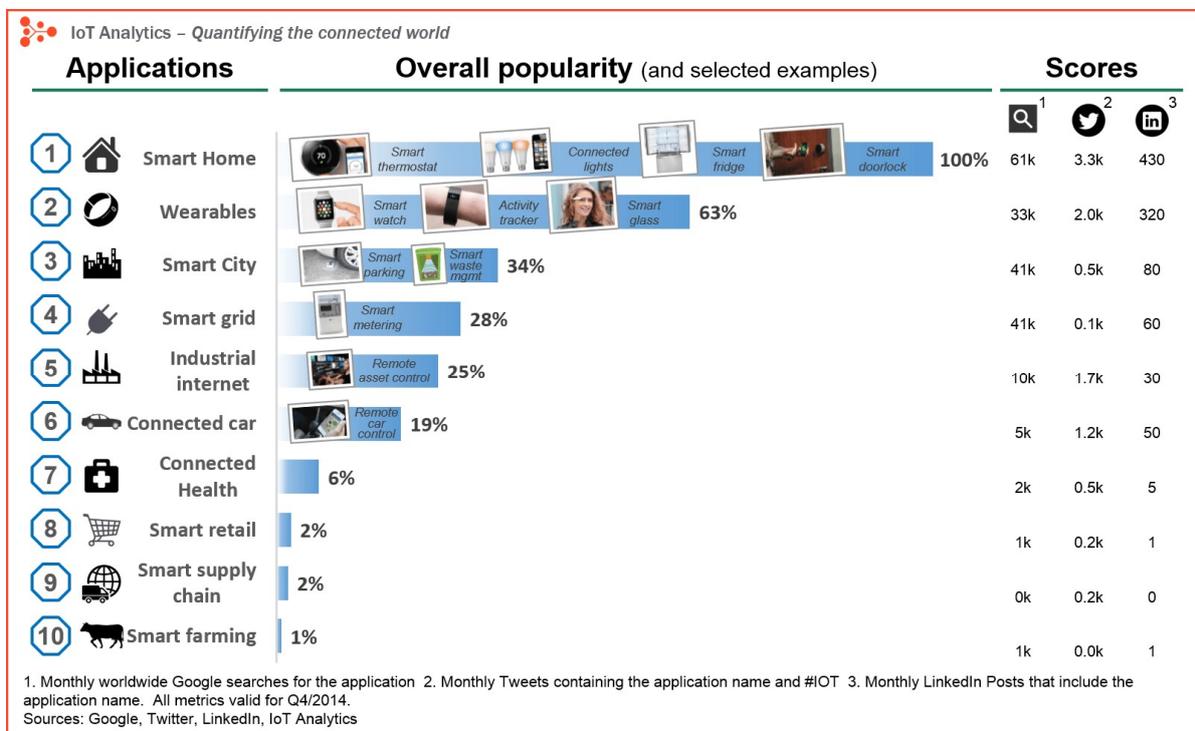
Figure 23: IoT Analytics market segments

The Global Smart City market is growing with the rapid pace; mainly due to increasing urbanization, increasing number of aging population and high adoption of internet of things.

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interiot

The global smart cities market was valued at USD 529.55 billion in 2017, and is forecasted to reach USD 1944.67 billion by the end of 2023, with a CAGR of 24.21%, during the forecast period (2018 - 2023) Technological advancements in Information and Communication Technology (ICT) and growing demographics & hyper-urbanization are the major driving factors for the market.

The expanding population living in urban areas (58% by 2025), and the overall growth of urban population (81% of total population that are living in cities), are the major drivers for the adoption of intelligent and smart solutions. The main reason behind the growth of smart cities is the need for effective solution for managing the cities. Governments of various countries are expected to collaborate and partner with each other, in order to transform into a collaborative and integrated service delivery model, from the traditional silo-based model. The expansion of cities and urbanization, widespread adoption of green technology, increasing telecom penetration, and rising adoption of Artificial Intelligence (AI) and Internet of Things, are the factors driving the demand for smart cities.

On the other hand, The Internet of Things (IoT) in smart cities market is estimated to grow from USD 51.96 Billion in 2015 to USD 147.51 Billion by 2020, at a Compound Annual Growth Rate (CAGR) of 23.2% during the forecast period[8]. IoT in smart cities can be correlated with economic stability and wise usage of natural resources to provide smart investments in human and social capital, along with transportation and modern communication infrastructures and a high quality of life to the citizens.

7.1.3.6 Conclusion

Although citizens should be put at the heart of smart-city developments, there are also other stakeholders of the smart city of the future which must be considered such as: Cities & Governments, Citizens, and society as a whole, Information and Communication Technology (ICT) Companies (ICT, software developers, products producers, and service providers), Insurance companies, Logistic, transportation and infrastructure development companies, etc.

INTER-IoT offers the Smart City market services and products to help stakeholders of the smart city of the future to improve and enrich its daily operational and decision-making tasks, citizen services by resolving the interoperability and integration of heterogeneous IoT Platforms. Future aspirations beyond M36 include real-time data management and analyses that affects its daily tasks. This enrichment will provide the stakeholders a great added value in front of the current competition alternatives on the market. Additionally, the interconnection of smart city platform with external elements; platforms, devices, or sources of data, to enrich the functionalities of the services provided by the smart city deployment. As an example, connection of the smart cities with smart cars for emergencies, connection with security systems or even with private enterprises bringing data of the city (public available data) to perform statistics of studies or other applications.

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[8] Internet of Things (IoT) in Smart Cities Market by Solutions (Remote Monitoring, Data Management) Platform (Application & Device Management) Application (Building Automation, Energy Management, Transportation) - Global Forecast to 2020. By: marketsandmarkets.com. Publishing Date: February 2016

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7.1.4 Smart agriculture

7.1.4.1 Market Definition

The agricultural market is divided into five markets with their individual specific characteristics and applications. Some of these markets can overlap other markets domains as smart agriculture has requirements from smart transportation, eHealth, smart city, etc.

Yet, restricting the scope to pure agriculture elements, this market is based on:

Market	Description
Arable farming	Open field farming
Dairy	Milking: cows, goats, sheep etc.
Fruits	Growing of fruits
Vegetables	Green house growing
Meat	Meat production: pigs, poultry, eggs etc.

Table 54: Smart agriculture markets

7.1.4.2 Market division by geography

The agricultural market can also be divided by geography, each with specific IoT demands. Below the current IoT demand for each region is given. Take into account that technologies developed in the 1st world are introduced into the second world approximately five years later and 10 to 20 years later for the third world. This will have a great impact on where and how to introduce IoT products first.

This geographical division is really determinant because two main reasons: the type of good, and the way this good is provided to the companies. Of course, the type of good will determine its obtaining, treatment and distribution and depending of the situation, economic or social, of the counties, these processes will occur in different manners. And this affects directly to the market creating a more granulated segmentation to be studied.

Region	World	IoT demand
North America & Europe	1st	High
Russia	2nd	Medium
Asia Pacific	2nd	Medium
Africa, South America	3rd	Low

Table 55: Smart agriculture geographic priority

7.1.4.3 Market segment challenges

Each market segment has specific challenges that could be solved with an IoT solution. So, it is advised to look for solutions for these specific challenges. In general, it can be stated that the biggest added value of IoT in the agricultural market is to connect the entire food chain from "seed to the (toilet) seat".

Segment	Challenges
Arable farming	Disease detection Soil management Growth / harvest prediction Irrigation control Track & trace Emission reduction Precision farming Labour cost reduction Storage optimization
Dairy	Animal behaviour

	Animal well being Antibiotics reduction Track & trace Emission reduction Labour cost reduction
Fruits	Disease detection Soil management Growth / harvest prediction Irrigation control Track & trace Emission reduction Labour cost reduction Storage optimization
Vegetables	Disease detection Soil management Growth / harvest prediction Irrigation control Labour cost reduction Track & trace Emission reduction Labour cost reduction Holy grail: crop growth model
Meat	Animal behaviour Animal well being Antibiotics reduction Track & trace Emission reduction Labour cost reduction Storage optimization

Table 56: Smart agriculture challenges

7.1.4.4 Market drivers

The major market drivers are mostly based in economical, legal, and overall environmental factors, as the organic and sustainable farming is nowadays one of the biggest concern of the world's food market. Those are the following:

- Labour cost reduction
- Emission reduction
- Growth prediction
- Track & trace for the entire food chain (from seed 2 toilet seat)

7.1.4.5 Market opportunities

The agricultural market is an interesting market with on one side very few large original equipment and machines (OEM) suppliers, in between many individual farmers, and on the other side very few large supermarket chains serving many individual consumers. There are two large parties (OEM & supermarkets) that have the bandwidth to control pricing to farmers and consumers. So the big opportunity for IoT would be to create transparency that could improve the position of farmers (i.e. get a better price for their products and become less dependent of OEM systems) and the other side of consumers getting a better price and insight in their food safety.

In the EU, there are roughly 12 million farmers and 1 billion consumers versus 10.000 OEM firms and super markets. Focusing on farmers and consumers in their application will bring a much larger potential market for IoT solution providers in comparison to focussing on the large OEM and supermarket chains. A disruptive scenario could be to develop a method that would give consumers direct insight in how their food was grown without interference/control by supermarket

chains. This might be achieved by close cooperation with federal governments that can prevent food scandals.

No information could be found on the overall IoT potential of the market. Estimations of the global agriculture robotization market (milking robots, autonomous tractors, etc) are around 22 billion USD in 2022.

7.1.4.6 Conclusions

Agriculture is a highly attractive market for IoT solution providers where the main markets will be in the EU and North America. Market drivers for individual segments are given and some potential market aspects to be considered for entering this market Even if the main markets are located in countries of the 1st world, is expected that the growth on this area affects new zones of the globe over the next years, as it could be a cheap and efficient solution to solve agriculture problems in 3rd world countries.

The product quality, higher productivity, resource conservation and reductions on costs are just some of the ways the Agricultural IoT promises to transform farming and food production in the future. For that reason, INTER-IoT products have to enter the market being capable to fulfil the high expectations on this area. As the main pilots of the project are not targeted on agriculture, still it has to be checked the effects on the market of our products. However, as the approach followed during the project has been as domain agnostic as possible, the success on this market if highly coupled to the success on the other smart areas.

7.1.5 Academic

7.1.5.1 Market definition

The academic market is different than the previously discussed commercial markets. Competition is mainly focused in the area of student recruitment and funds gathering at a national and European level. Also, the publication and impact of the solutions provided by the project is a great indicative on the domain on this sector.

MARKET	DESCRIPTION
Masters programs	Taught and research courses
PhD programs	Taught and research courses
Commercial/post graduate training	Taught courses
Publications and academic projects	Articles, books, and other publications based on the products together with new open source projects based on our products.

Table 57: Academic markets

7.1.5.2 Market segment challenges

MARKET	Challenges
Masters programs	Attracting students Publishing manuscripts Presenting at conferences
PhD programs	Attracting students Publishing manuscripts Presenting at conferences
Commercial/post graduate training	Attracting students Creating new courses
Publications and academic projects	Attracting people from academia. Publishing manuscripts Creating new research academic projects

Table 58: Academic market challenges

7.1.5.3 Market drivers

The major market drivers are:

- Increasing student numbers
- Increasing funds gathered from national and European level grants
- Increasing the number of publications
- Increasing the quality of journals and conferences disseminating work

7.1.5.4 Market opportunities

The consortium contains some of the largest research institutions in Europe.

Academically in Spain there are few universities interested in IoT interoperability as a whole, only in partial aspects of interoperability (e.g. UPM in semantics and UPC in security). At European level, different universities, and research centres are competitors of UPV. Delivering expertise on a more complete picture such as the design, architecture, technology, implementation, and deployment as well as economic aspects allows INTER-IoT partners to differentiate themselves from other institutions.

7.1.5.5 Conclusions

There is room in the academic market for courses covering the latest innovations. INTER-IoT has the potential to draw students and increase university funding through cutting edge research initiatives. Training programs that can be developed around the INTER-IoT solutions will be in demand if INTER-IoT products and solutions are utilized in industry. Courses addressing interoperability are in demand. Also, to be the base of other new academic research project is an interesting point to be covered.

7.2 INTER-IoT General Trends

Markets trends that will influence the business opportunity for the product tend to fall into one of the following PESTEL categories: Political, Economic, Socio-cultural, Technological, Environmental, and Legal.
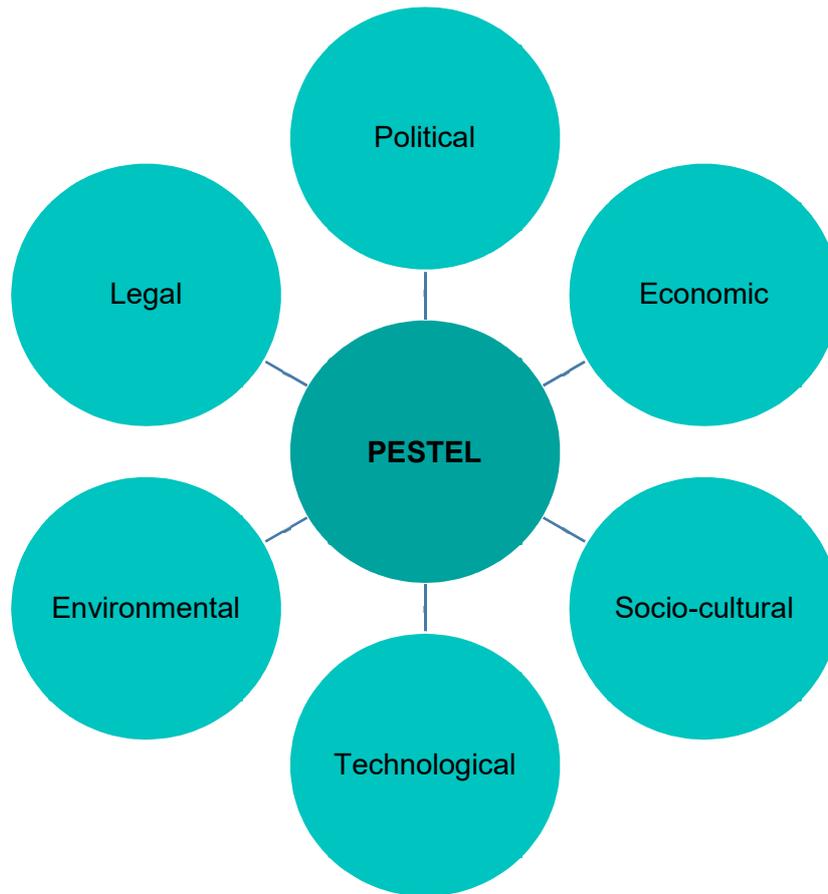
Figure 24: PESTEL analysis

Trend	Details
Political	• Push for sustainability • Globalisation
Economic	• Globalisation will require a "standard" to unify the supply chain. INTER-IoT can facilitate this unification. The major impact will be from "click" to door and will force the integration of the shopping platforms with factories and logistic requiring additional cross platform interoperability. Thus, logistics and ports will be a very big market for IoT solutions.
Socio-cultural	• The rapid increase of chronic diseases and the progressive ageing of population require cost-effective healthcare services. • The key indicator of success is not to reduce the delivery time, but to reduce to zero the uncertainty. • Time as a commodity.
Technological	• Growth of digital healthcare systems for analysis and management of patient health. • The top trend in the IoT platform market is consolidation. According to the business insider's report[9], platform providers are increasingly trying to provide a near full-stack solution to fulfil all five stages of the IoT's potential. As a result, larger companies are snatching up smaller ones that may specialize in a single part of the technology stack, such as messaging or

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[9] P. Newman. "The IoT Platforms Report: Examining the wide variety of software that holds the IoT together." Business Insider. 2017.

Trend	Details
	analytics. INTER-IoT facilitate integration on this level while also providing the infrastructure for smaller companies to form strong partnerships with the barriers to entry of many markets lowered.
Environmental	● Push for sustainability
Legal	● Globalisation ● Data protection laws and regulations

Table 59: PESTEL analysis

Alongside this need for a viable value proposition, today's consumers are redefining their values and priorities, which Euromonitor International has termed "The New Consumerism". This new consumerism unites many of the key consumer trends of our time and shares many of the same drivers. One such trend is the emergence of time as a crucial commodity for today's consumer. Work and family pressures, combined with economic stress, have taken a toll on consumers. Four in 10 respondents surveyed feel under constant pressure to get things done, according to Euromonitor International's 2016 Global Consumer Trends Survey[10]. In this fast-paced world, consumers are looking to buy more time in order to reduce stress.

During interviews with end users and representatives of the different market segments, feedback mainly focused on technical functionality of the provided solutions.

Market Segment	Number of interviews	General feedback
Health	10	Facilitating interoperability with health systems while protecting patient confidentiality
Transport and Logistics	75	Mainly interested in providing extensions to existing systems to other application domains Interested in how IoT and big data will interact. Interested in new courses around IoT and big data interaction. If benefit can be demonstrated, they will be interested in participation in INTER-IoT Interested in participating and developing the project and final products as they can see the benefit to their business Keen interest in the results of the pilots. The idea is appealing, but they want to see it in practice
Smart Cities	15	Interested in how IoT and big data will interact. Interested in new courses around IoT and big data interaction.
Smart Agriculture	10	Customers require help to translate IoT innovations into strong business models
Academic	115	Interested in how IoT and big data will interact. Interested in new courses around IoT and big data interaction. General interest New courses focused on IoT Interest in IoT end-to-end architectures

Table 60: End user interviews

7.3 INTER-IoT General SWOT analysis

As a supplement to D2.1, a review of the SWOT analysis was done with the new product definitions in mind. It identifies the internal strengths and weaknesses of the INTER-IoT exploitable

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[10] *Euromonitor International Global Consumer Trends survey, 2016*

products and services on the whole, as well as the opportunities and threats faced by INTER-IoT due to changes in the external environment. More specifically it provides the opportunity to:

- Highlight the strengths of the new products, enhancing the potential for effective marketing strategies directed to target consumers.
- Consider the weaknesses, which the consortium will put effort to properly address and to minimize during the project.
- Recognize the possible threats and treat them in a planned and organized way.
- Identify new market opportunities useful to consolidate our products in the context of a well-defined niche market.

A more detail product-by-product analysis is carried out in the following section looking at individual products defined in section 3.2.2 near completion.

SWOT Analysis	
Strengths	• Many INTER-IoT partners have extensive speciality knowledge in this area as work has been ongoing since 2007. • Close ties with end users allow bespoke solution development rather than "copy and paste" solution. • The modularity of INTER-IoT allows for flexibility of solution options
Weakness	• Reliance on the open source community if in house expertise is not available for all aspects of the INTER-IoT solution will be a weakness of the Freemium product but creates an opportunity for the premium product. • Inactive open source community can be a weakness for the Freemium product if in house expertise is not available. • Inclusion of proprietary technologies is a barrier to entry for the Freemium product in open source environments. • A key barrier that has been found for the adoption of INTER-IoT solutions is the risk that the solution may become another standard or architecture to add to the large list of current standards and algorithms. • There is a stigma that is associated with open source technology when it comes to healthcare.
Opportunities	• The more platforms are connected, the more data will be available to create new services. • Security of sensitive data and privacy, if properly addressed, will make the product appealing • Small/medium private healthcare providers keen to integrate current solutions. • Port authorities are demanding interoperability and integration of heterogeneous IoT platforms in order to improve the services they are offering and to increase security and efficiency aspects. • System integration is in demand. This presents a huge opportunity. • Legacy systems are currently operating across multiple sectors. These systems will be updated or replaced. INTER-IoT can capitalise on these modernisations.
Threats	• Currently exclusivity contracts. • Possibility of becoming "yet another standard". • Companies already have strong ties with existing service providers, even though these providers do not offer satisfactory interoperability. • Inappropriate handling of sensitive data. Strong security and privacy of sensitive data is crucial. • Small size in comparison to larger platform providers when targeting the healthcare sector • Individual platforms see the need for interoperability and are expanding to try to take advantage.

Table 61: SWOT analysis summary

7.4 General INTER-IoT competitor analysis

INTER-IoT project will deliver a set of products and services to cover a wide range of unmet needs in several and different market domains and market segments, related with IoT interoperability. Deliverable 2.1 provided a detailed stakeholder and market analysis; D2.2 provided the initial business models; D8.3 provided the exploitation plans whose progress has been detailed in D8.5, sections 3.2.1 and 3.2.2 of current deliverable introduce a list of the already identified services and products to be released on project termination, that extend the initial five product list already defined at the beginning of the project. After an identification of the market segments in which INTER-IoT services and products would fit in and an overview on the characteristics of these markets, the competitor analysis introduced in this section helps to understand the positioning of each individual outcome with respect to existing solutions, as it is one of the key aspects of the LLAVA matrix, the methodology we are proposing for the completion of INTER-IoT business plan definition.

The competitor analysis evaluates the strengths and weaknesses of INTER-IoT products and services and, moreover, according to the expertise of each partner in the consortium, identifies potential competitors which have similar products and services in the market. Section 3.2.2 provides a product by product assessment intended to highlight key areas for development and exploitation. The products have been defined from the interest of the different stakeholders with which the consortium discussed, the interaction with IoT-EPI, discussions with the Advisory Board of the project and other inputs gathered from the market. The final version of D8.7, will include a further evaluation of the competitors in order to determine how their solutions compare to the final products provided by INTER-IoT and which the differential advantage with respect to current solutions is.

Exploitable results	Strengths and weaknesses	Competitors
P1: INTER-METH methodology book	The INTER-METH book aims at supporting Integrators/Developers of IoT Systems to integrate, interconnect, and interoperate between heterogeneous IoT systems through the INTER-IoT approach. The Book will document the developed methodology by using the OMG SPEM notation that is a standard notation in Process Engineering. It is worth noting that we will have two versions of INTER-METH: a) the abstract version that is independent from the INTER-IoT tools and frameworks and that could be instantiated for any specific approach; b) the INTER-IoT version that is fully dependent of INTER-Layer and INTER-FW.	INTER-METH is the very first methodology supporting integration of heterogeneous IoT systems/platforms, thus no competitors are present so far. The concept of methodology is very broad, however in relation with IoT interoperability the only associated methodology is a manifesto available in the web site http://www.iotmethodology.com, and it does not address explicitly interoperability.
P2: INTER-METH Training schemes	The training schemes can be seen as an addendum to the INTER-METH Book in order to clarify the application of INTER-METH. Specific use cases will be reported involving the use cases of INTER-IoT (INTER-LogP and INTER-Health) as well as other examples	To the best of our knowledge INTER-METH will be the very first methodology supporting integration of heterogeneous IoT systems/platforms, thus no competitors are present so far. However, the consortium will monitor the main universities and training entities as new courses and training schemas are appearing in the area of IoT, e.g. Master in IoT founded by IoT Forum and Mandat International with U. Geneva.

P3: INTER-METH CASE Tool	The INTER-CASE tool will allow application of INTER-METH according to the INTER-IoT approach. Thus, while the abstract version of INTER-METH could be reused to drive integrations not based on INTER-IoT approach, INTER-CASE will be fully dependent on INTER-IoT products.	INTER-CASE is the very first case tool that is based in a methodology supporting integration of heterogeneous IoT systems/platforms, thus no competitors are present so far. However, case tools to address different aspects of IoT deployments or monitoring are present in the market and the consortium will control the link with the proposal of INTER-METH CASE tool.
P4: INTER-IoT physical Gateway	Strengths: - Modularity (OSGi) - Physical/Virtual separation - Only device level duties - Suitable for constrained devices, low resource consumption. - Core runs in any JVM - Easy extensibility Weaknesses: - Need of a JVM stack - Extensions could be OS dependant - Network access to virtual counterpart unless both run locally	INTER-IoT gateway for interoperability is composed by two parts that can be considered as separated products or as a joint product. The flexibility of the development allows several types of deployment. Not many open source gateway software makes a clear separation of physical and virtual layers, and not at the same extent. Main Open Source competitors: - Eclipse Kura - H2020 ICT30 project Agile
P5: INTER-IoT Virtual Gateway	Strengths: - Modularity (OSGi) - Physical/Virtual separation - Brings typical cloud operations closer to the device - Runs in any JVM, OS agnostic - Easy extensibility Weaknesses: - Need of a JVM stack - Network access to physical counterpart unless both run locally	Main Proprietary competitors: - Ubiworx - FogHorn - ProSyst (Bosch)
P6: SDN Component	Strengths: - High level and centralized overview and control of the whole network and information about each node - Scalability: facility in the addition of more nodes to the network - Dynamic: on-the-fly adaptability of the switches content depending on the situation - Flexible: different applications can be running within the controller and different forward components can be easily added to the network - QoS: for prioritization and division of the traffic by services. - Compatibility: with services as OpenStack, to work in the Cloud, and with other controllers and applications. - NFV compatibility Weaknesses: - Security: central point of the network instead of distributed information. - A little bit more complication in the first deployment due to set-up and configuration complexity.	Not many open source projects are focused on the implementation of an SDN component network in the IoT file. For this reason, even if we find different project that use SDN they are not direct competitors as they are not involved in the IoT domain. However, some projects are creating, as us, these IoT oriented SDN, for example: - IoTDM of ODL created by Cisco is currently being developed. - H2020 5G!PAGODA

P7: SDR component	Strengths: - Flexibility of frequency - Provide interoperability in connecting to the gateway Weaknesses: - Currently an expensive option - Huge development effort to realize the full potential	There are currently no products that address the scope of SDR in IoT. However, to the same extend as INTER-IoT is adapting the technology COTS components can be used for IoT deployments. There are many providers of SDR development platforms. Solutions with software are less common and much more expensive. There are some SDR systems that could be utilized with INTER-IoT components, such as LimeSDR.
P8: INTER-IoT middleware	Strengths: - Extendibility to new platforms – bridging to additional middleware platforms - Extendibility of provided services (QoS, Device registry, Platform registry, Roaming…) - Support for semantic interoperability - Scalability - Open source Weaknesses: - Initial set of supported platforms my not fulfil specific customer requirements - Despite the fact that a comprehensive SDK for development of bridges is going to be provided, a considerable effort is needed to develop and validate a new bridge	Currently, there is no comprehensive industry-accepted "super middleware" to support interoperability across IoT middleware. However, according to a recent review published in Computing Now[11] there are several on-going research efforts in the area of middleware interoperability: - MOSDEN: An Internet of Things Middleware for Resource Constrained Mobile Devices - FIoT: An agent-based framework for self-adaptive and self-organizing applications based on the Internet of Things - Integration of agent-based and Cloud Computing for the smart objects-oriented IoT - Smart Semantic Middleware for the Internet of Things It seems none of the proposed solutions addresses inter-layer and inter-domain challenges at the same time, which is the main strength of INTER-IoT. All proposed solutions are in an early research stage, so it is difficult to assess their market potential at this moment
P9: Application services module	Strengths: - The solution is developed in an open source development environment and with a wide community of collaborators. - Is a friendly and simple environment to start working with it - It is simple to extend and to add some new capabilities and types of integration. Weakness: - It is a concrete bet by Node-RED since it is the development environment for IoT most implanted for Flow-based Programming. Although it may appear a more powerful tool in the future.	The solution INTER-IoT is providing is based in Node-red, there are other projects that use Node-red and many vendors that are developing their own connectors. The Node-Red ecosystem is rather an opportunity than a competition. On the other hand, there are other tools that try to fill the same or similar gap in the market like: Apache NiFi, Ifttt, NoFlo, Flogo, Intel IoT Services Orchestration Layer, Microsoft Flow...
P10: IPSM - semantic mediator	Strengths: - The solution is developed on an open source software - IPSM is extensible for new IoT	No other solution for alignment-based semantic interoperability in the IoT area has been identified, except some scientific related papers.

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[11] https://www.computer.org/web/computingnow/archive/interoperability-in-the-internet-of-things-december-2016-introduction

	platforms and services - Will work with any ontology existing or creating in the future - Scalable in terms of connected artifacts and translations performed - Customizable and adaptable (deployment-specific central ontology) Weaknesses: - Assumption that for each artifact there is an ontology, that in some cases has to be created - Potential complexity of alignment creation	
P11: INTER-LAYER security module	Strengths: - Common cross-layer security infrastructure - Specific and tight interactions with services provided by each layer - User management and accountability Weaknesses: - Only used in INTER-IoT environment - Security in IoT is continuously evolving. Easy to get outdated.	Some cloud companies integrate their own crypto-services with their IoT platforms such as Amazon, Azure and Symantec. For Access Control and Authorization: - ACHILLES, that has entered in the project through the application of the open call. - DCAF (IETF Draft)
P12: INTER-FW framework	Strengths: - A toolset for developers, integrators and end-users - A complete but simple API for different layers and IoT interaction - Easy deployment - Basic functions can be used without technical background Weaknesses: -Must run in a non-constrain device. Need for higher resources - Many functionalities can lead to user saturation	There are many IoT platforms that not only provide support for the devices and data but provides development and management tools. Still, not all of them are as complete as the framework we develop but some competitors could be: - Apache camel - Ifttt - Fred - Kaa - Leylan - Zetta
P13: INTER-FW	Strengths: - Provide a framework to manage and integrate your IoT solution plus tools and SDK for developers, integrators and end-users - Extensive documentation and community support - Easy to use - Expose a complete API for different layers and IoT interaction Weaknesses: -Many functionalities can lead to user saturation	Almost any competitor includes both a management framework of solutions and a set of tools to keep improving the platforms. Even so, if we have to name a possible direct competitor would be: - - Eclipse IoT Framework and - FIWARE.
P14: INTER-FW SDK	Strengths: - Single entry point for developing with INTER-IoT components - Extensive documentation for developers about each of the components - Developers can contribute improving	Since this SDK is bound to Inter-IoT software products, no direct competitors exist. Other indirect competitors for other IoT related products SDK could be: - Fiware-SDK - Sofia2 SDK - Eclipse IoT SDK

	the components or extending its capabilities Weaknesses: - Technical knowledge is required - Developing constraints (programming languages, communication protocols, etc.)	- Azure SDK - BugLabs
P15: INTER-IoT Transportation support platform	Strengths: - Real time monitoring of your assets - Proper planning of your resources - You know the position of your vehicles/machines in every moment Weaknesses: - Security. Confidential data is being shared and security must be guaranteed - Longer procedures for workers	- Reefer containers monitoring system of Maersk - Fleet management systems with interoperability features - Orbita - Okode - Nokia - Sothis - Kii - Infoport
P16: INTER-IoT Health platform	Strengths: - Integration of legacy systems with new technologies - Optimization and customisation of sensoring platforms - Medical doctors can design and draw the specific services they need Weaknesses: - Costs are not competitive - These type of services is usually provided by medical technologies manufacturers on low rate basis - Cost-effectiveness of the solutions delivered by the services must be demonstrated	Several integrated platforms for interoperable health monitoring can be found in the market, main competitors are: - Philips - Everis - General Electric - Air Liquide - Telefonica - Medtronic
P17: INTER-Health RemoteCare App	Strengths: - Improved care delivery through intensive remote follow-up - Patient empowerment - Digitalization of data - Fully-integrated with Electronic Health Records Weaknesses: - Patient acceptability of the mobile app is uncertain - Privacy, security and confidentiality issues - Dependency on the type of integrable sensors	Remote monitoring apps are a huge market and there are several large and small entities addressing these aspects: - Bayer - Jhonson and Jhonson - General Electric - NeedStreet Web Technologies Private Limited - Private Health Insurance Companies - CareFit
P18: INTER-Health Connectors	Strengths: - Stable software components for community development - Compliant with ISO/IEEE standards for medical device integration - Replicable and customizable Weaknesses: - Some parts may be copyrighted and not able to commercialization	Connectors in health environment for interoperability, are typically developed by the own vendors, main connector developers are: - Renensas Electronics Corporation - Roche - Fujitsu - BlueGiga - SHARP - A&D Medical - Intel

	- Too many competitors - Needs continuous support and update as it depends on external device vendors and standards	
P19: INTER-IoT Cross-domain solutions	Strengths: - In house development for firmware and hardware in combination with own manufacturing capacity (with global footprint) - Large variation in business knowledge from semicon / automotive / agriculture to defence Weaknesses: - No own sales channels, no own products so development is done for other parties; our customers who always remain IP owner of the products	Main competitors are mainly integrators and hardware developers: - Bosch - Cisco - Philips - Prodrive - Benchmark
P20: INTER-LAYER platform	Strengths: - Global interoperability: Inter-Layer is an innovative IoT solution achieving interoperability in all layers - Based on the concept of multilayer architecture provide infrastructures to adapt heterogeneous peer layers (device-to-device, networking-to-networking, middleware-to-middleware, application services-to-application services and semantics-to-semantics); Each integration is different, and any layer can be integrated. Weaknesses: - Difficult to understand at first glance - Might not be the best option for certain environments	Since our solution for IoT interoperability is a novel approach, no other direct competitors are present for this component of INTER-IoT platform. The indirect competitors are listed below in the INTER-IoT platform product.
P21: INTER-IoT platform	Strengths: - Practically infinite scenarios - Not Unique Approach - Full toolset to have different possibilities of integration (multi-layer, techniques, …) Weaknesses: - Its wide approach can be overwhelming for some users - Some components might not be needed for certain situations - For some legacy platforms, the integration might need specific configurations	The main competitors for IoT interoperability solutions are the H2020 EPI projects: - AGILE - SymbIoTe - bIoTope - Big-IoT. And also large IoT platform developers that use their platform as interoperability platform: - FIWARE - SOFIA2 - sensiNact
P22: IoT course	The course will be the first one providing a set of concepts and related methods, frameworks, and tools for IoT systems integration. It will be strongly based on INTER-Layer, INTER-FW, and INTER-Meth. The course could be customized to be used for several	Currently IoT is a very relevant area for industry and academia and several universities are providing courses related with IoT. The competition is low now but in the next years is going to be high, some examples: - Universidad Politecnica de Madrid - U. Geneva

	purposes: academic at different levels (Master, PhD), training in companies, training consultants, etc. The consortium is going to provide different IoT courses, with a highlight in a multi-university course and the provision of a MOOC using UPV platform[12].	- Stanford University Some of these courses are provided online as MOOC.
P23: INTER-CASE tool for Semantic analysis	Methodology (part of the INTER-METH) dedicated to integration of IoT artefacts at the semantic level. The methodology will guide the user through the analysis of IoT artefacts with respect to semantic-awareness, include best practices for lifting artefact's information scheme to an ontology and designing a central ontology for INTER-IoT ecosystem. The INTER-CASE Semantics tool (part of INTER-METH case tool) will support user in defining alignments between selected ontologies. Strengths: - Documented procedure for achieving semantic interoperability - Best practices for lifting other information schemes to an ontology - Case tool to support the alignment preparation Weakness: - The potential risk that the procedure will be too complex to execute without the "semantic background"	No methodology and case tool for achieving semantic interoperability has been identified. Solutions/tools are available for lifting information schemes to an ontology, but this is only one optional step in the proposed procedure. Competitors can be IoT-EPI projects that may propose other approaches to achieving semantic interoperability.
P24: INTER-METH Design guide	The definition of a collection of design patterns with the aim of driving the integration designer to provide the most effective solutions. Strengths: - Well-formalized domain-specific guidelines - Allow designers to produce rapid and effective specifications for the IoT platform integration at any desired layer and also cross-layer - Supported by INTER-METH and INTER-CASE tool, implemented in INTER-LAYER products	No well-formalized design patterns dedicated to IoT Platforms interoperability have been identified. There are publications on design patterns in the IoT domain, but they focus on use cases and related architecture and not on the aspect of interoperability. Existing design patterns catalogues e.g. Enterprise Integration Patterns include patterns that could be applied in the IoT domain. However, to the best of our knowledge there exists no documented well-formalized set of patterns for interoperable IoT platforms.
P25: Reference Meta-Data Model	The definition of the metadata model of interoperable and open IoT platforms. The metadata model will specify the basic data-structure and relationships of all data entities of an IoT platform	Different aspects of IoT domain have been semantically modelled in the scope of the following projects: - FIESTA-IoT - Open-IoT

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[12] http://www.upvx.es

with the interoperability mechanisms developed in INTER-LAYER. The meta-data model will be a provided as the set of ontologies. Strengths: - Meta-data model will provide a common understanding of the terms and relationships when describing the IoT domain - Following the meta-data model during a new IoT platform design will later enable easier integration - Can form the basis for designing the modules of the central ontology to be used in the IPSM component Weaknesses: - Risk of designing too generic or too detailed model to be effectively used - Meta-data model represented as a set of ontologies may be difficult to understand for people without "semantic background"	- IoT-EPI e.g. symbIoTe

Table 62: Competitors analysis

In the framework of IoT-EPI RIAs (i.e. Big-IoT, symbIoTe, bIoTope, AGILE, VICINITY 2020, and TAGIT SMART) there are several common works and interaction that will provide competing products and solutions. These and additional solutions will be assessed and mapped to the proposed products above prior to final delivery of D8.7 in M30. As it is considered part of the exploitation strategy a reference and a description of the liaison with these projects is provided in D8.5.

Another set of competitors that will be considered in the following version of the deliverable are the companies who are planning to use products different to INTER-IoT. The consideration of such competitors is that they are indirect competitors to INTER-IoT customers. More detail on competitors to INTER-IoT exploitation are listed in Q9 in the exploitation plans. Some will only compete with individual products utilizing a subset of the functionality developed within INTER-IoT.

An in depth look at the competitors of the pilots will also be undertaken in the M30 final version of this deliverable.

7.5 Regulatory Considerations

The Internet of things reaches into many aspects of life and as such has a complex regulatory framework. D2.5 addresses the legal and regulatory obligations that must be met by the INTER-IoT consortium and users that wish to utilize its products and services. Acceptance and adoption of INTER-IoT solutions relies upon building trust in the products and those that will promote them. Working within the legal and regulatory frameworks will go a long way to achieving this. As a famous quote states, "It takes 20 years to build a reputation and five minutes to ruin it". This focus on legal issues is essential for building trust, growing confidence, and facilitating investment. To successfully exploit the results of this work, we must promote the products utilisation within the legal framework available.

The health care market is one of the most highly regulated due the sensitive nature of the procedures done, and the data collected. Convincing consumers that the use of INTER-IoT is safe and secure in is domain is necessary to gain market entry and traction. Obtaining appropriate certifications and providing guidance on this matter will help. This process involves classification of the devices in question and undertaking the appropriate certification activity.

7.5.1 e-Health

Medical devices are defined in the MDD with further clarifications made in supplemental MEDDEV guidelines. Additionally, the Medical Device Regulation (MDR) is a new piece of legislation that has come into effect on 26 May 2017 and will be enforceable in 2020. This legislation will supersede the MDD after this transitionary time.

7.5.1.1 Is it a medical device?

The first important issue to consider when operating in the medical sector is if your product is a medical device.

A Medical Device (MD) is defined in Directive (93/42/EEC) as: Any instrument, apparatus, appliance, material, or other article, whether used alone or in combination, including the software necessary for the proper application, intended by the manufacturer to be used for human beings for the purpose of:

- diagnosis, prevention, monitoring, treatment, or alleviation of disease,
- diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap,
- investigation, replacement, or modification of the anatomy or of a physiological process,
- control of conception

And which does not achieve its principal intended action in or on the human body by pharmacological, immunological, or metabolic means, but which may be assisted by such means.

It is important not to underestimate the importance of this step. The intended purpose must be clearly defined in order to determine if a product is considered a medical device. As an example, a scale to measure a person's weight intended for use in the context of personal weight tracking would not be classed as a medical device while the same device with the intended purpose of being used in the context of monitoring a patient's disease progression would be classified as a medical device. Making clear the intended purpose of the device at the beginning is paramount to operating within the existing legal framework and obtaining the necessary certifications.

If the device in questions is a medical device, it must be classified so that the appropriate CE marking procedures can be undertaken.

7.5.1.2 Classification of medical devices

The technical characteristics of the device and its intended purpose for use, assigned by the manufacturer of the device, determine the class of the medical device. While similar products can be considered, the class assigned to other similar products manufactured by the same manufacturer or different manufacturers cannot be assumed to be the same.

Medical devices are broken down into Class I (including Is & Im), Class IIa, IIb and III, with Class III. Higher number classifications require greater levels of assessment. All Class Is, Im, IIa, IIb and III medical devices require the intervention of third party called a Notified Body during the certification process.

The classification rules are set out in Annex IX of the MDD. Classification of a medical device will depend up on a series of factors, including:

- how long the device is intended to be in continuous use
- whether or not the device is invasive or surgically invasive,
- whether the device is implantable or active
- whether or not the device contains a substance, which in its own right is considered to be a medicinal substance and has action ancillary to that of the device.

For our purposes, active devices are of most importance as all INTER-IoT products will rely for their functioning on a source of electrical energy. These are covered under rules 9-12 in section 3 of annex IX of the MDD.

Rule 9 All active therapeutic devices intended to administer or exchange energy are in Class IIa unless their characteristics are such that they may administer or exchange energy to or from the human body in a potentially hazardous way, taking account of the nature, the density and site of application of the energy, in which case they are in Class IIb.

All active devices intended to control or monitor the performance of active therapeutic devices in Class IIb or intended directly to influence the performance of such devices are in Class IIb.

Rule 10 Active devices intended for diagnosis are in Class IIa:

- if they are intended to supply energy which will be absorbed by the human body, except for devices used to illuminate the patient's body, in the visible spectrum,
- if they are intended to image in vivo distribution of radiopharmaceuticals,
- if they are intended to allow direct diagnosis or monitoring of vital physiological processes, unless they are specifically intended for monitoring of vital physiological parameters, where the nature of variations is such that it could result in immediate danger to the patient, for instance variations in cardiac performance, respiration, activity of CNS in which case they are in Class IIb.

Active devices intended to emit ionizing radiation and intended for diagnostic and therapeutic interventional radiology including devices which control or monitor such devices, or which directly influence their performance, are in Class IIb.

Rule 11 All active devices intended to administer and/or remove medicines, body liquids or other substances to or from the body are in Class IIa, unless this is done in a manner:

- that is potentially hazardous, taking account of the nature of the substances involved, of the part of the body concerned and of the mode of application in which case they are in Class IIb.

Rule 12 All other active devices are in Class I.

For INTER-Health, our products will serve to connect devices, both medical and non-medical with other platforms and applications. It is important to note whether or not the intended purpose of the

devices changes due to this connection. If so, the INTER-Health solution will need to be CE marked as a medical device and classified according to this new intended purpose, or the devices being connected will need to be re-CE marked to update the intended purpose to be included the new use case.

7.5.1.3 CE marking

CE marking is a mandatory conformity marking for certain products sold within the European Economic Area (EEA). The CE mark is also found on products sold outside the EEA that are manufactured in or designed to be sold in the EEA. This makes the CE mark recognizable worldwide even to people who are not familiar with the EEA.

Affixing a CE mark to a product in the manufacturer's declaration that the product meets the requirements of the applicable European Commission (EC) directive. Identification of the appropriate EC directives will be a key step in insuring proper compliance with the law.

Steps to obtain CE Marking for your Medical Devices

1. Identify all EU Directives applicable to your product. For medical devices, this will be the MDD and MDR.
2. Classify your device.
3. Select the most appropriate conformity assessment module.
4. Select your Notified Body, if your chosen conformity module requires so, to perform the third-party conformity assessment tasks.
5. Assess your device according to Essential Requirements.
6. Prepare the "Technical File".
7. Prepare the "Declaration of Conformity".
8. Affix the CE Marking on your device and start to sell.

Once the device is CE marked, the following steps must be taken:

1. Publish Your Device:
2. At http://www.CEmark.info/mdd/YourProduct.html for third party verification
3. Product Registration:
4. If applicable, we must register the product in EU and get your product a Certificate of Registration.
5. Maintain and Update Product Registration:
6. The product Certificate of Registration is valid for one year only and must be renewed annually. The information about the product must be updated whenever it changes and at least once a year when renew the product Certificate of Registration.
7. Keep Your Technical Files:
8. The Technical Files may be inspected at any time by the Competent Authorities for a period ending at least five (5) years after the last product has been manufactured.
9. Legislation Monitoring:
10. We must monitor and report on new developments in European product legislation relevant to your products.
11. Vigilance and Incident Reporting:
12. We must implement and maintain a system to support product vigilance and incident reporting.
13. Product Recalls and Advisory Notices:
14. We must issue product recalls and Advisory Notices when necessary.

7.5.1.4 INTER-Health

The intended purpose of all products conceivable using INTER-IoT in healthcare is difficult to define and must be done on a case by case basis. It is easy to see that some could potentially fall into the category of medical devices. This could occur if medical devices are connected to other systems using INTER-IoT and the intended purpose is changed. The whole system would become classed as a medical device unless the device itself was re-certified to include the new intended purpose.

It is important to highlight issues surrounding wearable technology like the Fitbit and other similar devices currently not classified as medical devices. Their use is not currently covered by the MDD as the intended use is not for clinical purposes and does not see them classified as medical devices. If these IoT devices are to be used in a medical context, their intended purpose would change requiring CE marking of the device. Manufacturers are opposed to this due to the difficulty to test efficacy and define risks associated with the products in this new context. There is also the issue of responsibility for actions taken in response to the measurements generated. To address this, INTER-IoT will include a function to label devices as medical devices within the system.

The choice of which devices and applications are connected using INTER-IoT will be the users. If uncertified devices are used in conjunction with other medical devices, the responsibility for review of the components and the certification of the system will fall on the users. By labelling devices when they are registered in INTER-IoT, we will be highlighting the difference between medical and non-medical devices. This tool will allow end users to act within the legal framework.

7.5.2 Transport and Logistics

Maritime transport is a complex system that aims to provide a service as part of the freight transport chain. Among the large number of companies and organizations that work in a port, a mutual influence and a series of relationships has been established to carry out operations successfully.

Port operations depend on the environment in which port activity is carried out. This environment will affect both how a port works and its performance.

That is why, port operations depend on the existing political, regulatory, labour and economic framework in a country and on the port management model chosen, among other important aspects.

The logistics area has a wide variety of legislation to consider in relation to road transport, security, safety, railway, environment, naval engineering, passengers, communications, etc.

In particular, there are regulatory thematic areas that must be applied in logistics and maritime transport focusing on IoT, which each day acquire more relevance:

1. Security. The main objective of security regulations is to implement measures aimed at enhancing the security of ships through measures of preventive nature used in international trade and associated port facilities in the face of threats of intentional unlawful acts
2. Safety. Safety at sea is a key element of maritime transport policy with a view to protecting passengers, crew members, the marine environment, and coastal regions. Given the global nature of maritime transport, there are a number of international bodies such as the International Maritime Organization (IMO) develops uniform international standards.
3. Privacy, Trust services, Data protection: Protecting the integrity and the privacy of data is a fundamental part of the Supply Chain   service provision.
New production or storage methods that multiply the number of deliveries require reliability and regularity. Furthermore, with outsourcing and subcontracting, the transmission of

information must be efficient and quick to horizontal partners (suppliers, manufacturers, carriers) and vertical partners (subcontractors). In fact, the volume and complexity of information continues to grow in a world where trade is going global and new industries and distribution networks are cropping up.

4. CyberSecurity. The Facilitation and Maritime Safety Committees of IMO have initiated consideration of cyber security matters and will work on this matter in consultation with other United Nations bodies and relevant international organizations such as the International Telecommunication Union (ITU). There are developing guidelines on maritime cyber risk management, aimed at enabling stakeholders to take the necessary steps to safeguard shipping from current and emerging threats and vulnerabilities related to digitization, integration and automation of processes and systems in shipping.

Because ports are critical infrastructures, they have more restrictive legislation than other sectors to protect their facilities. Mainly on issues related to safety, security, and cyber security. It is necessary to establish the appropriate strategies and structures to manage and coordinate the actions of the different organs of the Public Administrations in the field of protection of critical infrastructures, to improve the prevention, preparation, and response of the State against attacks or other threats that affect the critical infrastructures.

Some types of goods being transported also influence the legislation to be applied. For example, dangerous goods encompass various types of goods and have special treatment, as they may pose a danger to people in the event of an accident. Another example is the perishable goods, since to guarantee the health of the consumers the chain of cold must be maintained at all times.

Moreover, logistics and maritime transport is covered in an international environment, making it more difficult to create common legislation. That is the main reason why there are three levels of legislation to take into account, international agreements ratified by most countries, European directives and regulations and national laws.

EU directives and regulations have, over the past few years, greatly improved standards in maritime transport and logistics. But this is a time of a continuous moment of change where a great amount of international regulations and recommendations will be produced in order to improve the described aspects, which it will be necessary to continue to analyse and consider.

7.6 Branding and go-to-market strategy

A marketing plan is a comprehensive document or blueprint that outlines a business advertising and marketing efforts for a certain period of time (e.g. a full year). It describes business activities involved in accomplishing specific marketing objectives within a set time frame. The marketing plan describes all the strategic activities planned to achieve the goals and objectives of the project based on the findings from the market research and market analysis.

Marketing operations are activities with the purpose to manage and monitor both sales and promotion activities to ensure that efforts are spent efficiently and effectively. This involves the management of data to produce evidence that the sales and promotion efforts are generating the desired return (Increase in revenue or market share etc.). In general, it can be said that Marketing Operations are responsible for marketing performance measurement, strategic planning guidance and execution, budgeting, process development, and marketing systems and data.

This section will set out the initial marketing plan to be used by INTER-IoT, and it will be followed by individual marketing plans addressing individual products. It will also define the data needed to form a marketing plan and define the work to be done in developing the INTER-IoT marketing operations plan. Marketing operations are a key component in the LLAVA matrix defined and used in INTER-IoT to analyse the business models and the exploitation strategy.

Marketing plans have to be fluid and flexible due to the continually changing market landscape, due to the rapid evolution of new trends, changes in customer and consumer behaviour, and emerging new technologies. Therefore, marketing plans must be regularly updated to ensure their effectiveness. The IoT landscape is a perfect paradigm for such changing environments, as has been highlighted by different consulting companies and in the framework of IoT-EPI. Many new vendors, standards, OSS projects and alliance appear continuously, creating the need of adapting any business plan and marketing strategy. This process is illustrated in the figures below.
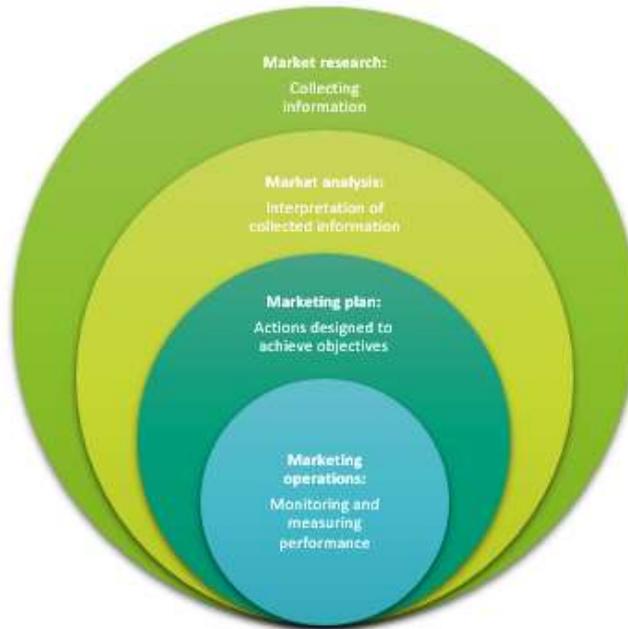
Figure 25: Market Research to Market Operations sphere

Figure 26: Market Research to Market Operations

7.7 Marketing Plan

7.7.1 Preliminary Methodology

The general marketing plan of INTER-IoT is designed using the 5P concept, which describes the product, the people (customers and end-users), the place (distribution channels), the price strategy, and the promotional activities. These aspects must be clearly defined and specified for each product to develop a successful marketing plan that sets the marketing goals and actions to perform to achieve them The exploitation questionnaires, but also the interaction with stakeholders during the development of D2.1, integration and discussions in the IoT-EPI framework and the meetings with the Advisory Board have contributed to the definition of the initial marketing plan.

Product:

Table 6: Products in Section 3.3.2 defines the 25 products that are currently expected to be a result of the project. The type of product, its features, dependencies, and owner are precisely specified. This table will be continually assessed as the technology develops. Additionally, Table 63 below lists all the INTER-IoT products with related actions to be taken according the marketing plan.

People (Customers and end-users):

The marketing plan address those that will purchase, use and promote the products. Potential customers and end users have been identified in D2.1. The former deliverable addresses the full list of project stakeholders, that can be divided in several groups:

- customers and end users
- association and public representatives
- design, engineering, and business experts

Due to the broad application potential for INTER-IoT, it is difficult to define specific customer groups, as was demonstrated during the market analysis. A common theme among all customers is the need to facilitate interoperability of heterogeneous platforms, devices, and applications.

The product association breakdown already provided in D2.1 is done by component type: INTER-Layer, INTER-FW, INTER-METH, INTER-Health and INTER-LogP. These must be updated and mapped to each new product during the marketing plan development and will be done during the next phase. D8.5 and D8.7 have provided a finer grained identification of products in order to better define the exploitation strategies. The marketing plan initially is addressed to the big group of products, and in the final version of the deliverable will be addressed to the new specific products.

A key consideration should also be the differences between the customers, who are the people and/or organisational entities purchasing the INTER-IoT product, and the potential end-users, who are the people or organisations using INTER-IoT. Addressing the needs of the end users while appealing to the customers will drive market uptake and satisfaction. D2.1 provided us a deep study on the differences between customers, during this work, that is also included in the LLAVA matrix methodology, we focused mainly in stakeholders and customers associated with transportation and logistics and health, in a later analysis we extended to other application domains with the interaction with stakeholders, advisory board and liaison with other projects like IoT-EPI and IoT-LSP.

INTER-IoT should be considered as a new task purchase for all customer segments, as very few organisations and entities will have extensive experience with new developments such as those available through INTER-IoT.

Price:

Pricing strategy of the INTER-IoT solutions has developed since D8.3 to further break down the commercial aspects of the project. Section 3 of this document describes the exploitation vision in which the Community (Freemium) and Commercial (Premium) products are described. Additionally, section 4 of D8.5 analyses the OSS strategy of the project in the framework of the exploitation strategy, directly linked with the LLAVA matrix.

INTER-IoT products will be available as Freemium solutions free of charge. This price strategy supports the INTER-IoT aim to get market share, leverage develop the open source community, and become a recognised player in the markets. Revenues will be generated from the Freemium product through The price of support, customisation, consultancy, and training services. Pricing will depend on the specific use case.

Additionally, Premium, off the shelf products, will be available such as the INTER-IoT Transport support platform. Prices must be set for each use case but will vary greatly as the scale of individual projects and the level of maintenance required vary. However, there is no agreement yet on the pricing policy neither in the main sources of revenue. Some preliminary analysis has been done, and the responses from the questionnaires are in this line. From the interaction with the Advisory Board, one of their recommendations is directly oriented to the use of INTER-IoT with the figure of interoperability-as-a-service, with the consequent revenue possibilities.

Place (Distribution):

How customers access the products is a critical decision that will have a very significant impact on the expansion and distribution of the product. This will be dependent on the type of product offered. Currently, INTER-IoT envisions academic, consultancy, training, cloud services and standard products. Distribution will involve direct distribution channels, or instead two-step indirect channels:

- In cases of the direct channel, contact with the customer will be performed by a project partner. Products will be made available via the project or partner website; software will be downloadable through these webs, and it will be available the option of on-line purchase for physical products.
- In the case of indirect channels, referrals from official bodies promoting IoT, current partner distributors, and Open source communities willing to promote interoperable IoT will be used to attract directly clients or connect project partners and those with the expertise to utilize INTER-IoT solutions with customers. Additionally, a combination of these indirect channels can be used as some project partners are end users and will act to refer work internally to other project partners. Also, these organizations could also distribute directly INTER-IoT products from their websites, becoming at the same time direct channels. Key account management will also be used in both cases to ensure that each customer gets the personalised service required.

The consortium will focus on the European Economic Area while being open to opportunities worldwide, as the different partners have connections in every continent as indicated in the exploitation strategy, South America and Asia being two primary targets for extension of the marketing opportunities.

Promotion:

To increase awareness of the INTER-IoT products and to facilitate market uptake, a promotional campaign must be implemented to introduce INTER-IoT products to the maximum number of

potential customers and attract clients willing to adopt those products. The promotional campaign has 4 stated goals:

- Raise awareness in the potential audience of the product that INTER-IoT is offering
- Persuade the customer to acquire and/or purchase the product
- Create a preference with the customer to select our product instead of the competition leveraging INTER-IoT differentiators and using specific promotional strategies.
- Remind and reassure the customer that our product is the most suitable (due to its unique features and differentiators from competition).

The following 4 dimensions of the DRIP model[13] applied to the INTER-IoT promotion will serve as the foundation for the campaign contents, with a direct connection with the LLAVA matrix strategy:

- Differentiate INTER-IoT from the competition
- Reinforce positive experiences and beliefs of INTER-IoT products
- Inform the customer about the INTER-IoT unique selling points (USPs) and distribution channels.
- Persuade the customer that INTER-IoT is the best solution for their needs

The promotional campaign must consider the following marketing channels:

- Email marketing
- Search engine marketing
- Social and display adds
- Public relations such as blog features, tv appearances etc.
- Offline channels
- Existing platforms
- Affiliate marketing
- Sales
- Business development
- Community building
- Content marketing
- Offline events
- Speaking engagements
- Trade shows
- Product website (Connected to the INTER-IoT portal)
- Social media engagement

The application of the above 5P methodology is necessary for defining the associated marketing plans. The following table identifies a sort of specific actions that are necessary for each product type in the development of its marketing plan.

Product Type	Products	Actions
Academic	P1: INTER-METH methodology book P2: INTER-METH Training schemes P3: INTER-METH CASE Tool P16: INTER-IoT Health platform P17: INTER-Health RemoteCare App P18: INTER-Health Connectors P22: IoT course	● Identify the people who will utilise these products. This must include both the students and institutions that will stakeholders. ● Define the pricing strategy appropriate.

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[13] http://thenovicemarketeer.com/drip/

	P23: INTER-CASE tool for Semantic analysis P24: INTER-METH Design guide P25: Reference Meta-Data Mo	• Define how students, instructors and institutions will access the resources necessary to undertake and develop courses. • Apply the DRIP model to make the courses appealing to both students and institutions • Identify appropriate marketing channels to address both institutions and prospective students
Product	P1: INTER-METH methodology book P3: INTER-METH CASE Tool P4: INTER-IoT physical Gateway P5: INTER-IoT Virtual Gateway P6: SDN Component P7: SDR component P8: INTER-IoT middleware P9: Application services module P10: IPSM - semantic mediator P11: INTER-LAYER security module P12: INTER-FW framework P13: INTER-FW P14: INTER-FW SDK P15: INTER-IoT Transportation support platform P16: INTER-IoT Health platform P17: INTER-Health RemoteCare App P18: INTER-Health Connectors P20: INTER-LAYER platform P21: INTER-IoT platform P23: INTER-CASE tool for Semantic analysis	• Identify the people who will utilise these products. This must specifically address the market segment. • Define the product as either a Freemium or Premium solution and address the level of support that will be available and the cost of each. • Identify the method in which customers will gain access to the product. • Define the best marketing channels and the key product characteristics which will drive uptake.
Consultancy	P3: INTER-METH CASE Tool P10: IPSM - semantic mediator P14: INTER-FW SDK P15: INTER-IoT Transportation support platform P16: INTER-IoT Health platform P17: INTER-Health RemoteCare App P19: INTER-IoT Cross-domain solutions P20: INTER-LAYER platform P21: INTER-IoT platform P22: IoT course P23: INTER-CASE tool for Semantic analysis	• Identify the people who have a need for the INTER-IoT product and require additional support to implement their solution. • Determine the model of payment that will be implemented to best further drive market penetration of INTER-IoT. • Create a strategy to demonstrate the additional benefits which can be realised through expert involvement in the deployment and development of INTER-IoT products. • Define the best marketing channels and the key product characteristics which will drive uptake.
Training	P3: INTER-METH CASE Tool P10: IPSM - semantic mediator P14: INTER-FW SDK P15: INTER-IoT Transportation support platform P16: INTER-IoT Health platform	• Identify the people in need of training. Particular attention should be given those who will go on to extend the market penetration of INTER-IoT solutions

	P17: INTER-Health RemoteCare App P19: INTER-IoT Cross-domain solutions P20: INTER-LAYER platform P21: INTER-IoT platform P22: IoT course P23: INTER-CASE tool for Semantic analysis	• Define the pricing strategy appropriate. A Freemium solution could be considered if it leads to additional consulting work or Premium product purchase. • Define how students, instructors and institutions will access the resources necessary to undertake and develop training courses.
Cloud Service	P5: INTER-IoT Virtual Gateway P6: SDN Component P8: INTER-IoT middleware P9: Application services module P10: IPSM - semantic mediator P11: INTER-LAYER security module P13: INTER-FW P20: INTER-LAYER platform P21: INTER-IoT platform	• Identify the people who will utilise these products. • Define the product as either a Freemium or Premium solution and address the level of support that will be available and the cost of each. • Identify the method in which customers will gain access to the product. • Define the best marketing channels and the key product characteristics which will drive uptake.

Table 63: Specific actions for the different product types

7.7.2 Preliminary methodology applied to the INTER-Health product

Each specific INTER-IoT product must have its own individual marketing plan. As the products are still being developed and new combinations of technology evaluated, we present below one of the most well-defined products. Additional plans addressing each product will be progressively reported in further versions of this deliverable. The following is a sample of those marketing plans specifically focused on a particular INTER-IoT product, to show the applicability of the methodology. The section describes the marketing plan for the INTER-IoT e-Health platform product (P16):

Product: INTER-IoT m-Health platform.

The INTER-IoT e-Health platform provides services for the integration of healthcare services and wearable systems. By combining previously disparate systems, each with their own utility when providing patient care and management, this product aims to generate new models of care and streamline previously labour-intensive care plans. Creating an environment where the clinician has as much information about the patient as possible facilitates informed clinical management. The creation of an easy pathway to providing advice and clinical justification to patients is thought to increase the effectiveness of treatments.

INTER-IoT Health platform focuses on patient mobility, remote measurements of biomarkers, local mobile physical detection, and analysis of lifestyle data. It is dependent on INTER-FW, INTER-LAYER, and INTER-METH.

People (Customers and end-users):

Due to the broad application potential for INTER-IoT Health platform it is important to distinguish between the customers who are the people and/or organisational entities purchasing this product, and the potential end-users, who are the people or organisation using the platform.

End-user segments:

- Any patients or patient groups that use devices using the INTER-IoT Health platform technology. Typical examples include diabetes patients, who communicate their blood sugar numbers to their GP, and people recording their heart rate data to a mobile device for lifestyle monitoring.
- Any health professional using the platform to monitor their patients. Examples could be first responders, GPs, and paramedics, who use medical devices with the INTER-IoT Health platform technology to collect data either in the field or in their surgery from patients. It could also be used to communicate with remotely located patient records, other medical professionals, or the patient themselves.

Customer segments:

- Manufacturers of wearable technologies and devices intended for health monitoring or healthcare functionalities. This segment is characterised by high levels of innovation and should be considered potential early adopters for the platform.
    - The recent trend indicates a considerable interest for personalised health and enabling wearable technologies, and it must be expected that this segment will experience a significant increase in the volume of market entrants in the next years. However, as experiences with similar trends indicate, a large volume of these new entrants will not be successful in the long run. Global companies such as Apple, Microsoft, and Google are entering the market, which will create both opportunities and threats for the platform.
- Public healthcare service providers such as the NHS (UK), Danske Regioner (DK), and Sistema Nacional de Salud (ES), who provide healthcare services to local populations. This segment includes both primary and secondary care providers. Also, this customer segment is generally considered to be the late majority that is slow to fully embrace new technologies, and in some cases, may even be classed as laggards who are very slow to adopt the latest technologies.
    - Historically, public sector healthcare service providers are a difficult segment to engage with due to numerous and often undisclosed gatekeepers blocking access to decision-makers. This segment is also experiencing severe fiscal and financial strain in many countries, which may be considered a barrier, but it can also be considered an opportunity to for the platform to contribute to the solution to the underlying problem.
- Private healthcare service providers such as private hospitals and specialist healthcare services. This segment is generally faster to jump on the band wagon for new technologies and should be considered as the potential early majority.
    - This segment is experiencing a slow, but growing increase in competition along with a continuing increase in demand for services due to the strain experienced by the public healthcare service providers.
- Healthcare insurance providers, who utilise extensive mapping of healthcare data as part of their modus operandi. This segment is driven by fierce competition and should be considered as early adopters, who will take advantage of new technologies to gain market shares.

o This segment is experiencing increased scrutiny from both clients and regulators due to the recent democratisation of healthcare data enabling technologies available for consumers.

INTER-IoT Health platform should be considered as a new task purchase for all customer segments, as very few organisations and entities will have extensive experience with new developments such as the platform.

Price:

The INTER-IoT Health platform will be sold as a Freemium software-as-a-service product free of charge. This price strategy supports the INTER-IoT aim to get market share and become a recognised player in the markets. The customer segments are considered to be relatively price in-elastic, so a future change of pricing strategy to a paid model can be phased in later, which is a recommended strategy for the late adopters and laggard segments.

Place (Distribution Channels):

The INTER-IoT Health platform will be distributed through the INTER-IoT consortium partners using direct sales and key account management to ensure that each customer gets the personalised service that is required. For the specific application of the product in the nutrition environment, direct engagement with ASLT05 will allow project partners to leverage their network to identify other customers interested in accomplishing the same goals. They will also be able to identify key events, journals, and organisations to engage with that will allow engagement with the community on a whole. Additionally, other project partners with interest in health markets will engage their distributors and extended networks to identify potential opportunities. The aforementioned entities and organisations will become additional distribution channels of the product as clients will be able to acquire the product through them.

Promotion:

A promotional campaign will be designed to increase the objective public awareness of Inter-IoT e-Health platform and facilitate market uptake.

Promotional campaigns are one of the most fundamental tools used to introduce products and services to a large audience, over a period of time. This measure and its associated actions will maximize the promotional campaign has been designed to fully exploit the potential. The campaign has 4 stated goals:

- Raise awareness of the product offering
  - o Produce microtools, free e-books or white papers with information about the project and products
- Persuade the customer to buy the product
  - o Present evidence of the superior benefits of the product
- Create a preference with the customer to select our product instead of the competition
  - o Continually engage with the customers to help embed our solution deep into the customer's work flow.
- Remind and reassure the customer that our product is the most suitable
  - o Publish success stories and a continuing stream of evidence to remind and reassure the customer about their choice.

The following 4 dimensions (DRIP model) will serve as the foundation for the campaign contents:

- Differentiate INTER-IoT Health platform from the competition
- Reinforce positive experiences and beliefs of INTER-IoT Health platform

- Inform the customer about the INTER-IoT Health platform USPs
- Persuade the customer that INTER-IoT Health platform is the best solution for their needs

The promotional campaign will utilise the following marketing channels:

- Business development
    - Utilising key contacts to identify new opportunities
- Product website (Connected to the INTER-IoT portal)
    - Mini-sites for each involved partner's website
- Dedicated social media accounts for
    - Twitter
    - LinkedIn
    - Facebook
    - Instagram
    - Hi5
    - Xing

Social media engagement will be managed through the Hootsuite social media manager to ensure a unified, consistent, and timely utilisation of the platforms and messages.

- YouTube
- Articles in selected newspapers for consumer relatable interest stories
- Relevant industry and technology magazine (online and offline) for customer relatable interest stories
- Peer reviewed journals and publications
- Tradeshows and industry events

7.7.3 Extracted Marketing plans from the LLAVA methodology and exploitation questionnaires

In section 3.5 we see the results of the LLAVA process addressing specific products. These results address the key points identified in the preliminary marketing methodology outlined in section 7.7.1: Product, People, Price, Place and Promotion.

Product descriptions are included for the 4 selected products. Additionally, the value promise and solution sections of Table 10Table 15Table 20Table 25 add to the description of the products. These are very well developed and a clearly expressed.

The people involved are identified in the customer segments section of Table 10Table 15Table 20Table 25. These are broad descriptions with specifics being included in section 5.

The price for each product is discussed in the willingness to pay section of Table 10Table 15Table 20Table 25. Further information is provided in the cost structure and revenue streams section of Table 12, Table 17, Table 22, and Table 27. For the majority of partners, pricing models are still being developed.

The place and promotion sections are discussed in the channels and key metrics sections of the of Table 12, Table 17, Table 22, and Table 27. Consortium partners have utilized project outputs and promotion done by project channels such as Facebook, LinkedIn, twitter and the project website to showcase results. Moving forward, the INTER-IoT GitHub will be available to promote the project.

7.8 Marketing Operations Plan

The purpose of the marketing operations plan is to define the methods and metric to be used for monitoring and measuring the outcome of all marketing and promotional efforts. The ultimate metric is called Return on Marketing Investment (ROMI), and it is calculated using the following standard formula:

(Sales growth in monetary value – cost of marketing efforts) x 100 / marketing investment

To correctly measure the ROMI a fixed time period must be set, i.e. one month. However, the result of the formula must also be benchmarked against similar metric to compare the results and decide if it is a success or not. Typical benchmarks are the same period in the previous year or month, or a similar industry competitor running and comparable campaign. ROMIs of 50% or higher are generally considered successful.

The behaviour of consumers and the landscape for businesses today are constantly evolving and changing at an increasingly rapid pace. Smart technologies have democratised the flow of information with the result that businesses are struggling to keep up with new and emerging trends using the conventional marketing methods. Marketing operations is the methodology to utilise efficient processes and supportive technologies to both measure the effectiveness of marketing efforts and to enable businesses to not only connect with customers but also shape their interactions. So, if the marketing plan is what we will do to reach the potential customer segments, then marketing operations is the quantitative (and sometimes qualitative) control mechanism to ensure that the goals of the marketing plan is achieved within reasonable and acceptable terms.

A literature review of marketing operation journal articles concluded that the key to successful marketing operations involve the application of the following 5 general concepts:

1. Show understanding of the customers by designing customer journeys based on insights to deliver great functionalities and experiences. This requires solid processes for tracking and analysing customer behaviours to enable quick decision-making and responses to the shift in the market landscape.

2. Deliver a superior experience. Avoid bad customer journeys by planning each stage of the customer experience and identified the technologies, processes, and functions across the organisation that must coordinate to deliver it.

3. Use the right marketing technologies to deliver an omnichannel customer experience. Consistency and clarity of message is vital in promotions. Setting definitions for all the elements used to deliver the customer journey is where many businesses fail.

4. Implement processes and governance for utilising technology to ensure that the technology delivers what it is supposed to. Guidelines describing the responsibilities for each stage of the customer journey are vital to successful marketing.

5. Use the best metrics to drive success. Technology now enables businesses to measure the effectiveness of marketing campaigns with an unprecedented level of details by tracking customers' buying behaviour in real-time. However, this information must be delivered in a way and format that enable businesses to act and react to changes and customer feedback. Metrics should generally be customer-focused as opposed to the traditional product- or regional-focussed approach.

A modern marketing operations plan is rather labour intensive and requires utilisation of a dedicated platform to ensure smooth management. Specialised tools such as Google Analytics can

be used to enable this process. For this aim in the Inter-IoT project, the software platform Klipfolio[14] has been selected as the enabling technology to manage the marketing operations plan. This monitoring tool includes Google Analytics/AdWords support, social media engagements, and web metrics. It is particularly well suited for the SaaS business model. Klipfolio provides a customisable dash board functionality that allows data from a wide range of sources to be aggregated in one place. A Klipfolio subscription costs US$80 per month (US$960 per year) for the enterprise version which includes over 80 dashboards.
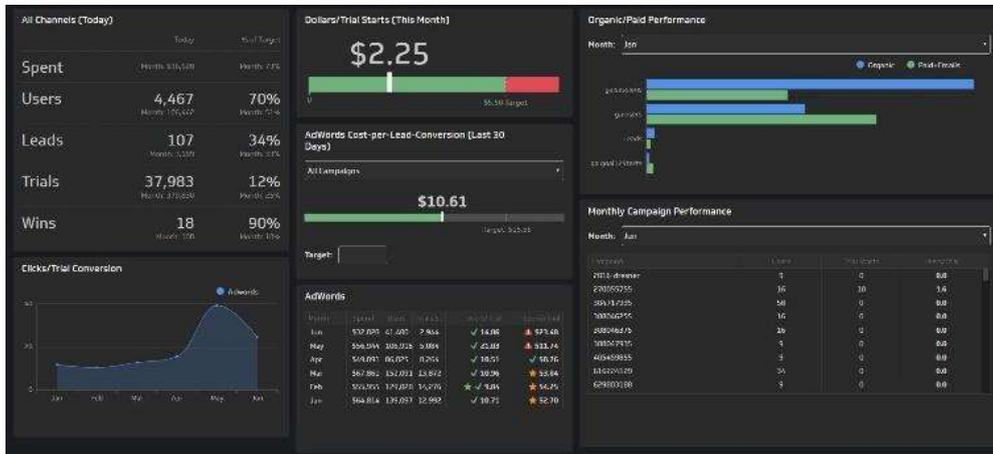
Figure 27: Klipfolio Campaign Monitoring Dashboard Example
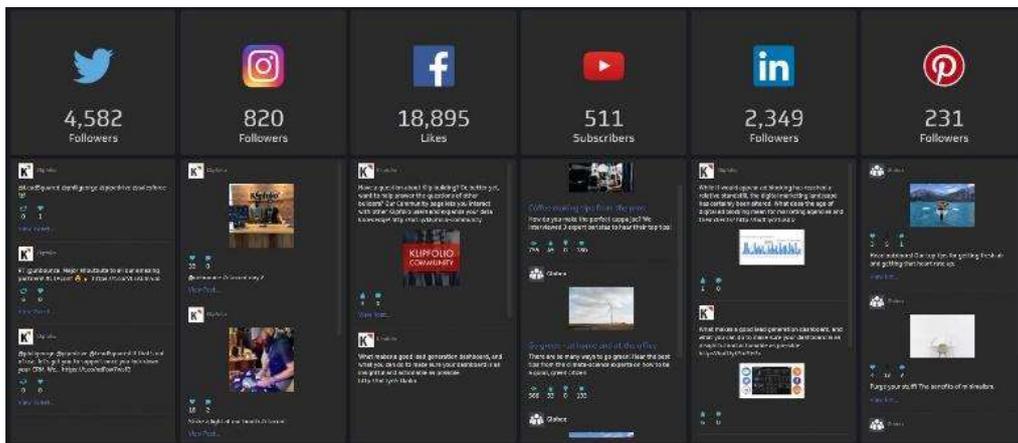
Figure 28: Klipfolio Social Media Dashboard Example

To ensure uniform customer engagement, a Centralised Content Management System (CMS), also called a vault, will be managed by a selected consortium partner. The content vault will collect all news, customer success stories, and all other marketing materials. Moreover, the CMS will manage the distribution of these materials through the selected marketing channels in accordance with the marketing plan and the agreed timings.

For each channel, a timing frequency for updates must be scheduled. As well, taglines/hashtags need to be agreed along with specific metrics for monitoring.

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[14] www.klipfolio.com

The process is to have all the consortium partners contribute to the vault by preparing a number of scheduled 'content' elements such as Tweets, Facebook updates, Instagram photos, articles on LinkedIn etc. It is essential for a successful marketing campaign to have a store of material prepared for scheduled release as sudden inactivity will have a severe negative impact that cannot always be recovered, particularly in the fast-paced marketplace of online media. The exact schedule and details of the specific partner contributions will be detailed in the final version of this document.

The key performance indicators (or KPIs) regarding marketing for the INTER-IoT project are the specific numerical metrics that can be tracked and followed-up in order to measure the progress towards previously defined marketing goals. They provide reliable information of the degree of accomplishment of the aims previously set for the marketing plan. As well they are indicators capable to facilitate estimations of the future situation of several aspects concerning market and marketing performance. The most relevant KPIs for monitoring the marketing performance of the project are cited below:

- Web traffic (Google Analytics)

    o Organic searches

    o Direct

    o Paid searches

    o Referrals

    o Social media

    o Emails

    o Subscribers

    o Other

- SEO progress (ranking)

    o Keyword rankings

- Social media growth (increase in the number of followers and engagements)

- Brand awareness (where do people hear about us)

- Number of unique first-time visitors to websites (where do they come from)

- Returning visitors to the website

- Online conversion rate = ((number of sales / number of clicks) x 100)

- Newsletter conversion rate

- Each metric will have a target previously set to determine the progress or regress of the measured aspect.

Each metric will have a set target to determine progress or regress. The below table identifies the key metrics to be monitored as part of the promotional efforts for each product.

INTER-IoT product	Key Metrics

INTER-IoT Gateway	Number of available and requested extensions, particularly for SDN and SDR, and consultancy requests
INTER-IoT Middleware + IPSM + Bridges	Number of available and requested bridges, consultancy requests
INTER-IoT Framework	Number of users, time of usage, data volume over the tool, number of systems connected.
INTER-METH	Books sold, students listed, certifications received

Table 64: Marketing operations key metrics

Customer journey example: The story about how we ideally would want a customer to experience our product and the engagement from us.

- A customer discovers INTER-IoT while at a commercial trade show.
- He engages with the representative and discuss a possible use case to address an issue of IoT interoperability.
- Following on from this, they visit the website and contact the consortium member responsible for the product, who offers the new customer the different pricing alternatives.
- The customer is interested in using to receive the Freemium version of the INTER-IoT product, because the features and characteristics fit better his needs.
- They deploy this solution relying on some training included in the Freemium version.
- As they deploy the solution and see the benefits, both operationally and economically, they will be potentially willing to expand their use of INTER-IoT to bring together more disparate systems. To do this, the customer enquires with their contact in INTER-IoT about consultancy.
- INTER-IoT grows with the new work done and the customer is satisfied with the products.

8 Industry dissemination and communication

8.1 Report on what was done with link to dissemination activities

The dissemination activities in INTER-IoT project have been focused on both industry and science. Scientific dissemination includes: publications, seminars, conference participation done by INTER-IoT consortium partners. Industrial dissemination included participation in business-oriented events.

Dissemination included:

- publication of over 45 papers
- over 35 presentations on scientific events
- over 20 presentations on industrial events
- over 10 academic seminars

Scientific dissemination

Type C - conference, J - journal, B- book, BC - book chapter	Pub	Pres	Title	Title Journal and Equivalent	When	Place
C	x	x	Semantic Technologies for the IoT - an Inter-IoT Perspective	2016 IEEE First International Conference on Internet-of-Things Design and Implementation (IoTDI)	4.2016	Berlin (Germany)
BC	x		Tools for Ontology Matching - Practical Considerations from INTER-IoT Perspective	Internet and Distributed Computing Systems, Springer, 2016	9.2016	N/A
C	x		From implicit semantics towards ontologies - practical considerations from the INTER-IoT perspective	14th IEEE Annual Consumer Communications & Networking Conference (CCNC)	1.2017	Las Vegas (USA)
C	x	x	TSCH schedules assessment	2017 IEEE 14th International Conference on Networking, Sensing and Control (ICNSC)	4.2017	N/A
C	x	x	Towards Common Vocabulary for IoT Ecosystems - Preliminary Considerations	9th Asian Conference on Intelligent Information and Database Systems (ACIIDS)	4.2017	Kanazawa (Japan)
C	x	x	IoT platforms interoperability for Active and Assisted Living Healthcare services support	Global Internet of Things Summit (GIoTS 2017)	6.2017	Geneva (Suisse)
C	x	x	Modelling Opportunistic IoT Services in Open IoT Ecosystems	18th Workshop From Objects to Agents	6.2017	Scilla (RC) (Italy)
C	x	x	Toward Opportunistic Services for the Industrial Internet of Things	2017 13th IEEE Conference on Automation Science and Engineering (CASE)	8.2017	Xi'an (China)

Type C - conference, J - journal, B- book, BC - book chapter	Pub	Pres	Title	Title Journal and Equivalent	When	Place
C	x	x	An Embedded Risk Prediction System for Wheelchair Safety Driving	12th International Conference on Body Area Networks (Bodynets 2017)	9.2017	Dalian (China)
C	x	x	Securing the IoT world: Issues and perspectives	2017 IEEE Conference on standards for Communications and Networking (CSCN)	9.2017	Helsinki (Finland)
C		x	Interoperability in Internet of Things	3rd International Conference on Advances in Computing, Communication & Automation (ICACCA 2017)	9.2017	Dehradun (India)
C	x	x	Semantic Technologies for the IoT - an Inter-IoT Perspective	2016 IEEE First International Conference on Internet-of-Things Design and Implementation (IoTDI)	4.2016	Berlin (Germany)
BC	x		Tools for Ontology Matching - Practical Considerations from INTER-IoT Perspective	Internet and Distributed Computing Systems, Springer, 2016	9.2016	N/A
C	x		From implicit semantics towards ontologies - practical considerations from the INTER-IoT perspective	14th IEEE Annual Consumer Communications & Networking Conference (CCNC)	1.2017	Las Vegas (USA)
C	x	x	TSCH schedules assessment	2017 IEEE 14th International Conference on Networking, Sensing and Control (ICNSC)	4.2017	N/A
C	x	x	Towards Common Vocabulary for IoT Ecosystems - Preliminary Considerations	9th Asian Conference on Intelligent Information and Database Systems (ACIIDS)	4.2017	Kanazawa (Japan)
C	x	x	IoT platforms interoperability for Active and Assisted Living Healthcare services support	Global Internet of Things Summit (GIoTS 2017)	6.2017	Geneva (Suisse)
C	x	x	Modelling Opportunistic IoT Services in Open IoT Ecosystems	18th Workshop From Objects to Agents	6.2017	Scilla (RC) (Italy)
J	x		Modelling and Simulating Internet-of-Things Systems: A Hybrid Agent-Oriented Approach	Computing in Science & Engineering	9.2017	N/A
C	x	x	Towards IoT Platforms' Integration Semantic Translations between W3C SSN and ETSI SAREF	SEMANTICS Workshops 2017	9.2017	Amsterdam (The Netherlands)
C	x	x	Activity recognition of wheelchair users based on sequence feature in time-series	IEEE International Conference on Systems, Man, and Cybernetics (SMC 2017)	10.2017	Banff (Canada)
C	x	x	Agent-Based Computing in the Internet of Things: A Survey	International Symposium on Intelligent and Distributed Computing	10.2017	Belgrade (Serbia)

Type C - conference, J - journal, B- book, BC - book chapter	Pub	Pres	Title	Title Journal and Equivalent	When	Place
C	x	x	From relational databases to an ontology - Practical considerations	21st International Conference on System Theory, Control and Computing (ICSTCC)	10.2017	Sinaia (Romania)
C	x	x	Streaming Semantic Translations	21st International Conference on System Theory, Control and Computing (ICSTCC)	10.2017	Sinaia (Romania)
C		x	Interoperability in Internet of Things	21st International Conference on System Theory, Control and Computing (ICSTCC)	10.2017	Sinaia (Romania)
J	x		Activity Level Assessment Using a Smart Cushion for People with a Sedentary Lifestyle	Sensors MDPI	10.2017	N/A
J	x		Evaluating critical security issues of the IoT world: Present and Future challenges	IEEE INTERNET OF THINGS JOURNAL	10.2017	N/A
C	x	x	Distributed TSCH Scheduling: A Comparative Analysis	2017 IEEE International Conference on Systems, Man and Cybernetics	10.2017	Banff (Canada)
C	x	x	Towards high throughput semantic translation	Inter-IoT 2017 Conference	10.2017	Valencia (Spain)
C	x		Alignment-based semantic translation of geospatial data	3rd International Conference on Advances in Computing, Communication & Automation (ICACCA 2017)	11.2017	Dehradun (India)
C		x	Interoperability in Internet of Things	3rd International Symposium on Big Data Analytics in Science and Engineering (BASE 2017)	11.2017	Aizu Wakamats u (Japan)
C	x	x	AmI Open Source System for the Intelligent Control of Residences for the Elderly	Inter-IoT 2017 Conference	11.2017	Valencia (Spain)
J	x		Mobile Health: Studio pilota sul "Monitoraggio decentralizzato ed in mobilita degli stili di vita" nell'ambito del progretto europeo "Interoperabilita di piattaforme eterogenee IoT-INTER-IoT"	Rivista italiana di nutrizione e metabolism	12.2017	N/A
J	x		Agent-Oriented Cooperative Smart Objects: from IoT System Design to Implementation	IEEE Transactions on Systems, Man, and Cybernetics: Systems	12.2017	N/A
B	x		Advancing IoT Platform Interoperability	(editorial) River Publishers (title) Advancing IoT Platform Interoperability	1.2018	N/A
J	x		A multimodal Fingerprint-based Indoor Positioning System for airports	IEEE Access	1.2018	N/A
C	x	x	Opportunistic Cyberphysical Services: A Novel Paradigm for the Future Internet of Things	IEEE 4th World Forum on Internet of Things	2.2018	Singapore

Type C - conference, J - journal, B- book, BC - book chapter	Pub	Pres	Title	Title Journal and Equivalent	When	Place
C		x	Interoperability in Internet of Things	International Conference On Internet of Things: Smart Innovation and Usages (IoT-SIU 2018)	2.2018	Bhimtal (India)
J	x		Workshop Networks Integration Using Mobile Intelligence in Smart Factories	IEEE Communications Magazine	2.2018	na
C	x	x	Fog and Cloud in the Transportation, Marine and eHealth Domains	Euro-Par 2017: Parallel Processing Workshops. Euro-Par 2017. Lecture Notes in Computer Science, vol 10659. Springer, Cham	2.2018	Santiago de Compostela (Spain)
C	x	x	WiFi Termograph for Cold Chain Monitoring with MPTCP support	Transport Research Area (TRA) 2018	4.2018	Vienna (Austria)
C	x	x	Interoperability of IoT Platforms applied to the transport and logistics domain	Transport Research Arena 2017	4.2018	Vienna (Austria)
C	x	x	Smart Interoperable Dynamic Lighting for Port Terminals	Transport Research Arena 2017	4.2018	Vienna (Austria)
C	x	x	A Methodology for Integrating Internet of Things Platforms	Globe-IoT 2018, Collocated Conference ACM/IEEE International Conference on Internet-of-Things Design and Implementation, 2018	4.2018	Orlando, (USA)
J	x		A Novel Mobile and Hierarchical Data Transmission Architecture for Smart Factories	IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS	4.2018	N/A
J	x		An Edge-based Architecture to Support Efficient Applications for Healthcare Industry 4.0	IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS	4.2018	N/A
C	x	x	Time-scheduled Network Evaluation based on Interference	Globe-IoT 2018, Collocated Conference ACM/IEEE International Conference on Internet-of-Things Design and Implementation, 2018	4.2018	Orlando (USA)
C	x	x	Flow-Based Programming Interoperability Solution for IoT Platform Applications	Globe-IoT 2018, Collocated Conference ACM/IEEE International Conference on Internet-of-Things Design and Implementation, 2018	4.2018	Orlando (USA)
C	x	x	Exploiting IoT Data and Smart City Services for Chronic Obstructive Pulmonary Diseases Risk Factors Monitoring	Globe-IoT 2018, Collocated Conference ACM/IEEE International Conference on Internet-of-Things Design and Implementation, 2018	4.2018	Orlando (USA)
C		x	Towards semantic interoperability in Internet of Things and beyond	2018 5th International Conference on Control, Decision and Information Technologies (CoDIT)	4.2018	Thessaloniki (Greece)

Type C - conference, J - journal, B- book, BC - book chapter	Pub	Pres	Title	Title Journal and Equivalent	When	Place
C	x	x	Fall detection system for elderly people using IoT and Big Data	9th International Conference on Ambient Systems, Networks and Technologies (ANT 2018)	5.2018	Porto (Portugal)
C	x	x	Identifier Management in Semantic Interoperability Solutions for IoT	IEEE International Conference on Communications Workshop 2018	5.2018	Kansas City (USA)
C	x	x	Cataloging Design Patterns for Internet of Things Artifact Integration	IEEE International Conference on Communications Workshop 2018	5.2018	Kansas City (USA)
C	x	x	Re-Engineering IoT Systems through ACOSO-Meth: the IETF CoRE based agent framework case study	19th Workshop From Objects to Agents	6.2018	Palermo (Italy)
C		x	Keynote IV: Integrating Internet of Things Platforms: A Methodological Perspective	16th IEEE International Conference on Pervasive Intelligence and Computing	8.2018	Athens (Greece)
J	x		Interference Graphs to Monitor and Control Schedules in Low-Power WPAN	Future Generation Computer System (Journal), Special Issue on Emerging Edge of Things	9.2018	N/A
C	x	x	Developing Agent-based Smart Objects for IoT Edge Computing: Mobile Crowdsensing use case	11th International Conference on Internet and Distributed Computing Systems (IDCS 2018)	10.2018	Tokio (Japan)
C	x	x	High-Speed M2M Data Transmission with Embedded MPTCP on WebRTC	JDUM IV	5.2018	Murcia (Spain)
C	x	x	IoT Community Support	Eu-SPRI ECC Science, Technology and Innovation: New challenges and practices	5.2018	Valencia (Spain)
C	x	x	Innovation strategies in IoT	Eu-SPRI ECC Science, Technology and Innovation: New challenges and practices	5.2018	Valencia (Spain)
BC	x		Towards Multi-layer Interoperability of Heterogeneous IoT Platforms: The INTER-IoT Approach	Integration, Interconnection, and Interoperability of IoT Systems		N/A
J	x		Semantic interoperability in the Internet of Things: an overview from the INTER-IoT perspective	Journal of Network and Computer Applications, Elsevier, 2017		N/A

Table 65: Scientific dissemination

Industrial dissemination

Type of Action	Description	Date	Place
Conference presentation	INTEGRA2 Port Conference	4.2017	Port Authority of Tarragona (Spain)
Conference presentation	SMART PORTS. "The Port of the future: Smart Ports"	5.2017	Port Authority of Avilés (Spain)
Conference presentation	ICHCA Conference:THE FUTURE IS SMART	10.2017	Las Palmas (Spain)
Technology Fair /B2B-B2C exhibition to potential stakeholders and customers	UN Technology Fair 2017	10.2017	Valencia (Spain)
Article	"Smart and Visible. Internet of Things Performance", Felicity Landon (Independent journalist)	11.2017	Port Strategy, vol. 1017 Issue 9
Keynote	INTER-IoT: Interoperability of IoT platforms	11.2017	Eindhoven (The Netherlands)
Conference presentation	WSO2Con Europe. Title: Bringing Innovation to your Enterprise: Use-Cases with WSO2	11.2017	London (Great Britain)
Keynote	TRONSHOW Title: INTER-IoT - consideration on interoperability issues and solutions	12.2017	Tokyo (Japan)
Keynote	Towards People-centric IoT Ecosystems @ IoT Workshop	12.2017	Rende (Italy)
Conference presentation	INTER-IoT: Interoperability of Heterogeneous IoT Platforms	1.2018	Maastricht (The Netherlands)
Round table	Samuexpo 2018: Industry 4.0 challenges	2.2018	Pordenone (Italy)
B2B Industry 4.0 Fair presentation	Industry 4.0 Innovation as a Service	2.2018	Ljubljana (Slovenia)
Conference presentation	Challenges for successful IoT Integration	2.2018	Leuven (Belgium)
Conference presentation	MARLOG7 The International Maritime Transport and logistics Conference INNOVATION in ports the Gateway to the Future	3.2018	Alexandria (Egypt)
Conference presentation	Conference of ATPYC in Spanish National Ports "JORNADA TÉCNICA DE INNOVACIÓN Y TECNOLOGÍA EN LA GESTIÓN PORTUARIA". Innovation Strategies in Valenciaport for next decade challenges	3.2018	Madrid (Spain)
Conference presentation	Port Technology. Container Terminal Automation Conference (#CTAC2018). IoT and Big Data in Container Automation	3.2018	London (Great Britain)
Conference presentation	PEMA AGM 2018: Digitalisation Signals "Fourth Industrial Revolution" For Global Ports Sector	3.2018	Bilbao (Spain)
Venture capital presentation	IoT Invest, Talis Capital	3.2018	London (Great Britain)
Conference & Brokerage	Mobile World Congress	3.2018	Barcelona (Spain)
Workshop	Integrated services: organizational healthcare models in the framework of chronic diseases	3.2018	Turin (Italy)

Type of Action	Description	Date	Place
Marketplace presentation	Transport Research Arena 2018 Title: WiFi Termograph for Cold Chain Monitoring with MPTCP support	4.2018	Vienna (Austria)
Conference presentation	Transport Research Arena 2018 Title: Interoperability of IoT Platforms applied to the transport and logistics domain	4.2018	Vienna (Austria)
Marketplace presentation	Transport Research Arena 2018 Title: Smart Interoperable Dynamic Lighting for Port Terminals	4.2018	Vienna (Austria)
Stakeholders' brokerage	ETNA2020/EEN Networking and Brokerage Event	4.2018	Vienna (Austria)
Conference presentation	Cargo Innovation Conference: The impact of digitization in container terminals	7.2018	Venlo (The Netherlands)

Table 66: Industrial Dissemination

Industrial dissemination

Type of Action	Description	Author/Speaker	Date	Place
Seminar	WSN in telecommunications	Giancarlo Fortino	3.2018	Valencia (Spain), Universitat Politecnica de Valencia
MSc	Master's degree final project	Pablo Giménez	12.2017	Valencia (Spain)
Seminar	TOWARDS MULTI-LAYER INTEROPERABILITY OF HETEROGENEOUS IOT PLATFORMS: THE INTER-IOT APPROACH	Giancarlo Fortino	11.2017	Cesena (Italy), University of Bologna
Seminar	Agents meet the IoT: Towards Cognitive and Interoperable Ecosystems of Networked Smart Objects	Giancarlo Fortino	4.2018	New York City, http://c2smart.engineering.nyu.edu/2018/03/16/distinguished-speaker-series-giancarlo-fortino-university-of-calabria/
Seminar	Agents meet the IoT: Towards Cognitive and Interoperable Ecosystems of Networked Smart Objects	Giancarlo Fortino	3.2018	Oulu (Finland), University of Oulu

Type of Action	Description	Author/Speaker	Date	Place
Seminar	INTER-Meth: A Methodology for Heterogeneous IoT Platforms Integration	Giancarlo Fortino	7.2018	Wuhan (China), Wuhan University of Technology, Logistics Engineering School
Seminar	Agents meet the IoT: Towards Cognitive and Interoperable Ecosystems of Networked Smart Objects	Giancarlo Fortino	6.2018	Wuhan (China), Huazhong University of Science and Technology
Seminar	Agents meet the IoT: Towards Cognitive and Interoperable Ecosystems of Networked Smart Objects	Giancarlo Fortino	6.2018	Wuhan (China), ZUEL University
Seminar	Towards Opportunistic IoT Services: A Novel Paradigm for Engineering the Next-generation IoT Systems	Giancarlo Fortino	6.2018	Xian (China), North Western Polytechnic University
Seminar	Interoperability in Internet of Things	Marcin Paprzycki	2.2018	CHARUSAT University
Seminar	Interoperability in Internet of Things	Marcin Paprzycki	2.2018	MNIT
Seminar	Interoperability in Internet of Things	Marcin Paprzycki	2.2018	Poornima University
Seminar	Interoperability in Internet of Things	Marcin Paprzycki	2.2018	Madav Rachna University

Table 67: Industrial Dissemination

8.2 Inter-IoT IoT-EPI mini-projects discussion

INTER-IoT collaborated within IoT-EPI initiative and participated in events and actions organized by the latter. INTER-IoT had its representatives in each IoT-EPI task force, and for each INTER-IoT representatives participated in telcos and contributed to prepared products.

Task force	Activities
TF01 Innovation and Community Building	- participation and contribution in IoT-EPI workshops in Valencia, Vienna, Athens and London, IoT Challenge 2017, Virtual Round Table of Experts - Self-Assessment Tool usability evaluation - White paper on best practices
TF02 Interoperability	- participation and contribution in IoT-EPI workshops in Valencia, Vienna, Athens, London, Berlin (preparation, event cancelled) - White paper on interoperability versions I and II

Task force	Activities
TF03 Accelerators	● Activities related with Working Group 3 (WG3) ● participation in IoT-EPI workshop in Valencia
TF04 Business Models	● preparation of Business Model canvas ● participation in UNIFY questionnaire ● participation in IoT-EPI workshops in Valencia, Vienna, Athens and London, webinar on Open Source Business Models in IoT, Data Driven Business models and other ● contribution to D02.04 Deliverable ● development of INTER-IoT monetization strategies on business models
TF05 Educational Platform	● interactive debates and discussions ● proposition for the inclusion of 38 educative contents in the educational platform ● participation in IoT-EPI workshops in Valencia, Vienna, Athens, and London
TF06 International Collaboration	● Inter-IoT expressed his links or interest with non-European IoT related activities and countries and was assigned to establish liaisons with Brazilians stakeholders. ● participation in IoT-EPI workshops in Valencia, Vienna, Athens, and London

Table 68: IoT EPI Task force participation

Main contributions include:

● IoT demos on the IoT week
● Participation on the IoT Challenge 2017
● Participation on all IoT-EPI events, activities and teleconferences
● Significant contribution to the white paper on Interoperability
● Contributions on IERC Cluster Books
● white paper on Best Practices: contribution on different areas
● Debates on virtual round tables with experts from INTER-IoT – especially in the areas of *Marketplace Mechanisms* (monetisation) and *Openness Ecosystems* in which INTER-IoT participation was highly relevant
● Collaboration on Unify-IoT deliverables
● Organization of the Active Transfer Workshop
● Creation of Successful Business Model 'INTER-LogP'
● 38 Content Proposals for the Educational Platform

9 Conclusions.

The plan for improvement of the INTER-IoT business models in this deliverable sets out a comprehensive and iterative method addressing areas where improvement can benefit the project which were previously identified by the commission. Utilising the LLAVA Matrix methodology to establish a framework, innovation process, and assessment process, we can add to the CANVAS business models a better understanding of customer needs, value network, competition, solution, and willingness to pay.

To bring these business models to life, a comprehensive exploitation vision is set out defining the community product (showing our commitment to open source development), academic exploitation (lead by the strong academic contingent), the commercial products, and the business to community initiative for continual development of INTER-IoT. This vision has come from the desire to fulfil the INTER-IoT value promise to provides an interoperable and open IoT framework, with associated engineering tools for seamless integration of heterogeneous IoT platforms, regardless of the application domains, using a layered approach.

To accomplish such an ambitious goal the INTER-IoT will produce 12 pieces of technology which can be exploited individually and in conjunction with other INTER-IoT developments to form 25 individual products. Further work has been completed to better define IPR around these products. These products will be exploitable in multiple ways:

- Community product, usable and open source with guidance will be additionally available with support available from more experienced users in the form of consultancy and training.
- The Academic product, imparting the latest knowledge to students through masters and PhD courses and industry/postgraduate training will drive development in this area and allow for expansion and creation of courses and talented individual capable of pushing IoT development even further
- Commercial products, more pointed at solving specific issues, these off the shelf products will be deployable to address more standard problems.
- Business to community, the improvement of the commercial and community products for the benefit of all will be seen here. Consulting services and customisation of INTER-IoT technologies will drive continual improvements.

Of these 25 products, 4 have been selected for close examination as they were thought to be the most mature and the consortium saw the most potential in them. These products were selected as part of the exploitation workshop. They are the INTER-IoT Gateway, Middleware + IPSM + bridges, Framework + SDKs, and the Methodology.

The opportunities for the INTER-IoT products are numerous. Primary focus will be given to the products associated with the pilots and the four products identified above. Opportunities for these products have also been identified for smart city and smart agriculture applications. Common market challenges have been identified such as cost, privacy, and regulation along with many market specific challenges which must be overcome to successfully operate in each market segment. Key drivers and trends have also been identified which reinforce the need for INTER-IoT products while the competitor analysis highlights the gap INTER-IoT will aim to fill.

Each partner has defined an individual exploitation plan addressing where they want INTER-IoT to take them and how they intend to reach the goals established. Additionally, joint exploitation plans have been produced and common goals set out. Open call third parties have also participated showing their goals and vision for how INTER-IoT can be utilized in the future. These goals differ

based on the partner's area of interest and expertise. In addition to the consortium members, the open call has brought new ideas which has led to new products being included and developed in this project. The establishment of an INTER-IoT foundation is also being considered as well as community building activities focused on established OSS communities in order to maintain the INTER-IoT code base moving forward.

Marketing operations of the INTER-IoT products have also been addressed. Individual marketing plans have been considered for the four products found to be the most promising. Partners have also increased industrial dissemination as the project nears completion. These plans address the people targeted by each product, the pricing strategy, how potential customers will engage with INTER-IoT and how INTER-IoT will endeavour to engage potential customers. Additionally, key metrics have been identified to ensure the effectiveness and efficiency of INTER-IoT marketing.

To conclude, improvements to the INTER-IoT consortium's understanding of the market, definition of individual INTER-IoT exploitable products, vision for driving exploitation, and monitoring progress has been gained. Continued execution of the strategy and specific plans will lead to positive exploitation results.

ANNEX A: Individual Exploitation Plans

A1 PRO

Individual Exploitation Plan		
Name of the partner: PRODEVELOP, S.L		interiot *interoperability of heterogeneous IoT platforms*
Partner's type: SME	**URL:** www.prodevelop.es	**Business Scenario selected:** ● Transport/ Logistics ● Cross-domain
1. Partner's role in the project		
PRO is a partner in the INTER-IoT project as a technological provider and participates and leads both technical and business activities within the project framework, and it is one of the main developers of the INTER-IoT platform. As PRO is an SME is interested in bringing the INTER-IoT results into the market.		
2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)		
One of the main goals of PRO is to position itself as a highly skilled technological INTER-IoT provider into the Maritime/ Port and Smart City sectors. PRO envisions a great business opportunity in Port and Smart Cities, in order to offer them a product to help them to improve its daily operational and decision tasks. On one hand, in the maritime sector PRO wants to enrich its current POSIDONIA SUITE © product with the results obtained in INTER-IoT project. A new module/service (POSIDONIA-IoT) will be developed with the aim to helps PRO's customers to resolve problems of interoperability and integration of heterogeneous IoT Platforms and real-time data management and analyses that affect its daily tasks, thus Port's business results. This enrichment will give it a great add value in front of the current competition alternatives on the market. On the other hand, these developed services can also be extrapolated to the Smart City sector. PRO envisions a great business opportunity in Port and Smart Cities, in order to offer them a product to help them to improve its daily operational and decision tasks. Regarding Port Sector our main target customer will be Port Authorities (AP). PRO contemplates two business models (B2B), depending on the type of the service (on premise or in the cloud): ● **On premise:** The delivery method is based on a build to order and service bundle that includes customization of POSIDONIA IoT, technical support and training services. The revenue source is based on the payment of the license of POSIDONIA-IoT plus support and training services. ● **In the cloud:** The delivery method is based on a service bundle based on SaaS that includes the integration of POSIDONIA IoT in the AP, technical support and training services. The revenue source is based on the payment of the costs of the services by AP or by the AP and its end customers.		
3. Which problem do you resolve?		
Regarding both maritime and Smart Cities sectors as business scenarios selected, nowadays there are not existing tools, methodologies and APIs that allow the interoperability and integration of heterogeneous IoT Platforms, the connection with unconnected IoT Platforms or the access to multiple IoT Platform's services, in order to access data from these IoT Platforms for further real-time data processing and decision making. This lack of interoperability is affecting daily operational and decision tasks in both sectors, thus Port's business		

results and City's planning and management.

4. Which is your value promise?

Our value promise is the same for both sectors (Ports and Smart Cities). PRO aims to offer cutting-edge technology through commercial products and professional services based in the cloud or on premise.

Our value promise is: "Improve daily operational and decision support, thus management and business results through the interoperability and integration of heterogeneous IoT Platforms, the connection with unconnected IoT Platforms and the access to multiple IoT Platform's services."

Some intrinsic advantages of INTER-IoT for both segment sectors are:
- Real time data access and processing for decision making
- Social and environmental responsibility aiming to reduce pollution and increase energy efficiency
- Safety, security, and privacy issues
- Cost and risk reduction
- More efficient transport service

5. Offered services/products from the project

PRO is leading the design and implementation of the Interoperable Framework (INTER-FW) engine by developing the UI, Portal and EXT. PRO is also modelling tasks for INTER-METH with its participation in the CASE Tool and in the extension of INTER-LAYER with its participation in the Middleware.

On the other hand, due to its extensive knowledge of the Maritime Industry business, PRO participates in the implementation in the INTER-LogP demonstration.

PRO will focus its individual exploitation plan by offering commercial applications and services (A&S) based on the combination of INTER-IoT exploitable outcomes: INTER-LAYER, INTER-FW and INTER-METH. For instance, the development of the module POSIDONIA-IoT for Port Sector and its extrapolation to Smart City sector.

6. Which is your target market? How big do you estimate the market?

PRO envisions business opportunities in two markets: Maritime and Smart City sectors.

The 60% of PRO's activity is related to the Maritime sector, where PRO offers to its customers a professional portfolio of solutions for managing and optimizing Port Authorities through POSIDONIA SUITE ©: Port Solution Suite for Port Management.

On the other hand, the 30% of PRO's activity is related to Public Administration, where PRO offers consultancy and open software development services. Currently PRO has been involved on several projects within the framework of the Smart City domain, where integration of IoT systems is an aspect to be foreseen in the near feature.

However, the initial target market to be addressed is the Maritime and Ports market where PRO is highly specialized with a steady commercial strategy and a strong customer base, both in national and international scenarios.

Currently, PRO has presence in the 90% of Spanish Port Authorities and the grown perspectives are mainly based on the internationalization of its portfolio of products/services in the Maritime Sector.

PRO works currently in three of the most important and biggest Port Authorities in Spain: Valencia, Barcelona and Algeciras and implements new products for Ports based on cutting-edge technologies, through its participation in Smart Port Projects developed for Vigo and A Coruña Port.

At international level PRO has worked for Port of Cotonu (Benin), Port of Cork (Ireland), Port of Melbourne (Australia). PRO is implementing POSIDONIA Port Solution Suite® in the National Ports Agency of Morocco (composed of 33 ports) and in Ghana Ports and Harbours Authority (Ghana).

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

PRO has carried out interviews with around 20 stakeholders from the port, public and technological sector that are interested in the results of the project.

8. Results of interviews?

During the interviews carried out with stakeholders, the main companies and entities associated or related with

INTER-IoT are not interested in breaking silos. They prefer to have their platform, device, or software component adopted by an alliance or association. The interest is mainly solving a problem in a specific application domain, e.g. transportation or m-health, and only the middleware related stakeholders are interesting in semantic interoperability, as they consider they can integrate at the middleware level all different underlying technologies (e.g. FIWARE or SOFIA2). At the business level, the use of INTER-IoT may provide a faster introduction of IoT technology and applications across multiple application domains.

9.   Which competitors are there and how do you differ from them?

Regarding Maritime and Port sector, there are national and international ICT companies that are offering IoT solutions for Smart Ports such as:
- **Emetel System (Spain)** with AGATA.
- **Orbita Ingeniería**
- **Balticon S.A (Poland):** A container services provider and trader serving an international and domestic client base.
- **SAAB (Canada)**
- **ORBCOMM Inc. (New Jersey)**

PRO differs from them with POSIDONIA IoT by offering interoperability and integration of heterogeneous IoT Platforms, the connection with unconnected IoT Platforms or the access to multiple IoT Platform's services for further real-time data processing and decision making. POSIDONIA IoT will offer to the Port Authorities the opportunity to offer their final customers, information about real time events for cost and risk reduction and a more efficient transport service.

On the other hand, regarding the Smart Cities sector, there are national and international ICT companies that are offering IoT solutions for Smart Cities such as: TELEFONICA, INDRA Solutions, etc. However, PRO don't want to be their competitor but to offer technical solutions to solve specific problems in this sector. For instance, PRO wants to offer interoperability and integration of heterogeneous IoT Platforms, (e.g. SOFIA2 (INDRA) and FIWARE (TELEFONICA)) for data analyses and decision making.

10.   What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

The result of the project will be a prototype (TRL6) tested in a real environment, so PRO will include it into POSIDONIA SUITE © product. The module/service (POSIDONIA-IoT) certified and tested (TRL8 and TRL9) will be ready to be on the market 6 months after the end of the INTER-IoT project.

11.   Which partners do you need or already have for the business implementation (outside of the consortium)?

PRO will take into account the consolidation of strategic alliances with cloud providers, standardization bodies and Smart Cities, to go into the market with the maximum trusted added value solution, thus the best quality.

12.   What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.

- **Strengths:** The main strength is that Port Authorities are demanding interoperability and integration of heterogeneous IoT platforms in order to improve the services they are offering and also to increase security and efficiency aspects.
- **Weakness:** However, the main barrier that has been found for the adoption of POSIDONIA-IoT by AP is the risk that the solution may become another standard or architecture to add to the large list of current standards and algorithms.
- **Opportunities:** Interoperability and integration of heterogeneous IoT Platforms will allow new and enhanced services that the Port and Smart Cities sectors are going to need.
- **Threats:** Security and sensitive data privacy have also to be considered.

13.   Which is your IPR vision?

PRO will take into account the agreed and signed statements in the consortium agreement of the project. Each partner is the owner of their own developments but in case that several partners participate in the same development, the IPR will be dealt with according to the consortium agreement and the most recent EC directives on the subject. We support the decision of the Consortium in applying the Apache 2.0 license to the

Open Source outcomes of the project.

14. Which is your open source vision? Is there any restrictions and limitations?

As part of the joint business Exploitation Plan based on OS, PRO has interest to be part of the INTER-IoT OS Platform as technological provider for Business Exploitation. In the Product community, being part of the INTER-IoT open source community is a great opportunity for PRO to be more visible and to find new business opportunities through collaborations with other ICT companies and providers.

As part of the community product (Fremium) PRO as leaders of the outcome INTER-FW will be committed to carry out the following tasks for community sustainability: maintenance, basic support and bug fixing. Regarding INTER-LAYER, PRO proposes to deal with partial maintenance of the middleware.

In the premium version of the OS Community, PRO for both INTER-FW and INTER-LAYER will offer the following professional services: training, consultancy services, personalisation and integration services with other projects. Finally, taking into account that the strategies of both INTER-IoT consortium and European Commission is to work with open source licenses, PRO agrees to work with Apache 2.0.

15. When and how do you plan to place the product on the market?

During the phase 'Go to Market' of the Exploitation Plan (M32-M36), PRO will review its completed business model to be complemented with the last activities carried out in Assessment Plan and the business model and marketing operations, in order to achieve an effective business plan and an initial design of the marketing and commercialization strategy for individual purpose.

The consolidated implementation of INTER-IoT outcomes will be obtained in M32. PRO expects to validate the INTER-IoT results in test environment at a client side (Valencia Port Authority) at M36 taking into account the evaluation of the large-scale trial results of INTER-LogP (D7.3). Once it has been correctly validated on the test environments, PRO expects to have the deployed implementation in production in one client site (Valencia Port Authority), while being under validation in test environment at two other client sites.

On the other hand, PRO as a technology INTER-IoT provider will also offer professional engineering services to other ICT companies and system integrators in this sectors that would have interest in using INTER-IoT Technology for its projects.

In order to attract the attention of customers, PRO is making pre-commercial activities and plans to participate in trade shows and fairs dealing with its target marketplaces.

16. Describe your financing strategy for a 5 years' scenario

Our financing strategy will take into account costs and incomes in order to calculate the cash-flows.

The income structure will contemplate the direct sales of the module POSIDONIA IoT in Port Sectors through licenses and services integration and service bundle payments and its extrapolation to Smart Cities sector.

Besides consulting services for third parties (other ICT providers) through professional engineering INTER-IoT integration, training and technical support services will be contemplated.

The incomes scenario will be calculated on the basis of a national and international scenario focused on the mid-term overview. The cost structure will consider production and commercial costs. The production costs will consist of investment man-power to convert INTER-IoT results (TRL-6) into a TRL-9. The commercial costs will agglutinate human resources for services and products sold, marketing activities and others commercial costs such as travel, accommodation, etc.

17. Describe the expected impacts of your business idea

The POSIDONIA IoT will improve the daily operational and decision tasks in Port and Smart Cities Sectors, thus Port's business results and City's planning and management.

POSIDONIA IoT will help to increase PRO's turnover, thus to push the national and international economy.

18. *Paying customer: how many of your direct customers can turn on potential customers?*

In Port Sector, 80% of our customers have already chosen our product POSIDONIA SUITE ©: Port Solution Suite for Port Management and trust in us. Approximately, 55% of them have showed interest in seeing it enriched with POSIDONIA IoT.

Identified by: **PRODEVELOP, S.L**	Registration Date: 18/04/2017

A2 RINI

Individual Exploitation Plan

Name of the partner: Rinicom Ltd

interiot
interoperability of heterogeneous
IoT platforms

Partner's type: SME	URL: www.rinicom.com	Business Scenario selected: ● M-Health ● Cross-domain

1. Partner's role in the project

Rinicom's role in the IoT project is interlayer and FW development focusing primarily on the E-Health use case. Rinicare will also lead WP7 to assess the pilots.
Rinicom's role in the development will be mainly at the Gateway and the Middleware layer contributing to healthcare device and platform integration and SDR development.
Project partners will benefit from the Rinicom's experience with SDR, medical device integration, and close contact with end users in the medical field.

2. *Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)*

Business strategy is to utilize interlayer components to facilitate system integration of various medical sensors and systems for current and future clients. Sales channels will be further developed through strategic project and external partners.
Working primarily with a B2B business model, Rinicom will utilize INTER-IoT products to grow as an integrator by providing bespoke services to clients. This will include the deployment of a gateway hardware solution for device and PAS system integration. The purpose is to gain entry to the growing market demanding system integration in the healthcare sector.

3. Which problem do you resolve?

Rinicom address the problem of silos in healthcare data. Multiple healthcare platforms are used in current NHSs. To facilitate continuity of care across geographical and departmental boundaries, the sharing of information needs to be streamlined. One solution for this problem is system integration. INTER-IoT offers a unique solution to facilitate this process with the provision of a base layer of technology to streamline the process.

4. *Which is your value promise?*

Rinicom's value promise is to provide dependable forward-thinking solutions for modern medicine.

5. Offered services/products from the project

System integration, PRIME Hub (utilizing the INTER-IoT Gateway)

6. Which is your target market? How big do you estimate the market?

Our target market is health care providers both publicly and privately funded. They are using disparate systems of health sensors and data management applications which can benefit from the integration of IoT functionality. Healthcare is ever expanding with a growing and aging population and the constant development of new treatments.

7.	How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

We have had multiple interviews with GPs, surgeons, cardiologists, health care administrators, private practice business leads and medical research practitioners. We have 10+ user story epics which could be addressed by INTER-IoT products. The current customer need is present, but product uptake will depend on price and cost-effectiveness demonstration.

8.	Results of interviews?

Customers see the need for system integration and the utilization of IoT services. Trials demonstrating the health economic benefit of utilizing INTER-IoT products is needed to further justify the expenditure.

9.	Which competitors are there and how do you differ from them?

Rinicom offers the flexibility of a small SME coupled with the capability a larger organization due to our close ties to multiple academic institutions and our network of subcontractors. We will offer set products and bespoke solutions to ensure that client needs can be addressed.

- http://intelesens.com/remote-monitoring - ZENSOR. Small device with 3 lead ECG for predicting/monitoring cardiac events. Seems to perform limited functions. Data sent over WiFi to clinician. Worn for 7 days at a time. Battery powered. No cost has been found.
- http://www.rdtltd.com/emspre-hospital/ - TEMPUS. Defibrillator Monitor. 3kg weight is being heavily advertised. 4 wire ECG. Everything works from the tablet. Full vital sign monitoring. Military Grade. Aimed at field use for ambulances, military etc. Capable of telemedicine. Collates patient records. No cost has been found. Already widely used – worth investigating their sales model/approach.
- http://www.caretakermedical.net/ - CareTaker. Wireless wrist and finger cuff. Blood pressure and heart rate monitored. Lightweight and easy to use. Transmits data over Bluetooth or cellular network to clinician. Can also send to patients EMR. Software works on all existing platforms. Simple and effective.
- https://ihealthlabs.com/ - iHealth. Apple peripherals costing between $20 and $100. Wireless devices for monitoring patient data. Cheap and cheerful. Nice aesthetics.
- http://www.philips.co.uk/healthcare/solutions/enterprise-telehealth/home-telehealth - ECAR COORDINATOR/COMPANION. Uses multiple wireless sensors and tablet. Used as a gateway between patient and clinician rather than as a clinical tool. Cloud based. Cost not has been found.
- https://www.alivecor.com – KARDIA MOBILE. Small electronic strip for ECG readings. Used by placing two index fingers on sensor. £100. Instant ECG reports. Uses users own phone/tablet. Big innovation in delivering medical equipment to the home in a tangible way.
- https://www.welchallyn.com/en/products/categories/patient-monitoring/vital-signs-devices.html - SPOT VITALS DEVICE. A dated looking vital sign monitor. Appears to be quite large. Weighs 4.25 KG. Performs all functions but not extras. Does not appear to have any external connection capabilities. Cost approx. £800 - £900
- https://www.dremed.com/catalog/index.php/cPath/183_351 – WAVELINE EZ PATIENT MONITOR. Functional box shape with touch screen front. Not aesthetically pleasing. No external connections with clinicals over cloud, WiFi etc. Robust and widely used. Cost approx. £3000 - $5000
- http://www.woodleyequipment.com/clinical-trials/p0/vital-signs-monitoring/82.htm – DINAMAP CARESCAPE. Ugly box monitor with push buttons. Claims to be portable but looks more like a hospital monitor. Monitors only BP, Temp and Sp02. Stored memory – no connectivity. Cost approx. £1250
- http://www.infiniummedical.com/vital-signs-monitoring-2/ -CLEO. SP02, BP and Temp. Small lightweight monitor. Unattractive and dated design. Simplistic option. Seems to be used mostly in clinical settings. Cost approx. $1200
- http://www.midmark.com/products/medical/diagnostics/product/midmark-iqvitals – IQVITALS. Wired but portable solution. Very basic looking. Out of the box integration with EMR systems. Simplicity seems to be its biggest selling feature which should not be underestimated. Cost approx. $3000 - $4000
- http://www.inhealthcare.co.uk/digital-health-services/ - MY INHEALTHCARE. App which provides basic clinical monitoring for a patient in their home. They can monitor their own vital signs and upload them to this portal. They describe it as NHS in your pocket. Suspicious as to how useful this is as it requires buy-in from NHS to use on the other end. Worth keeping an eye on to see how the self-care market develops.

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?	
We envision the beta version of the INTER-IoT gateway deployed in a bespoke hardware solution being deployed before the completion of the project in a trial.	
11. Which partners do you need or already have for the business implementation (outside of the consortium)?	
All partners contributing to WP3 will be instrumental to this deployment.	
12. What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.	
System integration is in demand. This presents a huge opportunity. Individual platforms also see this need and are expanding to try to take advantage. The strength of Rinicom's INTER-IoT offering is in the flexibility offered by the INTER-IoT base for development. The main weakness is in the need to demonstrate security and overcome the stigma that is associated with open source technology when it comes to healthcare. Good opportunities for us are addressing small/midsized private healthcare providers. The main threat is our small size in comparison to larger platform providers when targeting the healthcare sector.	
13. Which is your IPR vision?	
Rinicom policy: if IPR is available, we will apply to hold these rights, we will apply unless we have an agreement with the end-customers. Regarding the INTER-IoT gateway, we will utilize the open source component developed, but customize it to fit our end user needs. This hardware software solution will be protected. (%?)	
14. Which is your open source vision? Is there any restrictions and limitations?	
Rinicom will contribute to open source projects where possible. We are utilizing/creating more open source content during this project. We will however protect our private developments where it is commercially beneficial to Rinicom and allowable within current contracts.	
15. When and how do you plan to place the product on the market?	
We will place the product on our company website and promote it at commercial events and through our sales team. This will be done once the first trials of the product are completed. We will also begin to look to utilize INTER-Layer components when they are developed.	
16. Describe your financing strategy for a 5 years' scenario	
Currently not available for publication.	
17. Describe the expected impacts of your business idea	
The expected impact is that the business ideally will gain 1 new customers and gain increased buy-in of 1 existing customers in the first year leading to grow with an estimated 10% over the next 3 years.	
18. Paying customer: how many of your direct customers can turn on potential customers?	
We have 2 potential customers currently	
Identified by: Rinicom Ltd	**Registration Date: 28/04/2017**

A3 XLAB

Individual Exploitation Plan

Name of the partner: XLAB		
Partner's type: **SME**	**URL:** xlab.si	**Business Scenario selected:** ● Transport/ Logistics ● M-heatth ● Cross-domain

1. Partner's role in the project

XLAB brings to the project its knowledge on sensor networks and high volume data, which expanded during several projects in the last years, as well as its expertise to improve the scalability, security and reliability of the projects' results. XLAB expects a flexible platform that can be used in other context of the IoT field, particularly to those related to its business of smart-transport, environmental monitoring, smart grids and people's wellness, that would allow it to extend its commercial potential in those areas.

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

The general strategy purpose is to position XLAB is to be a general purpose IoT platform integrator with expertise to customize and integration of different technologies. In that, our clients will be mainly IoT solution providers in a B2B relationship. In particular, SENTINEL that was already mentioned in the individual exploitation plan in the project proposal, is a typical client. We will also provide technology to a XLAB commercial solution - GAEA+ - that is a 3D GIS system customized for rescue and emergency services.

3. Which problem do you resolve?

As a general-purpose integrator, XLAB provides development, customisation and consultancy for integration of IoT platforms and methodology that can be customized for any application domain. A solution as such does not yet exist in the market and INTER-IoT will fill that gap in available technology.

4. Which is your value promise?

Our value promise is that we provide a unique integration approach where components from different IoT platforms that best fit the application domain can be taken and integrated, allowing interoperability across any available technology. With INTER-IoT from the business point of view, we allow our clients to avoid vendor lock-in at every IoT level (device, network, middleware, application, security).

5. Offered services/products from the project

Middleware integration according to the market trends and client needs; customisation of existing software solutions; and professional training in XLAB related expertise.

6. Which is your target market? How big do you estimate the market?

The target market for the XLAB positioning is the ecosystem of solution providers in the IoT area. Due to the fast development of this technology, and the growing number of application domains, it is rather difficult to predict the size of the market in the following years. That growth directly implies the existing IoT solution providers.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

None

8. Results of interviews?
We did not conduct any interviews.

9. Which competitors are there and how do you differ from them?
We do not know of existing competition, as of IoT platform integration. The existing competitors seem to be SMEs doing integration as a service per commercial project. No overall approach as much as we know.

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?
The technology development at XLAB will comply with the promised results and project prototype, contributing to a TRL6 technology readiness.

11. Which partners do you need or already have for the business implementation (outside of the consortium)?
Due to the specific expertise of XLAB in IoT platform integration, and the essential role in the project exploitation success, XLAB consolidation of strategic alliances with INTER-IoT partners in the business exploitation of it by support and development.

12. What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.
Our direct costumers are small companies and start-ups with needs for the management of data infrastructure for innovative solutions. In particular, with the results of INTER-IoT, we aim to improve our capacity to provide with data and infrastructure solutions to developers creating Internet of things applications, and particularly those who make use of heterogeneous data sources, or which integrate different existing IoT deployments. In that sense, we expect to support applications that will cover cross-market integrations to provide added value to different existing markets.

13. Which is your IPR vision
XLAB will take into account the agreed and signed statements in the consortium agreement of the project. Globally, XLAB's approach to IPR is the standard SME approach supported by local and international law. In particular, each partner is the owner of their own developments but in case that several partners participate in the same development, the IPR will be dealt with according to the consortium agreement and the most recent EC directives on the subject. We support the decision of the Consortium in applying the Apache 2.0 license to the Open Source outcomes of the project.

14. Which is your open source vision? Is there any restrictions and limitations?
XLAB's Open Source vision is to contribute as much as possible to Open Source communities. XLAB has been very active in this field for several years now. In that, the Open Source contributions within INTER-IoT are a relevant means of project exploitation for this SME. XLAB's most notable contributions are: NASA World Wind (within XLAB's commercial project Gaea+), OpenStack (within XLAB's EU project Mikelangelo), ManageIQ (within Red Hat CloudForms).

15. When and how do you plan to place the product on the market?
XLAB provides IoT data services to existing companies and start-ups, which we expect will be interested in connecting disjoint markets and platforms to provide innovative solutions. XLAB is also part of the Slovene ABC Accelerator as a mentor and technical consultant, but also as technical solution provider that allow start-ups to focus on their market. Though this channel XLAB expects to promote such projects in order to be able to provide its infrastructure and data management to entrepreneurs. XLAB's financial strategy considers the enlargement of the catalogue of available commercial solutions. In that we include both in-house solutions and project derived solutions with collaborations with Consortium partners. Moreover, XLAB will profit out of the novel expertise and experience gained within the project, refocused on consultancy and customization for related existing products. Furthermore, XLAB will contribute to bring the outcome of the project to TRL7 and to initiate commercialization.

16. Describe your financing strategy for a 5 years scenario
XLAB's financial strategy considers the enlargement of the catalogue of available commercial solutions. In that we include both in-house solutions and project derived solutions with collaborations with Consortium partners. Moreover, XLAB will profit out of the novel expertise and experience gained within the project, refocused on consultancy and customization for related existing products. Furthermore, XLAB will contribute to bring the outcome of the project to TRL7 and to initiate commercialization.

17. Describe the expected impacts of your business idea
INTER-IoT will provide XLAB with novel technical expertise that will better situate the SME in the IoT market. This will increase the competitiveness of the market itself. This will also better position XLAB within the Open Source community due to higher quality contributions

18. *Paying customer: how many of your direct customers can turn on potential customers?*
The profile of the paying customer, in the B2B approach aimed by the Consortium, is the institution having IoT-platforms with the need for integration. The client's need can be twofold: in training to better profit of the available Open Source technology; or the customization to better fit the technology to the existent infrastructure of the client. The number of such customers is proportional to the size of IoT platform market that is rising every day.

Identified by: XLAB	Registration Date: 21/04/2017

A4 ABC

Individual Exploitation Plan		
Name of the partner: Alessandro Bassi Consulting, SARL		interiot interoperability of heterogeneous IoT platforms
Partner's type: **SME**	**URL:** www.bassiconsultng.eu	**Business Scenario selected:** ● Transport/ Logistics ● M-health ● Cross-domain

1. Partner's role in the project
Technical partner, Task 4.1 leader, WP8 leader

2. *Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)*
ABC aims at giving consultancy to medium and large enterprises (C-level) that have problems with IoT implementation. INTER-IOT will allow us to offer a solution for medium to large corporation that have partial IoT implementation and seek interoperability among legacy solutions.

3. Which problem do you resolve?
Companies that have partial implementation of IoT (warehouse with SAP, quality control W IBM, production w Azure, etc.) and want to consolidate everything to increase productivity and reduce costs

4. *Which is your value promise?*

To consolidate legacy developments without spending millions and change everything.

5. **Offered services/products from the project**

Set of tools to help point 2, 3, 4

6. **Which is your target market? How big do you estimate the market?**

Medium-Large corporations worldwide. Market very difficult to estimate as we receive calls from totally different sectors (from Pharma to Manufacturing).

7. **How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?**

Besides the ones for WP2, none related.

8. *Results of interviews?*

N/A

9. **Which competitors are there and how do you differ from them?**

Large consultancy companies. We are much more focused, much cheaper, much more likely to understand our customers' culture and work closely with them rather than implement a "copy and paste" solution. We know IoT better as we are working in this space since 2007.

10. **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**

Software development companies for specific modules

11. **Which partners do you need or already have for the business implementation (outside of the consortium)?**

As soon as reach TRL 8 or above. As Companies cannot afford to have prototypes running in production mode, and as usually POC are done at no margin (if ever paid), there's no point in installing a TRL 7 or below solution to a customer.

12. **What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.**

S: Elaborated in point 9.

W: small size; cannot carry many projects in parallel.

O: VERY large potential market

T: Some larger corporation have exclusivity contracts with large consulting firms; therefore, regardless of how good we are, we cannot put a lot of weight in lobbying by larger corporations.

13. **Which is your IPR vision?**

We are happy with open source as our margin is on consulting.

14. **Which is your open source vision? Is there any restrictions and limitations?**

No

15. **When and how do you plan to place the product on the market?**

We don't plan to put INTER-IoT as a standalone product but to use it in case of need in a global solution

16. Describe your financing strategy for a 5 years' scenario
In principle, we don't need financing for developing INTER-IoT further as if a customer needs an improvement he should finance its development.
17. Describe the expected impacts of your business idea
The ability of capture a larger market, particularly working with companies with tighter budgets and legacy developments.
18. Paying customer: how many of your direct customers can turn on potential customers?
-

Identified by: Alessandro Bassi Consulting, SARL	Registration Date: 18/04/2017

A5 NEWAYS

Individual Exploitation Plan
Name of the partner: Neways Technologies B.V.

Partner's type: **Industry Organization**	URL: www.neways.nl	Business Scenario selected: ● Transport/ Logistics

1. Partner's role in the project
Neways role in the IoT project is interlayer FW development and device to device integration. Carrying projects are the port of Valencia, E-health and a, through an open call defined, 3rd project. **In these projects Neways will Neways role in the IoT project is integration of the project and validation of the use-cases. The main focus of the project for Neways is on the lower levels, the Gateway and the Middleware layer. The two primary use cases are logistics in the port of Valencia, and e-health monitoring of patients through an open call new use cases will be attracted.** **In these projects Neways will be responsible for the integration of all modules into one system, setting up parts of the INTER-IoT Gateway and realizing the connection to the virtual world.** **Project partners will benefit from the Neways broad experience dealing with critical embedded systems, mechanical-, hardware- & software-architecture, communication protocols, framework, manufacturability, interoperability, production yield and component management. Neways Technology will provide valuable feedback in terms of identification of problems and will make improvements strengthening Neways business partners' products and services.**

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)
Business strategy is to develop (generic) hard- and firmware that can be rolled out to other project where Neways can provide the hardware via it's EMS factories. Sales channels through strategic project partners. **Also Neways strategy is to build up a partner network in which Neways has the focus on the (electronics) hardware part and hardware related firmware, but uses the knowledge of its IoT partners for the development of the IoT architecture related software. This so that Neways can provide to the end-customer an integral IoT solution for their problem.**

3. Which problem do you resolve?
Neways will do the rollout of the developed meta architecture of the project into the real user cases in the port

of Valencia. In order to make this transition from the theoretically/virtual part of the project to go as smooth as possible, Neways has installed a virtual environment to which physical actuators sensors, storage devices, are connected to each other over the internet, stationed over different geographical locations and running over the same virtual gateway. With this virtual test environment, the debugging of the user scenarios can be virtual simulated so the 'real world bugs' can be tackled before they arise.

4. Which is your value promise?

Neways Value promise is to improve the technology (robustness, cross platform interoperability and decrease total cost of ownership) and increase applicability.

5. Offered services/products from the project

-

6. Which is your target market? How big do you estimate the market?

Our target market is the "legacy" market of installed equipment with long life capital equipment. This equipment has benefit of IoT devices because they can be upgraded with IoT devices that are easily installed and configured for the purpose. New capital equipment will be delivered with IoT capability in the (near) future.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

We have had > 10 interviews and user case stories varying from smart external gas tanks and drinking water sensors for cattle to intelligent monitoring systems for elevators and rolling shutters. Technically all customer requirements could be satisfied.

8. Results of interviews?

Customers are struggling with their business models for IoT. There is a huge promise but the major challenge is to translate them into a profitable business model.

9. Which competitors are there and how do you differ from them?

Neways differentiates from its competitors through several distinguishing Unique Selling Points. Advantages Neways customers have when working with Neways are the Neways IPR policy (White box development), complete life cycle support for the products and the global presence of Neways.

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

From Neways point of view we have 2 different approaches:
- For the (electronic) hardware we only expect to have a development/technology roadmap available, which will translate into actual prototypes & products if Neways is running projects with their customer base.
- For the virtual/software part of the project, the expectation is that at least a running Alpha version is available, debugging will be done during the rollout over the user cases, which is usable to be customized for application at projects for Neways customers.

11. Which partners do you need or already have for the business implementation (outside of the consortium)?

At this moment, all developments are done in house. But for the virtual/software part of the project, Neways is looking to some partners in the INTER-IoT project with who Neways can startup long-term relationships to be able to do the roll-out of the business implementation plan. Possible partners of interest could be (no formal communication regarding this has been started yet at date of writing) Prodevelop and XLAB.

12. What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.
At this moment Neways is sometimes limited in providing an integral- or full-inter IoT solution for their customers, so sometimes business opportunities are missed. With this extended network with IoT partners, the chances of gathering a greater business share are bigger. A weakness in the business model is that Neways will remain dependent on a partner for the virtual part since this is excluded to be done by Neways by the Neways business strategy.
13. Which is your IPR vision?
Neways policy: no buildup of IPR, this will always remain property of the Neways end-customers.
14. Which is your open source vision? Is there any restrictions and limitations?
Given the markets Neways work in and the type of customers that Neways serves, working open source is often not preferred by our customers. Especially since the IPR of the developments and products is not at Neways, but at the end-customer. Given this, Neways does not prefer an open source strategy.
15. When and how do you plan to place the product on the market?
Neways does not have an own product portfolio. The release of the first products in which the INTER-IoT knowledge of Neways is included will be depending on the sort and timing of products of the Neways end-customer. In practice however, Neways is already working on some projects which are related to IoT and of which the end customer is already in the integration phase. So, products that are IoT related with Neways contribution are release on the market during the second half of 2017.
16. Describe your financing strategy for a 5 years' scenario
Not available for publication (Neways shares are listed on the Euronext Amsterdam stock exchange)
17. Describe the expected impacts of your business idea
The expected impact is that the business idea will make the turnover of Neways grow with an estimated 15% over the next 3 years.
18. Paying customer: how many of your direct customers can turn on potential customers?
One.

Identified by: **Neways Technologies B.V.**	Registration Date: 31/03/2017

A6 UPV

Individual Exploitation Plan
Name of the partner: UNIVERSITAT POLITECNICA DE VALENCIA

Partner's type: **Public University**	URL:	Business Scenario selected: ● Transport/ Logistics ● m-health ● Cross-domain
1. Partner's role in the project		

UPV research team is project coordinator, a part of the management and administrative activities is technological provider in different levels of INTER-Layer and also in the final products of the addressed application domains.

2. **Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)**

UPV research group aims to lead research activity in IoT in the institution and in the different technical universities within Spain. Research results and competences will be used to promote the university, attract more students with the founding of new Masters and new Ph.D. program or enriching the existing ones; attracting new and existing companies in order to develop new products or participate in additional projects. Moreover, technological and research advances, obtained on the basis of INTER-IoT project results, will be exploited also for technology transfer, creation of spin-offs, and to increase the UPV reputation and the capacity to attract resources from competitive research programs and private funding.

Regarding the different application domains UPV plans to address mainly the research in ICT applied to transportation and logistics, mobile health and also smart cities. In the area of interoperability, UPV strategy is mainly linked with the business scenario related with consulting and application development.

3. **Which problem do you resolve?**

The main problems solved by UPV are related with the networking aspects of IoT interoperability (i.e. virtual and physical gateway and the application of networking components to IoT interoperability like SDN and NFV as a link with 5G programs; and development of APIs and components to achieve interoperability between heterogeneous platforms as there is a lack of this elements in current IoT deployments.

Additionally, UPV plans to solve application development problems in interoperability environments and application domains like transportation and logistics, smart agrofood or smart cities.

4. **Which is your value promise?**

The value promise provided by UPV research team activity in the project are twofold:
- From the academic perspective, UPV aims to strengthen teaching and research programs with a special focus on PhD. UPV will benefit using the links and networks mainly established with South America what will help to attract students. Additionally, to improve UPV presence in international rankings and increase publications in quantity and quality.
- From the industrial perspective UPV aims to provide consultancy services to medium and large enterprises wanting to use IoT in their business areas; promotion of the generation of startups and entrepreneurship activities, and the participation in the provision of services in the premium business model.

5. **Offered services/products from the project**

UPV will offer mainly services related with INTER-Layer components and INTER-FW API. UPV will include some of this elements in the registered product SIMACOP used by the Spanish army, in order to integrate heterogeneous IoT platforms for Command and Control purposes.

6. **Which is your target market? How big do you estimate the market?**

As the value proposition the target market can be seen in two planes: academic and industrial. Academically UPV is a Spanish public university and the target market are the students (Spanish, European and South American) and also institutions which may require training aspects related with IoT interoperability. Moreover, also the scientific community can be seen as a market where UPV wants to increase its prestige by publishing and disseminating valuable works. From the industrial point of view, some market opportunities can be represented by consulting activities to enterprises and the creation of spin-offs by students. Additionally, collaboration with the industry, mainly stakeholders may develop in new products and further collaborations in the area of IoT interoperability.

7. **How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?**

UPV has carried out interviews with around 15 stakeholders from the port, cities, public and technological sector

that are interested in the results of the project. And additionally, to more than 50 students from the master and PhD programs.

8. **Results of interviews?**

Regarding stakeholders, all of them showed great interest in the results of INTER-IoT with different degrees, while IoT platform operators are more interested in interoperability at middleware level, other industry interviewees were more interested in the lower layers of interoperability. There is an increasing interest regarding the link of IoT and big data.

Students are very interested in the IoT area, currently UPV only provides a course related to IoT interoperability in the Telecommunications PhD program and there is interest in increasing the number of courses and the provision of related MSc and PhD thesis.

9. **Which competitors are there and how do you differ from them?**

Academically in Spain there are not many universities interested in IoT interoperability as a whole, only in partial aspects of interoperability (e.g. UPM in semantics and UPC in security). At European level, different universities and research centers are competitors of UPV.

Competition is focused in the area of funds gathering at national and European level. The main difference between UPV and the other entities is mainly related with the flexibility and dynamicity of the university.

10. **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**

From the academic point of view the time estimation is to have new courses and thesis ready by the end of 2018, and a specific master program related with IoT and interoperability by the end of 2019.

Regarding the benefits and improvements to SIMACOP and the integration with INTER-IoT interoperability layers the end of 2018 will be provided the first version and a new one by the end of 2019.

11. **Which partners do you need or already have for the business implementation (outside of the consortium)?**

UPV has strong business links with the different partners of INTER-IoT (specially the Spanish partners with which has already participated in different business opportunities). In the academic area UPV has strong ties with UniCal and different academic initiatives will be performed together with them. Out of INTER-IoT consortium UPV will need collaboration with Telecom Operators, cloud providers and stakeholders from the different application domains.

12. **What strengths and risks do you foresee for your business idea?**

The main opportunity of the project will be a stand –alone solution of INTER-IoT and a cloud based solution providing Interoperability as a service. Another exploitation opportunity is the virtualization of gateways and connection with SDN and NFV components for the deployment of IoT services in telecom operator premises.

UPV foresees exploitation opportunities in vertical markets: smart cities together with city councils; transport and logistics with different stakeholders and operators; m-health with health agencies and safety and security with private and public agencies.

Main risk is that INTER-IoT fails to address the needs of the stakeholders and the users and that it becomes another de facto standard.

13. **Which is your IPR vision?**

As a public university, UPV will follow and open source approach as indicated in the Consortium Agreement. Licensing Apache 2.0

14. **Which is your open source vision? Is there any restrictions and limitations?**

UPV has no restriction in the OS environment, mainly UPV will address the recommendation of the EC in this aspect and what was stated in the Grant Agreement.

15. **When and how do you plan to place the product on the market?**

UPV will disseminate the results of the project in scientific events and as much as possible in industrial events related with IoT and interoperability. UPV will participate in the validation of INTER-IoT in the pilot site of

Valencia Port and will communicate the results during and after the project to attract new ICT companies and stakeholders to use INTER-IoT.

16. Describe your financing strategy for a 5 years' scenario

Research activities at UPV are funded by research projects (public and private) so the financing strategy will be linked to attract such funds. And in some cases, it will be able to use internal UPV funds when available. Regarding courses and training, these funds are directly managed by the university so it is not possible

17. Describe the expected impacts of your business idea

Expected impacts in the academic environment will be directly related with the increase in the number of students and the improvement in the national and international rankings.

In the industrial area, the impact will be related with the attraction of more research funds, technology transfer and facilitation of IoT interoperability to stakeholders.

18. Paying customer: how many of your direct customers can turn on potential customers?

Difficult to provide a number, no direct customers available.

Identified by: Universitat Politecnica de Valencia	Registration Date: 27/04/2017

A7 SRIPAS

Individual Exploitation Plan
Name of the partner: SRIPAS

Partner's type: **Public Research Organization**	**URL:** www.ibspan.waw.pl	**Business Scenario selected:** ● Transport/ Logistics ● M-health ● Cross-domain

1. Partner's role in the project

The role of SRIPAS is to conduct research and to deliver software artifacts in areas specified in the Grant Agreement. Furthermore, SRIPAS takes active role in dissemination of scientific results.

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

As a public research organization, there is no direct / explicit business-oriented / business-case exploitation strategy. However, based on the long-term strategy of the Institute, we can state what follows:
- SRIPAS runs a Ph.D. program, and results of the project will be exploited within its scope: (a) within its curriculum, and (b) as foundation for future research undertaken by Ph.D. students participating in the program.
- SRIPAS is a member of 3 Industrial Clusters. Therefore, members of the SRIPAS team will undertake appropriate actions to disseminate results to the industry and seek collaboration, including consulting and joint business endeavors.
- SRIPAS team will disseminate results of the project through industry-oriented conferences, seeking collaboration, including consulting and joint business endeavors.

3. Which problem do you resolve?

SRIPAS will use results of INTER-IoT to make the Ph.D. program more competitive – being closely connected to real-life applications of IoT. However, while the specific problems arising in the INTER-IoT use cases (and pilots) may be used to facilitate Ph.D. research, the SRIPAS is also interested in (re)use of domain-agnostic results (in particular, concerning use of semantic technologies in IoT)

4. Which is your value promise?

Possibility of using results from the INTER-IoT project, as well as direct contact with real-world applications of IoT (participation in development of actual IoT pilots) makes the Ph.D. program offered by SRIPAS more attractive to the students.
Separately various results concerning IoT interoperability may be used in consulting / joint R&D projects with the industry.

5. Offered services/products from the project

In consulting and collaboration with the industry, results concerning semantic interoperability, as well as the (INTER-METH) methodology will be used. However, they will be used in their open source format, i.e. they will be used "for free" to support other "money generating" activities.

6. Which is your target market? How big do you estimate the market?

As stated above, SRIPAS is a public research organization, so this point does not apply directly. The main way of SRIPAS participating in the market will be through joint endeavors with businesses and through consulting activities.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

Since interviews were conducted only with Ph.D. students, there are no user stories that have been collected.

8. Results of interviews?

Interviews have been conducted with Ph.D. students. They indicate awareness of, and interest in, the Internet of Things related topics.

9. Which competitors are there and how do you differ from them?

This criterion is not directly applicable – SRIPAS is a public research body. Implicitly, SRIPAS is in competition with other Institutes of Polish Academy of Sciences. Here, SRIPAS is the only one that is directly involved in hands-on IoT research.

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

Not applicable – TRL of software delivered by SRIPAS will be such as of all deliverables of the project.

11. Which partners do you need or already have for the business implementation (outside of the consortium)?

We expect that when the first full-fledged prototype will be operational and first results from pilots will be collected, SRIPAS will start showcasing the product(s) and will establish collaborations with businesses (primary target being members of the three Clusters).

12. What strengths and risks do you foresee for your business idea?

Not applicable – see, above

13. Which is your IPR vision?

The same as for the whole project – open source, Apache ver. 2.0.
14. Which is your open source vision? Is there any restrictions and limitations?
Precisely as it is defined in the Apache ver. 2.0 licensing.
15. When and how do you plan to place the product on the market?
Not directly applicable. We, primarily, plan to showcase the INTER-IoT products through business-oriented conferences in Poland.
16. Describe your financing strategy for a 5 years scenario
Not applicable – public research body.
17. Describe the expected impacts of your business idea
Not applicable – public research body.
18. Paying customer: how many of your direct customers can turn on potential customers?
Not applicable – public research body.

Identified by:	Registration Date: 21/04/2017

A8 UNICAL

Individual Exploitation Plan

Name of the partner: University of Calabria (UNICAL)

interiot
interoperability of heterogeneous
IoT platforms

Partner's type:	URL:	Business Scenario selected:
Public Research Organization	www.unical.it	● M-Health ● Cross-domain

1. Partner's role in the project

UNICAL is an Italian Public Research Organization. UNICAL's role in the project is to provide research support and disseminate scientific results. The UNICAL contribution is provided through its leading or participation on project tasks.

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

INTER-IoT outcomes will be fundamental for UNICAL to further increase its visibility in the IoT research area, specifically in the convergence of body area networks, mobile-Health and interoperability methodologies.
Research results will be used to attract more students with the founding of new Masters, new Ph.D. program, new computer/electronics engineering courses or enriching the existing ones.
Moreover, technological advances obtained on the basis of INTER-IoT project results will be exploited for technology transfer, to regional/national industrial and academic community, and to increase the UNICAL reputation and the capacity to attract resources from competitive research programs.

3. Which problem do you resolve?

The main problems that UNICAL aims to resolve are:

- the enabling of IoT interoperability through mobile gateway solutions;
- the design of agent-oriented meta-modelling and framework to support IoT interoperability;
- the lack of methodology for the integration of IoT platforms together with the lack of tools for supporting the automated application of the methodology;

4. Which is your value promise?

UNICAL's value promises are to provide:
- more attractive teaching courses to students;
- increase technology transfer to regional/national enterprise;
- improve third parties consulting activities;

attract higher resources from competitive research programs.

5. Offered services/products from the project

- INTER-LAYER: Mobile Gateway, Middleware;
- INTER-FW: API;
- INTER-METH: Methodology, CASE-Tool;
- INTER-Health: integration of BodyCloud platform into the pilot; design of Mobile Health Gateway.

6. Which is your target market? How big do you estimate the market?

UNICAL is an Italian Public Research Organization, so there is not a proper target market. However, some market opportunities can be represented by consulting activities to enterprises and training activities. Moreover, also the scientific community can be seen as a market where UNICAL wants to increase its prestige by publishing and disseminating valuable works.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

Interviews have been dispensed to about a hundred of Master and Ph.D. students.

8. Results of interviews?

Students report a great interest in IoT related topics. Most students would consider the opportunity to attend Master courses focused on IoT technologies and believe that a reorganization of degree courses, more focused on IoT issues, would be more attractive.

9. Which competitors are there and how do you differ from them?

UNICAL is an Italian Public Research Organization so competitors are other Public Research Organization. UNICAL has the largest student campus in Italy. UNICAL is the first, among southern universities, for technology transfer performances, eighth nationwide (evaluated 58 universities) and third among medium-sized universities (23 in total).

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

Not applicable

11. Which partners do you need or already have for the business implementation (outside of the consortium)?

Not applicable since Unical mission is not to bring product to the market.

12. What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.

Not applicable

13. Which is your IPR vision?

Apache ver. 2.0.

14. Which is your open source vision? Is there any restrictions and limitations?
Apache ver. 2.0. There are not restrictions.
15. When and how do you plan to place the product on the market?
Not total applicable. UNICAL plans to disseminate INTER-IoT research results and products in international conferences and journals.
16. Describe your financing strategy for a 5 years' scenario
Public research organization funded by the Italian government.
17. Describe the expected impacts of your business idea
UNICAL expects to: ● Increase the number of students; ● increase technology transfer to regional/national enterprise; ● improve third parties consulting activities; ● attract higher resources from competitive research programs.
18. Paying customer: how many of your direct customers can turn on potential customers?
Not applicable

Identified by: UNICAL	Registration Date: 28/04/2017

A9 ASL T05

Individual Exploitation Plan	
Name of the partner: ASL TO5	inter**iot** interoperability of heterogeneous IoT platforms

Partner's type: **Public Body Organization**	URL: www.aslto5.piemonte.it	Business Scenario selected: ● M-health ● Cross-domain

1. Partner's role in the project
The Hygiene Nutrition Unit of the Complex Unit of Food and Nutrition Hygiene is a public body that works in the Preventive Department of a Local Health Centre in the National Health System. This Unit works promoting appropriate eating habits and practice of physical activity to prevent the development of chronic degenerative diseases; it works performing nutritional counselling and educational interventions on the population. ASL TO5 is a partner of the project, stakeholders in the consortium and involved for the development of the Mobile Health use case concerning monitoring of lifestyles "Decentralization and monitoring of lifestyles" during the Integration and Pilot deployment to improve and overcome the traditional methods, tools and protocols.
2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)
The goal of prevention is addressed to the individual and to the community, proving the importance of not only the promotion of a healthy lifestyle but also education and information for the citizen in the field of health. Our main goal is the health of the subject through the improvement of the health care system involving the subject, health care operators, health professional network and health system.

Nutritional counselling is steadily and progressively subject to revision by research group and scientific societies. However, it can be further improved with the introduction of internet of things and interoperability between platforms. The collection of information about physical activity through the subjective and objective measurements using sensors and the collection and interchange of data about eating habits (electronics questionnaires and databases) on different platforms (outpatient, local doctors, citizens) could be an improvement for new standards composition and management of nutritional outpatient to assist the citizen in remote monitoring for maintenance his health. These standards could be the starting point for new revisions and updates in the view of the full abandonment of traditional nutritional counseling. Introducing IoT in the preventive area and the use of INTER-IoT will allow us to offer to our population a whole innovative point of view in the prevention medicine. The technologies could add value to our nutritional counseling and this approach could be translated in other preventive field, becoming a key factor to differentiate the providing services and solutions for the integration of heterogeneous IoT solution. To pursue the goal of the remote monitoring we need to overcome, both for the health care operator's point of view, which carried on the monitoring of the subject using technological tools, and for the subject's point of view, which will be involved in their health status monitoring, the issue of the digital and technological gap.

3. Which problem do you resolve?

We work in the prevention area of public health system and our outpatient offers to citizens a nutritional counseling service, promoting the field of preventive medicine, an healthy diet and proper and active lifestyle. The nutritional counseling for clinically healthy subjects and the monitoring of lifestyle in the outpatient, decentralized in subjects' homes and in mobility will be a proposed service of monitoring the subject in real time testing and developing IoT technologies in health scenarios.
The experience and skills of our working group about health status benefits through nutrition and lifestyle are able to ensure the connection of the Internet of things experience (IoT) directly to health.
This experience takes place in a field concerning the Preventive Medicine (Primary Prevention) which is subject to fewer testing than clinical areas of the patient's healthcare.

4. Which is your value promise?

Prevention field is a tool, which demonstrates its long-term effectiveness, counteracting today the possible spread of disease that may be manifest in the future health status of a subject. Any time, through the use of IoT technology, subjects will be able to check their physiological parameters, collected during the visit in the outpatient by the healthcare operators, and data collected with electronic devices and wearable sensors at home and in mobility about their eating habits and physical activity. Decentralizing the activity from nutritional outpatient, thanks to the interaction between platforms, the collected data can be use simultaneously by the Healthcare Centre of ASL TO5 and stakeholders. The innovative value of the mobile Health pilot, will be to overcome the traditional methods in the relationship with subjects who come to Nutritional Outpatients providing quantitative and qualitative advantages regarding the magnitude of the public can contact the outpatient (system efficiency) and collecting objective measures more effective and appropriate.
The adding value could be to extend the preventive action, for the same resources to a group of more extended population.

5. Offered services/products from the project

- **Nutritional Traditional Counseling:** collection by health operators during the first visit subject's objectives data (weight, height, BMI, waist circumference and blood pressure) that they will be monitored during subsequent checks, and subjective ones (eating habit and physical activity practice).
- **Subject remote monitoring (Experimental Nutritional Counseling):** at subject's home, using electromedical and mobile wearable devices the subjects can detect their objectives data, while using informatic questionnaires they can detect subjective data.
- **Nutritional Folder:** during the traditional nutritional counseling the ASL TO5 dietitian records data of subjects who arrive to nutritional outpatient on a "nutritional folder". It is used to record health and sensitive data of subjects such as: personal data (name, surname, age), anthropometric data (weight, height, BMI, waist circumference, blood pressure), eating habits and physical activity. The data collected will be protected under national law "Code regarding the protection of personal data".

6. Which is your target market? How big do you estimate the market?

Our individual target is a clinically healthy subject, who want to monitor his health status. We involved mayor age subject for the pilot development to follow the bioethics committee and experimentation trial rules. Subjects recruited want to reach and maintain a healthy lifestyle, and they are eager to control themselves their health status. The estimation of the size of the whole target is the citizen and we work within the public administration to reach them. We count on the number of subjects who attend the nutritional outpatient and who accept to participate to the trial and accordingly to the number of entry to nutritional outpatient we could estimate our impact on our area as a Local Health Unit.

We have to spread our work through the collaboration that we may build with potential stakeholder as municipalities, local sport and cultural association and count the number of collaboration that we could made up with them. We could involve university and research area and measuring the impact of the dissemination strategy through scientific associations (Italian Society of Human Nutrition- SINU; Italian Association of Dietetics and Clinical Nutrition-ADI; Italian Society of Sports and Exercise Medicine – SIMSE).

| 7. | How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers? |

-

| 8. | *Results of interviews?* |

-

| 9. | Which competitors are there and how do you differ from them? |

The competitiveness of our nutritional outpatient (that belong to preventive sector of public health State Service) is increased thanks to the maturation of an experience through the participation to this project that can be a reproduced example, to their advantage, by other private or public state nutritional outpatient, that are interested in health status of population of other territories.

| 10. | What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market? |

Technological objectives in order to propose a concrete experimentation introducing new technologies in public health state Service, notoriously undeveloped in Italy, to be an example reproducible by other public state or private entity to improving the health of population group of reference area.

This objective could be realized as soon as it will be defined regulation and statements on privacy and security. The problem of overcoming the digital and technological gap may slow down the development in the territory, for example, the difficulty of finding the connection and an adequately data traffic, for the health operator, using technological devices at work, and for subjects, which are limited by the lack of knowledge of available tools. Those gaps have to be defined by developers, who write hardware and software infrastructure, that could be capable of developing the needed products.

| 11. | Which partners do you need or already have for the business implementation (outside of the consortium)? |

For the development of Mobile Health use case in term of business implementation, we work in collaboration with technical partner, such as UNICAL and SABIEN, and the system will be built using a new IoT platform, called INTER-Health, obtained by integrating two existing heterogeneous and not interoperable IoT platforms: UniversAAL, developed by SABIEN (Technological Innovation for Health and Well-Being) of Institute of Applied Information Technologies and Advanced Communication (ITACA) in Valencia and BodyCloud, developed by the Department of Informatics, Modeling, Electronics and Systems (DIMES), the University of Calabria, providing us devices and platform to collect and storage the data for testing interoperability. We need technical support, to ensure the management of the pilot and we also need ethical support, to guarantee privacy and security issues at all level: detection from device, collection on database; sharing for dissemination activity.

| 12. | What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis. |

The experience, as a preventive department, gained in the outpatient and analyzing periodic review over the years of outpatient nutritional counseling practice and subject made it possible to modify the intervention

directed to specific situations by building alternative approaches and more effective than the dietary anamnesis alone.

The goals that guided the redefinition of traditional nutritional counseling:

- application in practice of the latest national and international Guidelines
- diversification of type of subjects that come to our outpatient and expansion of the nutritional counseling demand
- necessary quick and adequately response to the need for healthcare field
- optimization of working time and harmonization of interventions and educational language of healthcare operators

13. Which is your IPR vision?

The introduction of new Technologies in the Health National Service to be reproduced by other public or private services to improve and enhance population health of the reference area, the Intellectual Property is the focal point so that results of the research will produce an effective impact in the Society, to offer a competitive advantage in the market to stakeholders.

The innovative potential of this type of cooperation technologies-healthcare is maximized wherever healthcare center is able to develop a pro-active role towards industry, promoting it in the view of guide their business skills on healthcare settings and the most relevant clinical problems for healthcare organizations and patients (prevention of chronic degenerative diseases), so as to effectively combine the business and healthy skills and knowledge.

14. Which is your open source vision? Is there any restrictions and limitations?

At the beginning of the project, requirements for levels of integration, trade and existing open source solutions are described and evaluated in order to understand which existing components can be used in different parts of the set of INTER-IoT tools, promoting the reuse of existing open technology whenever possible. The open-source strategy of the project will be centered using, as far as possible, open-source components already existing while extending the functionality of these components in case of necessity. Public body, in general, works on close system that, runs offline and on intranet basis. As an operator, you can enter only with credentials or with restriction (both in order to follow the privacy code for entity and to suppress any possible entry outsiders). This system suffers from digital divide, the gap between those who have access to modern technology (private body, commercial area, for example) and who is somehow excluded (both for choice and for lack of tools). This is a developing problem that it has to be advanced in the access area and improve services for the citizen. We have to follow the growing of mobile network and spread the fixed network.

We need a network that works as a tool and as a platform. It's possible then to establish a synergistic relationship that creates value for the public administration if they can create some initial conditions and if they can promote the development. Given the importance of the spread of digital health or e-Health in the health sector and the centrality of the patient, e-Health sets the goal of assistance as a system in which converges contributions of at least three disciplines: computer science, medicine and business administration. It follows that the service, thanks to e-health becomes telemonitoring, and in this context, public and private roles more and more interface each other reducing the complexity of used instruments.

15. When and how do you plan to place the product on the market?

For measuring the impact of marketing strategy on the ASL TO5 institutional website, our site will be available and accessible in real time to the population and stakeholders, with all information related to the project (documents relating to the performance of the project, information on the INTER-Health program and results). At the moment ASL TO5 is not on social media, so IoT offers the opportunity to verify if we could use the potential relationship of these tools, which will be used to convey messages and specific initiatives on the INTER-Health program in order to try a new media strategy and with the possibility of measure the impact of our pilot on social media.

In this period ASL TO5 has enhanced the market impact through dissemination activity. During local event and during national scientific event it provides new instruments of Health representation to the simple real public (citizens) and to the holistic public (national and International literature and publication).

16. Describe your financing strategy for a 5 years' scenario

-

17. Describe the expected impacts of your business idea
As result of those improvement we could evaluate our pilot as a multidisciplinary impact: the experimentation of innovative approach of the project allow us to overcome the traditional method in relationship with subject which come to our nutritional outpatient. The new approach provides quantitative benefits about public wideness that can address to ours healthcare system because improve the efficiency, as a social impact and for the whole environment. Benefits are also qualitative because objective measurements (weight, height, body mass index, blood pressure, waist circumference) and subjective (eating habits and physical activity practice) result more effectives and appropriates and they produce a major health benefit on subjects, that could be matter of the research field for the health field and for the technological field. In particular, using mobile wearable device subjective measurements (physical activity practice) become objective ones.
18. Paying customer: how many of your direct customers can turn on potential customers?
The society is ready for the IoT implementation in the health involving several actors: subjects and Healthcare operator with a territorial, regional and national levels involvement (Public Institutions, Healthcare operators, research institutes, non-profit organizations, etc.). In terms of interoperability in healthcare scenarios this new approach will foster the competitiveness of the market, allowing a real economical saving of Public and private healthcare sector.

Identified by: **ASL TO5**	Registration Date: 28/04/2017

A10 SABIEN

Individual Exploitation Plan
Name of the partner: SABIEN

Partner's type:	URL:	Business Scenario selected:
Research Group - University	www.sabien.upv.es	● M-Health ● IoT-Health

1. Partner's role in the project
ITACA-SABIEN is responsible for the technical implementation of the e-Health pilot. The IoT platform used for the Health use case will be UniversAAL, a platform delivered from two European FP7 projects which has the support of the European Commission. ITACA-SABIEN has participated in the development of the universAAL IoT platform and has experience on its deployment on scenarios for assisted living. In this Project, Sabien will integrate this platform into INTER-IoT new paradigm focused to cover the needs from ASL TO5.

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)
Most of the existing developments in the Internet of Things (IoT) are based on closed concepts, focused on specific objectives and isolated from the rest of the world. Integration of heterogeneous elements is usually done at the device and network level, and is simply limited to the collection of data. Our approach proposes that a multi-level focus that integrates different devices, networks, platforms, services and IoT applications will allow a global continuum of data, infrastructures and services that will allow different IoT scenarios. By reusing and integrating existing and future IoT systems, a global ecosystem of IoT platforms can emerge. **Our business scenario is the integration and use of health sensors through a combined IoT platform, based on the**

INTER-IoT and universAAL blend, to support remote care and the management of nutrition and overweight prevention.

3. Which problem do you resolve?

We focus on the elimination of the barriers caused by sparse localization and the gain of efficiency by the exploitation of existing ICT tools to deliver personalized treatments. Or primary goal is to digitalize the management of nutrition, paving the way to the development of new tools for automatic data mining and discoveries of emergency cases. After that, by providing mobile application and health sensors to patients, we aim to strength the relationship between patients and doctors by providing new channels for communication and information exchange, but moreover, to empower patients and boost the self-management of the health status.

4. Which is your value promise?

Any time, through the use of IoT technology, subjects will be able to check their physiological parameters, collected during the visit in the outpatient by the healthcare operators, and data collected with electronic devices and wearable sensors at home and in mobility about their eating habits and physical activity. Decentralizing the activity from nutritional outpatient, thanks to the interaction between platforms, the collected data can be use simultaneously by the Healthcare Centre of ASL TO5 and stakeholders. The innovative value of the mobile Health pilot, will be to overcome the traditional methods in the relationship with subjects who come to Nutritional Outpatients providing quantitative and qualitative advantages regarding the magnitude of the public can contact the outpatient (system efficiency) and collecting objective measures more effective and appropriate.

The platform will be interoperable, so any type of device which doctors want to integrate will be integrated in a short time. This collection of sensors will not be limited to the wearable sensors but also to other type of sensors in the future that may help to manage nutritional status (like intelligent fridges, social media and so on). By using semantic engines, the IoT platform will also be capable of integration of the information layer with external databases (like the Elecronic Medical Record of the Hospital).

5. Offered services/products from the project

- **Integration of wearable sensors and questionnaires:** automatic collection of physiological values and questionnaires related to the nutritional status.
- **Dashboards for patient management:** a web dashboard to manage the information collected during clinical visits and remote follow-ups
- **Data mining services to exploit data:** graphical and statistical tools to exploit and reuse data for single-multi/patient analysis.

6. Which is your target market? How big do you estimate the market?

Our target market is any type of clinical institution or company which performs the management of nutritional status and could be benefited by the services we are delivering. Although, the market size estimation is huge, previous experiences show us that the penetration of this type of technologies is not very big, which compromises the exploitability of our contribution to the Project. Regular workflow involves a close relationship among client and provider to define a service which really meets the client needs and overcomes any barrier originated by the circumstance of the ICT system.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

We are focused now on the development and evaluation of our scenario

8. Results of interviews?

Not available.

9. Which competitors are there and how do you differ from them?

Big companies are starting to offer integration solutions connected to sensors, but this segment is very heterogeneous and fragmented. Consultancy companies related to ICT such INDRA/EVERIS could be competitors on the public purchase for to cover the needs of a hospital or clinic institutions.

10. **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**

Time-to-market in the domain of health technology is wider than usual. National and European regulations are very restrictive and tight for the commercialization of medical technologies, as the one presented herein. Even the platform and the software itself is based on the connection of existing certified solutions, it needs to accomplish European Directives on medical device certification and security, and moreover, has to be audited prior to the installation in a clinical setting and commercialization. The certification process is not complicated but effort-time consuming, as it is based on the reporting of every feature, risk and contingencies on the functionalities of the solution. Expected time-to-market will be in-between five-seven years after a successful pilot, nevertheless, the solution built under this project will be fit for purpose, and any other potential customer will need a special study on his requirements, suitability of the platform to cover his needs and needs of further developments.

11. **Which partners do you need or already have for the business implementation (outside of the consortium)?**

Before the business implementation we need the collaboration with ASL T05 and UNICAL for building and testing the solution. The achievement of a successful pilot in terms of covering the expected goals will be the evidence that this solution is useful for the remote management of patients, and thus, a flagship experience on the value this product may offer to other clinical organizations (public or private). The business study of the solution (away from the technical) will also need these two partners to define the cost structure of the IoT-Health solution and the circumstances in which a clinical organization can cover the expenses of maintaining such system.

12. **What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.**

The Major strength of our contribution into the project es that universAAL has increased the awareness of its goals and achievements in the EU. For example, the EU Policy workshop in Lisbon (2010) and several editions of the AAL Forum (Odense 2010, Lecce 2011, Eindhoven 2012, Norrkoping 2013) have been influenced by universal. In the EU Call for projects PM-15 this platform was mentioned as a reference model for interconnection. universAAL influenced the definition of the EIP-AHA policy framework, highlighting the need for adoption of open platforms by the industry, and recommending that specific calls in different funding programs promoted fully or partially by EU must emphasize and recommend the use of those open platforms (Brussels, Lecce declaration, Amb-11).

Nevertheless, our product comes from a funded project and has not reached yet self-sustainability. Tasks in the direction of self-sustainability are not yet solid or clearly promising, but the collaboration in this project is a good proof of concept to evaluate the satisfaction of clients and perhaps identify the possibility of acquiring new clients.

A major risk is that multiple proprietary/vertical solutions for specific problems or needs can be commercially launched to the market as we develop the solution for the health scenario. This would make it difficult to launch a platform oriented approach like the universAAL platform, where the different solutions can be integrated to provide more value than the sum of its parts.

13. **Which is your IPR vision?**

The main problem that should be avoided is the coding of everything without an explicit agreement on the copyright license that will be used for the software component that is developed, with non-repudiation terms. The need of an initial agreement is evident in case of joint development, however also in case of a development performed by a single Party, or just of background software, the definition of copyright license must be clear since the beginning. The reason is that any further dependency introduced with either foreground or background components cannot be based on ambiguous copyright license assumptions. The risk is that after months of development and effort spent in component design, an agreement with full satisfaction for each partner cannot be reached.

The second problem that should be avoided is the infringement of copyright licenses of the software we may use in case of derivative work. If the development is started by using third party software (external), it is needed to state which kind of restrictions or permission are applied by using that external software. Note that even the inclusion of a single file or snippet can cause a legal dispute.

SABIEN will use UniversAAL platform for IoT integration within the INTER-IoT paradigm. the main results produced within universAAL will be made available for free as open source. As decided within the consortium, the selected recommended license to apply to all software developed inside universAAL is the Apache Software License 2.0 (ASL 2.0)

14. Which is your open source vision? Is there any restrictions and limitations?

The access rights to the software modules that will be foreground have not been defined yet. Nevertheless, everything related to universAAL and INTER-IoT will be open source.

15. When and how do you plan to place the product on the market?

As academic partner, we do not expect to perform a commercial individual exploitation of our products but an academic (conferences, journals and educational materials)

16. Describe your financing strategy for a 5 years' scenario

Public funding using mechanisms to develop innovative systems in healthcare and participation in Public Purchase consortiums.

17. Describe the expected impacts of your business idea

- Increased Quality of Life of patients by reduction of nutritional decompensations in the mid/long-term
- Patient empowerment to take the control of their health status by the promotion of healthy decision making.
- Effectiveness on the management of patients through a platform for personalized case management oriented for many treating professional profiles (Doctor/Nurse).
- Better information management based on semantic and scalable IoT Solutions.
- Reduction of the visits to the clinical settings and overload of health professionals without compromising health care delivery quality

18. Paying customer: how many of your direct customers can turn on potential customers?

As a research group we do not have direct customers but partners, that can be engaged to participated on Public Purchase of Innovation calls for the acquisition of such a technology.

Identified by: SABIEN	Registration Date: 27/04/2017

A11 VPF

Individual Exploitation Plan		
Name of the partner: VALENCIAPORT FOUNDATION, VPF		interiot interoperability of heterogeneous IoT platforms
Partner's type: Research Organization	**URL:** http://www.fundacion.valenciaport.com	**Business Scenario selected:** - Transport/ Logistics

1. Partner's role in the project

As a research and development foundation with strong links to port stakeholders, VPF will make use of the results with a view to expand them to other actors and ports that could take advantage of similar solutions, by providing assistance and support services based on the experience gained in the project. As well as looking for innovative ways to expand these solutions and develop others related with the experience gained on the application of INTER-IoT to fill gaps in the port, transport and logistics sectors, mainly in connection with the Port Community System.

VPF, as the leader of WP2, have participated in the requirements and use cases for the use of INTER-IoT framework for port logistics and transport for intelligent trucks, intelligent containers as well as other IoT ecosystems external to container terminals and characterize their interactions with the container terminal IoT ecosystems, considering other logistic hubs IoT ecosystems. Additionally, VPF has participated in the business model design and the analysis of legal and regulatory requirements.

Furthermore, VPF has been involved in the technical development of some modules the WP3 and WP4, and will lead the implementation of the transport pilot in the port of Valencia. It has also contributed in other task such us the methodology, evaluation or communication and dissemination.

2. Which is your main goal? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

Our strategy consists in taking IoT innovations, within the INTER-IoT Project, to solve real problems that occur in the trade, transport, logistics and port sector. To do so, we will take advantage of our current knowledge in these areas of application along with the knowledge gathered on interoperability of heterogeneous IoT platforms. Once the major logistics problems/inefficiencies have been identified, the most appropriate IoT solutions will be offered to customers (i.e. LATAM ports, shipping lines, transport companies…) so that they can transform their existing processes to be more competitive and efficient, leading to higher profits.

3. Which problem do you resolve?

- We solve the inefficiencies of the road and inland waterway transport network; through the optimization and better utilization of available parking spaces; and additional community services. The use of such systems may increase efficiency and safety in port premises.
- We improve port performance through timely provision of goods and more effective use of existing cargo handling capacities (e.g., for terminal operators); global reengineering process with anticipation, simplification, the security of procedures and new services definition like cargo forecast, cargo availability or alerts (e.g., freight stakeholders) or access to transport and infrastructure information; easier communication between driver and dispatcher; monitoring of heterogeneous fleets with an integrated view; and, when combined with an appointment service, reducing waiting times at terminals (e.g., freight forwarders and road hauliers).

4. Which is your value promise?

- The design of adequate business models both the introduction and use of IoT technologies.
- A bidirectional knowledge transfer between trade, transport, logistics and port operators with technology providers and IoT software and device vendors.
- Setting up of Smart-Port solution packages able to be introduced in different ports with different needs and sizes.
- The supply of proven solutions through a previous execution of pilots, proofs of concept and demonstrations.
- The provision of consultancy services, decision making, project management and change management support as a business integrator

The design and provision of solutions based on social and environmental responsibility criteria.

5. Offered services/products from the project

As a company with strong links to port stakeholders we are the leaders of the task of gathering of stakeholders, requirements and scenarios.

VPF participates in the definition of interoperability elements.

VPF is also involved in the development and implementation of the port pilot.

6. **Which is your target market? How big do you estimate the market?**

Our main market segment are inefficient LATAM port authorities that aim to improve their productivity and performance through the use of new technologies such as the Internet of Things.

Additionally, we address our value proposition to other agents that participate in the supply chain. As an example, we intend to focus on terminal operators, logistics centres, logistics operators, road or rail transport companies, piloting services, towage, mooring, container depots and any other administration or operator involved within the supply chain execution.

We estimate the market to be big and prepared for the INTER-IoT solutions.

7. **How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?**

He had interviews with around 20 stakeholders from the port and technological sector that are interested in participating in the development of the project or in de final products.

8. *Results of interviews?*

The stakeholders are willing to participate in the INTER-IoT project, as the final product can benefit them.

9. **Which competitors are there and how do you differ from them?**

Consultancy firms which develop or implements new technologies in port environments.

10. **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**

The pilot will be a TRL6, as the system will be demonstrated in a relevant environment.

VPF will continue improving and testing the technology in port environments after the completion of the project. It will offer consulting services to other companies.

11. **Which partners do you need or already have for the business implementation (outside of the consortium)?**

It is needed the support of companies where we can test the technologies such as Noatum or the Port Authority of Valencia as well as technological partners that can complement the expertise of Valenciaport Foundation.

12. **What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.**

- **Strengths: All the companies need interoperability with other systems to provide better services.**
- **Weaknesses: Each platform or system is from different manufacturer and different technologies.**
- **Opportunities: The more platforms are connected; the more data will be available to create new services.**
- **Threats: Security and privacy of sensitive data is crucial.**

13. **Which is your IPR vision?**

As it was signed in the consortium agreement of the project, each partner is the owner of their own developments. In case that several partners have participated in the development, it will be of the entire consortium.

14. **Which is your open source vision? Is there any restrictions and limitations?**

The strategy of the INTER-IoT consortium and the European Commission is to work with open source licences. In this case our proposal for the licence is Apache.

15. **When and how do you plan to place the product on the market?**

The dissemination strategy is based on the relationship with strategic partnerships, VPF commercial labour force, dissemination across its commercial contact network, sectorial events, or public tenders in which VPF participates.

The result of the project will be a prototype (TRL6) tested in a real environment. So, the first potential customer will be those companies where the pilot has been tested, after validation and certification (TRL8 or TRL9). After that, other ports can be advised.

16. Describe your financing strategy for a 5 years' scenario

The financing strategy is based in two branches: on the one hand, own resources for R&D&I project activity, and national and international projects. On the other hand, contracts of technical assistance for the implantation of the product.

17. Describe the expected impacts of your business idea

The data provided by INTER-IoT can be used to enhance the systems to be more efficient and environment friendly.

New business can arise for SMEs from the data available.

18. Paying customer: how many of your direct customers can turn on potential customers?

VPF will use this knowledge to apply for public tenders and contracts with port authorities, terminal operators, government organisms, development banks, etc.

Identified by: **VALENCIAPORT FOUNDATION, VPF**	Registration Date: 21/04/2017

A12 AFT

Individual Exploitation Plan

Name of the partner:

Association pour le développement de la formation dans les transports, AFT

interiot
interoperability of heterogeneous
IoT platforms

Partner's type:	**URL:**	**Business Scenario selected:**
Research Organization, semi-public body	http://aft-dev.com	● Transport/ Logistics

1. Partner's role in the project

AFT will work at exploiting the project's results in different ways. Since we are dealing day by day with transport undertakings, as well as transport associations and representatives of the government regarding transport issues, we are planning to use the results by communicating them to all those bodies we are working with. Since AFT is an association which goal is not to make profit, we will not exploit in a commercial way the results of the project. Nevertheless, the participation to this kind of project is very useful to us, as it allows us to be a body which diffuses innovation among the transport community. The objective is therefore to exploit the results by raising awareness on these solutions among the French transport community.

AFT, has participated in WP2, notably as leader of the Stakeholders and market analysis (T2.1) and is involved in most project WPs, notably WP4, WP6 and WP8.

2. Which is your main goal? Business scenario selected. Which type of business model do you envision

(B2B, B2C, etc.)

Our strategy will be to select the IoT innovations for interoperability developed in the framework of INTER-IoT, to then present, explain these innovations to the transport organisations and undertakings which constitute our "market".

On the basis of the needs expressed by AFT's stakeholders, AFT will then counsel, assist and facilitate the integration of INTER-IoT interoperable products into transport.

3. Which problem do you resolve?

AFT aims to:
- Ensure the development of vocational education and training in Transport and Logistics
- Provide French transport undertakings with the adequate knowledge of foreseeable changes in work processes to be expected in the transport and logistics industries
- Anticipate changes in the industry so as to incorporate these changes in the training offer transport companies will need to resort to keep their workers updated
- Assist transport companies in acquiring knowledge on and integrating new innovative solutions in their business activities

Thus, we will use INTER-IoT results, especially those related to INTER-LogP, to advise transport undertakings on how to optimize efficiency in transport planning, transport networks and customer relations for transport companies when using interoperable IoT solutions.

4. Which is your value promise?

- Development of updated training solutions for the Transport & Logistics sector
- Analyses and counseling transport companies on the use of new and innovative business processes trends
- Assistance of transport companies in the implementation of social and environmental-friendly business solutions
- Analyses and counseling of the Transport industry on employment and qualification trends

Counseling of Transport workers on training and career progression pathways

5. Offered services/products from the project

AFT has strong links with transport and logistics undertakings. It has led task 2.1 related to market analysis and will be providing insight and feedback in the preparation and implementation of the port pilot.

AFT will be providing relevant transport stakeholders in France with information and insight in the use of interoperable IoT solutions tested in the framework of the project, especially in INTER-LogP.

6. Which is your target market? How big do you estimate the market?

AFT's main market segment here is composed of the near 9 000 transport companies and other institutional actors we regularly consult with which it has already worked. Beyond this figure, we estimate –considering the need for innovative IoT solutions expressed during interviews, our market could potentially reach the 20 000 figures. Therefore, our market can be viewed as large.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

We have so far conducted 12 interviews with transport companies in France. Though none had concrete stories to share on the difficulties encountered when dealing with heterogeneous IoT platforms, all acknowledged the need for interoperable solutions and expressed an interest to know more on our project's products.

8. Results of interviews?

Stakeholders have expressed a keen interest in knowing more about inter IoT products, but also the results of the pilots.

9. Which competitors are there and how do you differ from them?

As far as counseling transport companies on training, AFT has very little competitors as we are the only organization developed the industry to precisely fit this need. In terms of making the industry adopt new IoT solutions, then our competitors are manufacturers but also consultancy firms that offer to implement these solutions in a tailored-made fashion. We have not identified them as IoT solution development is not our core business.

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

We have no technology-level requirement and will bring to the market advice/assistance in understanding and where to purchase project solutions.

11. Which partners do you need or already have for the business implementation (outside of the consortium)?

We have no partner engaged at this stage.

12. What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.

- **Strengths:** companies have expressed a need for interoperable IoT solutions
- **Weaknesses:** Companies already have strong ties with existing service providers, even though these providers do not offer satisfactory interoperability.
- **Opportunities:** Interoperability will allow for new and enhanced services that companies can value to their customers
- **Threats:** Security and privacy legislation bears a heavy constraint. Moreover, language barriers may become an issue unless supporting documentation is also drawn in French.

13. Which is your IPR vision?

Our IPR vison is that that was mentioned in the consortium agreement: each partner has the rights for what he has developed, and all partners share rights for the products developed jointly.

14. Which is your open source vision? Is there any restrictions and limitations?

AFT has fully accepted the idea of working with open-source licenses. AFT has no preference as to which license to choose.

15. When and how do you plan to place the product on the market?

The product will be placed on the market as soon as they have been developed and tested. AFT will then communicate with its stakeholders, probably through the organization of a workshop, with the objective to identify the first batch of transport companies willing to integrate the products. If any other consortium partner wishes to attend special Transport-focused shows/events to sell project products, we will assist this partner accordingly.

16. Describe your financing strategy for a 5 years' scenario

AFT receives public funding and funding from its members to assist its sectorial stakeholders. It can therefore not charge its stakeholders whenever carrying out its mission. It will therefore not be charging its "clients" for any assistance that does not go beyond presenting stakeholders with project products and assisting them in integrating them.

17. Describe the expected impacts of your business idea

Inter IoT results will help transport companies offer more valuable services to their clients, in a environmentally-friendly and economically efficient manner.

18. Paying customer: how many of your direct customers can turn on potential customers?

By helping spread the use of INTER-IoT products, AFT will strengthen its pivotal role in assisting the transport industry and build on this project's experience to further develop its expertise notably by engaging In new innovation-driven projects.

Identified by: AFT	Registration Date: 26/04/2017

A13 NOATUM

Individual Exploitation Plan

Name of the partner: Noatum Ports Valenciana, S.A.U. , NOATUM

interiot
interoperability of heterogeneous
IoT platforms

Partner's type: Logistic Company	URL: http://www.noatum.com	Business Scenario selected: ● Transport/ Logistics

1. Partner's role in the project

Noatum is owned by institutional investors, the majority of which are pension funds, advised by J.P. Morgan Asset Management Infrastructure Investment Group, and the Dutch Pension Fund Stichting Pensioenfonds ABP.

Noatum Ports: Investor in strategic terminals offering efficient handling services managed by an experienced team of professionals: Bulk terminals, Container terminals, Multi-purpose terminals, Rail terminals, Ro-Ro and vehicle terminals.

NOATUM will participate in the requirement needs definition due to the pilots participation at the Container Terminal. Noatum will make available the execution of this pilots, allowing communication with the existent systems and platforms, doing and making the required tests.

2. Which is your main goal? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

Noatum aims to take advantage of INTER-IoT potential by offering the connectivity of its logistic operations with their clients as a unique operation chain giving them a visibility of their cargo to its customers. Additionally, Noatum will use the IoT platform to offer value-added services such as reefer container monitoring, parking spaces information and just-in-time operations.

3. Which problem do you resolve?

- Prepare the SEAMS platform to the INTER-IoT environment
- The platform should be able to INTER-operate with outside terminal trucks, being able to know the location and communicate with them i.e. giving tasks, orders, etc
  1. Orders: where to go – leave the Container Terminal.
  2. Energy Efficiency – Dynamic lights with to be able to operate with external trucks.
  3. To locate and identify incidents (e.g. the container is not loaded in the right truck, being identified first that the truck is the one that should be working with the machine)
  4. Safety and Security (e.g. being able to communicate with external's personnel in case of Tsunami)
- Identify automatically the IMO containers (e.g. an smartphone (of the truck's driver) is connected to the platform (for the case of the IMOs), instead of using an RFID, so it is known the location of the IMO and their cargo, priority and security information required)
- The platform should be able to connect with the Shipping line systems and transfer information of the reefer containers e.g. temperature, location, etc.

4.	**Which is your value promise?**

- **Real time logistics data and reliability**
- **Planning and fix bottlenecks before they occur**
- **Seamless interaction between multiple sensors and several IoT Platforms**
- **Social and environmental responsibility aiming to reduce pollution and increase energy efficiency.**
- **Safety, security and privacy issues. Cost and risk reduction.**
- **Prestige and innovative solutions in opposition to competitors.**

5.	**Offered services/products from the project**

NOATUM as a logistic company offers a perfect environment to test INTER-IoT developed products.
NOATUM participates in the definition of interoperability elements. NOATUM is the host for development and implementation of the port pilot.

6.	**Which is your target market? How big do you estimate the market?**

Two mains markets:
- As internal clients: all NOATUM terminals
- As external clients: all shipping lines and logistics truck and rail companies, that are huge, thanks to the integration of their logistic chains with ours.

7.	**How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?**

He had interviews with around 10 stakeholders from the port and technological sector as shipping lines and port technologies companies, that are interested in taking part in the development of the project or in the final products.

8.	**Results of interviews?**

The stakeholders are willing to participate in the INTER-IoT project, as the final product can benefit them.

9.	**Which competitors are there and how do you differ from them?**

Others big groups of terminals that are in the process to digitalize their company as APM or TIL.

10.	**What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**

The pilot will be a TRL6, as the system will be demonstrated in NOATUM facilities.
NOATUM will continue development the product after the pilot with their clients and their internal process.

11.	**Which partners do you need or already have for the business implementation (outside of the consortium)?**

NOATUM is working with FVP (research centre), Orbita (technology provider), Paceco (equipment manufacturer) and Terminal Operation System development.

12.	**What strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.**

- **Strengths: at day 1 it will give us economical results through the improvement of our processes.**
- **Weaknesses: Lack of experience of NOATUM and their clients, it is new.**
- **Opportunities: Offer better service to the clients, saving time of vessels and trucks fleets.**
- **Threats: Security and privacy of sensitive data is crucial.**

13.	**Which is your IPR vision?**

As it was signed in the consortium agreement of the project, each partner is the owner of their own developments. In case that several partners have participated in the development, it will be of the entire consortium.

14. Which is your open source vision? Is there any restrictions and limitations?

The strategy of the INTER-IoT consortium and the European Commission is to work with open source licences. In this case our proposal for the licence is Apache.

15. When and how do you plan to place the product on the market?

The result of the project will be a prototype (TRL6) tested in a real environment. So, the first potential customer will be those companies where the pilot has been tested, after validation and certification (TRL8 or TRL9). After that, other ports can be advised.

As soon of the pilot runs smooth it will be offer to some critical services as appoint system for trucks

16. Describe your financing strategy for a 5 years' scenario

It will be done with internal finance.

17. Describe the expected impacts of your business idea

The data provided by INTER-IoT can be used to enhance the systems to be more efficient and environment friendly.

New business can arise as integration with the logistic chain of our clients.

18. Paying customer: how many of your direct customers can turn on potential customers?

NOATUM doesn't sell the product, it will use it with their clients.

Identified by:	Registration Date: 18/04/2017

A14 TU/e

Individual Exploitation Plan	
Name of the partner: TUE	interiot interoperability of heterogeneous IoT platforms
Partner's type: **University**	**URL:** www.tue.nl	**Business Scenario selected:** ● Transport/ Logistics ● Cross-domain

1. Partner's role in the project

TU/e is set to deliver research output and reach out to regional partners and foster cooperation with industry. Besides publications, the research output is composed of new research programs and experimental facilities available to the whole community. TU/e will reach out to local SMEs via trainings as well as bilateral agreements on IoT research and development projects. Results of INTER-IoT will boost these efforts by increasing the readiness level of existing inhouse IoT facilities, the expertise and experience on IoT. It is TU/e's role to transfer these results to the regional and national industrial and academic community.

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you

envision (B2B, B2C, etc.)
Transport and logistics are top sectors of innovation and interest for the Netherlands. Therefore, projects and companies active in that sector are supported by the authorities. This has created a very rich ecosystem of enterprises, SMEs and startups eager to compete by innovating. IoT is the new innovation space about which very little is known. That ecosystem is now looking for new expertise either via graduates and postgraduates or via bilateral research and development contracts. This will make TU/e's proposition on IoT expertise very valuable.
3.   Which problem do you resolve?
TU/e is trying to tackle two main problems: ● Lack of open IoT facilities accessible by any industrial or academic partner of the ecosystem. ● Lack of expertise in the job market as IoT is a recent trend and many industries are reluctant to invest on it unless reassured of its benefits and reliability.
4.   Which is your value promise?
The first IoT training program in the NL that offers a complete range of skills on IoT system viability analysis, design, implementation and deployment on an open real IoT infrastructure. The program is offered at different levels: seminars to SMEs, bachelor, master educational programs. This promise is to be fulfilled with actions like: ● Masterclasses to SMEs from IoT technology and application sectors ● Research program on core aspects of IoT technology such as big data and communications ● Courses offered to all the technical universities, besides TU/e. ● Large scale open IoT facility for testing IoT applications and hardware.
5.   Offered services/products from the project
-
6.   Which is your target market? How big do you estimate the market?
TU/e is a public research and education organization, so this does not apply directly. The main way of participating in the market will be through joint endeavors with businesses and through consulting activities.
7.   How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?
Not applicable.
8.   Results of interviews?
Interviews have been conducted with master and PhD students. There is strong interest on IoT end-to-end architectures.
9.   Which competitors are there and how do you differ from them?
The only organizations offering propositions close to the one TU/e offers are the Technical University of Delft (TUDelft), Wageningen University and Research (WUR) and University of Twente (UTwente). However, these propositions fall short in completeness and generality. Each of those organizations either provide expertise on specific aspects of IoT or focus on specific application areas. For instance, TUDelft's on IoT is restricted to the effects of IoT on the design, WUR studies IoT for farming applications and UTwente on real estate sector. TU/e delivers expertise on a more complete picture such as the design, architecture, technology, implementation and deployment as well as economical aspects.
10.   What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?
Not applicable.
11.   Which partners do you need or already have for the business implementation (outside of the

consortium)?
TU/e is not planning to spin off based on INTER-IoT results.
12. What opportunities, strengths and risks do you foresee for your business idea? Describe the SWOT Analysis.
Not applicable.
13. Which is your IPR vision?
Open source Apache v2
14. Which is your open source vision? Is there any restrictions and limitations?
Open source Apache v2
15. When and how do you plan to place the product on the market?
Public institute with education at its core business. New IoT related courses are deployed this year. Software and IP produced in this project are available as open source Apache v2 to the world community.
16. Describe your financing strategy for a 5 years' scenario
Public organization – funded by the government of the Netherlands
17. Describe the expected impacts of your business idea
Not applicable.
18. Paying customer: how many of your direct customers can turn on potential customers?
Not applicable.

Identified by: TUE	Registration Date: 26/02/2017

ANNEX B: Joint Exploitation Plans

B1 PRO

Joint Exploitation Plan	
Name of the partner: PRODEVELOP,S.L	inter**iot** interoperability of heterogeneous IoT platforms
Partner's type: **SME**	**URL: www.prodevelop.es**

1. Partner description

PRO is a growing technology-based SME employing 80 engineers located in Valencia and Barcelona, (Spain) with customers in Europe, Africa, America and Oceania. PRO's mission is to offer advanced solutions in information and communication technologies to our customers and collaborators, with the aim of facilitating their business processes, bringing a distinguishing character to their value chain, in an atmosphere of collaboration where we become their constant and reliable technological partners.

PRO has high expertise in the implementation of ICT solutions, based on consultancy services, integration of technologies, Geographic Information Systems (GIS). PRO is continuously evolving and adapting to innovative approaches, keeping working on the use of cloud, IoT and Big Data technologies to create innovative market products for improvement of its services and portfolio's solutions and services.

The company is highly specialized in the Maritime Industry, which leads our international, started in 2011. Currently, PRO has two international sales delegations in Sao Paulo (Brazil) and Casablanca(Morocco). In addition to the maritime market, PRO also provides services and products in other sectors such as Agriculture, Public Administration, Transport and Environment.

PRO is specialized in consulting, development, deploying, and operating Geospatial Solutions based on free and open-source technologies.

PRO is a partner on INTER-IoT as technological provider and participates and leads both technical and business activities within the framework of and it is one of the main developers of the INTER-IoT platform. As PRO is a SME is interested in bringing the INTER-IoT results into the market.

2. Partner's role in the project

PRO participates in all the WPs of the project. However, it mains efforts are focusing on the lead of WP4 where as high skilled software designers and developers. PRO is leading the design and implementation of the Interoperable Framework (INTER-FW) engine by developing the UI, Portal and EXT. PRO is also modelling tasks for INTER-METH with its participation in the CASE Tool and in the extension of INTER-LAYER with its participation in the Middleware.

On the other hand, due to its highly knowledge of Maritime Industry business, PRO participates in the implementation in the INTER-LogP demonstration. PRO is leading the Exploitation Plan (T8.4), in other to lead the reach in an early phase of the project a consensus on joint and individual exploitation strategies that will satisfy the INTER-IoT consortium partners.

3. Partner's strategy purpose

As part of the joint business Exploitation Plan based on OS, PRO has interest to be part of the INTER-IoT OS Platform, that will help PRO to position into the IoT sector as technological provider.

On the other hand, PRO expects to find ways of collaboration with other INTER-IoT partners in Port, Smart Cities and Smart Agriculture sectors.

4. Offered services/products in the OS Community	
Considering INTER-IoT OS Business Model, PRO as leaders of INTER-FW will committed to carry out the following tasks: maintenance, basic support and bug fixing. Regarding INTER-LAYER, PRO proposes to deal with partial maintenance middleware. In the Premium version, for both INTER-FW and INTER-LAYER, PRO will offer the following professional services: training, consultancy services, personalization and integration services with other projects.	
5. Joint Exploitation opportunities	
In this early stage of the project PRO envisions joint exploitations opportunities through collaborations between INTER-IoT partners as follows: Transport and Logistic with UPV, IoT Agriculture with NEWAYS, IoT for Smart Cities with XLAB and Transport Domain through the development of the INTER-LogP: With FVP, UPV and NOATUM.	
6. OS License and IPR considerations	
The strategy of the INTER-IoT consortium and the European Commission is to work with open source licenses. PRO agrees to work with Apache 2.0.	
7. Business considerations	
As part of the joint business Exploitation Plan based on OS, PRO has interest to be part of the INTER-IoT OS Platform as technological provider for Business Exploitation. In the Product community, being part of the INTER-IoT open source community is a great opportunity for PRO to be more visible and to find new business opportunities through collaborations with other ICT companies and providers. As part of the community product (Fremium) PRO as leaders of the outcome INTER-FW will be committed to carry out the following tasks for community sustainability: maintenance, basic support and bug fixing. Regarding INTER-LAYER, PRO proposes to deal with partial maintenance of the middleware. In the premium version of the OS Community, PRO for both INTER-FW and INTER-LAYER will offer the following professional services: training, consultancy services, personalization and integration services with other projects. Regarding the business models related to these premium services: ● INTER-FW: PRO will offer Platform as a service, hybrid, on premise services with a fix price for the service. ● INTER-LAYER: PRO will offer services for Consultancy and the revenue streams will be the costs of the service. ● INTER-FW+INTER-LAYER: PRO will offer Platform as a service, hybrid and on-premise services with a fix price for the service.	
8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.	
PRO considers that a foundation should be created in order to assure a long-term sustainability of the INTER-IoT Platform. The partners of the INTER-IoT projects should be included as members. Efforts to attract and to include as many stakeholders as possible in this foundation would be a need. Our role at this stage of the project is not clear enough.	
9. **Issues to overcome**	
None.	
Identified by: PRODEVELOP, S.L	**Registration Date:** 21/03/2017

B2 RINI

Joint Exploitation Plan

Name of the partner: Rinicom Ltd	
Partner's type: SME	**URL:** www.rinicom.com

1. Partner description

Rinicom Ltd is a UK based, privately owned global technology company specialising in providing state-of-the art solutions for wireless broadband communications, healthcare system integration and wireless video surveillance applications. Rinicom gained recognition as the leading-edge technology company providing bespoke solutions with outstanding customer support. Rinicom's portfolio of products is growing fast with a number of new products are in the final stage of design and verification.

2. Partner's role in the project

Rinicom's role in the INTER-IoT project is focused on INTER-layer and framework development focusing primarily on the e-health use case. Rinicom will participate in the pilots, contribute to WP8 focusing on business development and marketing, and lead WP7 to assess the pilots.
Rinicom's role in the development will be mainly at the Gateway and the Middleware layer contributing to healthcare device and platform integration and SDR development.
Project partners will benefit from the Rinicom's experience with SDR, medical device integration, and close contact with end users in the medical field.

3. Partner's strategy purpose

As part of the joint business Exploitation Plan Rinicom has interest to be part of the INTER Layer-IoT with a focus on the e-Health applications and the INTER-Health use-case.

4. Offered services/products in the OS Community

Considering INTER-IoT OS Business Model, Rinicom will continue to contribute, where possible, to device integration at a gateway level and bridge development for existing gateways focusing mainly on healthcare application and devices.

5. Joint Exploitation opportunities

As of month 18 of the project Rinicom envisions joint exploitations opportunities through collaborations between INTER-IoT partners focused on INTER-Health.

6. OS License considerations

The strategy of the INTER-IoT consortium and the European Commission is to work with open source licenses. Rinicom agrees to work with Apache 2.0.

7. Business considerations

As part of the joint business Exploitation Plan based on OS, Rinicom will endeavour to engage with end users in need of system integration, promote INTER-IoT products and utilize INTER-IoT products to facilitate the process.
As part of the community product (Fremium) Rinicom will focus on health sensor integration at a gateway level.
In the premium version of the OS Community, Rinicom will provide personalization and integration services with other projects.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

Our role in the long-term sustainability of the INTER-IoT is not yet defined. We envision a role promoting the platform to end users who have a need for system integration in the health care sector.

9. Issues to overcome	
None.	
Identified by:	Registration Date: 28/04/2017

B3 XLAB

Joint Exploitation Plan
Name of the partner:

Partner's type: SME	URL: xlab.si

1. Partner description
XLAB Research is recognized as one of the strongest computer science research teams outside the academic world in Slovenia. It employs 35 people including 10 PhDs and the vast majority with MSc or BSc degrees. XLAB Research also currently runs a program in education with 4 PhD students from various fields (economics, machine learning, computer science, etc.). XLAB collaborates with 34 external experts, providing with access to more than 100 experts in the fields of computer science, electronics, mathematics, design and marketing. Distributed and Cloud systems are the main area of work at XLAB, which has a long experience in very important European projects. The company has participated in FP5, FP6, and FP7 and H2020 projects, as well as several national research projects. Most are related to Cloud architecture, scalability, security, but also in the fields of interoperability, Big Data, energy, Internet of Things and GIS systems. XLAB aims to further extend its knowledge on Internet of Things with this project and expand its commercial potential.

2. Partner's role in the project
XLAB brings to the project its knowledge on sensor networks and high-volume data, which expanded during several projects in the last years, as well as its expertise to improve the scalability, security and reliability of the projects' results. XLAB expects a flexible platform that can be used in other context of the IoT field, particularly to those related to its business of smart-transport, environmental monitoring, smart grids and people's wellness, that would allow it to extend its commercial potential in those areas.

3. Partner's strategy purpose
The general strategy purpose is to position XLAB is to be a general purpose IoT platform integrator with expertise to customize and integrate different technologies. In that, our clients will be mainly IoT solution providers in a B2B relationship. In particular, SENTINEL that was already mentioned in the individual exploitation plan in the project proposal, is a typical client. We will also provide technology to a XLAB commercial solution - GAEA+ - that is a 3D GIS system customized for rescue and emergency services.

4. Offered services/products in the OS Community
Due to specific expertise of XLAB in IoT platform integration, and the essential role in the project exploitation success, XLAB offers all customization and consulting services for platform integration.

5. Joint Exploitation opportunities
XLAB will consider the strategic alliances with INTER-IoT partners in the business exploitation of it by support and development. There are no joint exploitation opportunities identified to date
6. OS License and IRP considerations
XLAB will take into account the agreed and signed statements in the consortium agreement of the project. Globally, XLAB's approach to IPR is the standard SME approach supported by local and international law. In particular, each partner is the owner of their own developments but in case that several partners participate in the same development, the IPR will be dealt with according to the consortium agreement and the most recent EC directives on the subject. We support the decision of the Consortium in applying the Apache 2.0 license to the Open Source outcomes of the project.
7. Business considerations
XLAB business opportunities stand within a number of customization and consulting services for platform integration yet to be identified.
8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.
In the long run, XLAB considers a number of customization and consulting services for platform integration to upcoming prospect clients. These services are yet to be identified.
9. Issues to overcome
No issues.

Identified by:	Registration Date: 21/03/2017

B4 ABC

Joint Exploitation Plan	
Name of the partner: Alessandro Bassi Consulting, SARL	interiot interoperability of heterogeneous IoT platforms
Partner's type: SME	**URL:** www.bassiconsulting.eu

1. Partner description
Alessandro Bassi Consulting (ABC) was created in 2010 with a specific vision: help his clients to get beyond stereotypes and enable real innovation in different fields using ICT solutions. ABC is a Business Consulting firm based in the Sophia Antipolis area, France. ABC focus is on three topics: the set of technologies belonging to the Future Internet and Internet of Things domain, with particular regards to Smart Cities application, technologies and mechanisms for high performance data transfers for Cloud Computing and Storage, and analysis of Security aspects of both traditional networks and Constrained environments. In particular, in the FI sector, the competences of ABC were used in defining roadmaps for industry and public-funded research, and managing large EU co-funded research projects. Currently, ABC has an expanding portfolio of clients, comprising technologies companies, end-user retailers, and several international SMEs. ABC acted as the Technical

Coordinator of the biggest research FP7 EU project on Internet of Things, called "Internet of Things - Architecture" (IoT-A) (18.6 M EUR budget), on behalf of Hitachi Europe. ABC is also one of the founding members of the Alliance for Internet of Things Innovation (AIOTI). ABC is a partner on INTER-IoT as technological provider and participates and leads both technical and business activities within the framework.

2. Partner's role in the project

ABC participates in WP2, WP3, WP4, WP6, WP7 and leads WP8. Its main focus is on WP4, where it leads the Architectural development, and in WP8, where it leads the Communication and Exploitation WP.

3. Partner's strategy purpose

INTER-IoT will allow a continuous development of our know-how in the area of IoT, and possibly increase the knowledge and market penetration in sectors where ABC is already present (such as logistics) and in other where we can enter (such as health). ABC will leverage the developments performed in the different fields in order to propose services and support to different actors and end- users. While the main results can be open source, ABC will use a business model similar to Canonical and Red Hat, proposing quality assurance and subscription-based customer support.

4. Offered services/products in the OS Community

While ABC is a fond supporter of OS, there is no plan to release parts of INTER-IoT within the OS community at the moment. ABC wants to use INTER-IoT as part of the bundle that is offered to customers, not making any margin on it.

5. Joint Exploitation opportunities

While it's too early to specify clear roadmaps, it seems logical to develop a partnership with some partners that have services in sectors where ABC is already present such as AFT in the Logistic sector.

6. OS License and IPR considerations

The strategy of the INTER-IoT consortium and the European Commission is to work with open source licenses. ABC agrees to work with Apache 2.0.

7. Business considerations

ABC aims at giving consultancy to medium and large enterprises (C-level) that have problems with IoT implementation. INTER-IoT will allow us to offer a solution for medium to large corporation that have partial IoT implementation and seek interoperability among legacy solutions. A large number of companies have partial implementation of IoT (warehouse with SAP, quality control W IBM, production w Azure …) and want to consolidate everything to increase productivity and reduce costs: given the fact that ABC is a boutique consulting firm, and is able to understand and work with its customers very closely, INTER-IoT will be a fundamental tool in order to develop solutions that are based on legacy deployments, allowing to break vertical silos.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

The use of Open Source and the development of a community that will keep marinating the code base of INTER-IoT is of fundamental importance for the long-term sustainability. ABC will work in order to obtain this, as the INTER-IoT solution needs to become a "de facto" standards in order to provide an invaluable asset to ABC.

9. Issues to overcome

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Identified by: **Alessandro Bassi Consulting, S.A.R.L.**	Registration Date: 26/04/2017

B5 NEWAYS

Joint Exploitation Plan

Name of the partner: Neways Technologies B.V.

inter**iot**
interoperability of heterogeneous
IoT platforms

Partner's type:	URL: www.neways.nl
Industry Organization	

1. Partner description

Neways Technologies BV (NT) offers a combination of services covering the entire product life cycle of high quality industrial electronics, including software, applications. These services range from co-development up to sustaining services. NT is a member of Neways Electronics International NV, listed on the Euronext Amsterdam Exchange, a global operating developer, manufacturer and supplier of electronic solutions for the industrial and professional electronics industry. With a total of 2700 FTE today, of which 200 FTE in development, Neways develops, produces, assembles and tests: from (micro-) electronics, printed circuit board assemblies and cable assemblies to complete box-built products and systems. Neways has operating companies in the Netherlands, Germany, Eastern Europe, China and US.

Neways has a strong technical know-how base on electronics, electro-mechanics, industrial realisation and production. Our Expertise is embedded in the solutions and products we develop for world class leading high-end technology industrial partners within health care, transport & logistic, agriculture, semicon, industrial, automotive, defence, marine, industrial test and analysis, telecom, and aerospace. We specialise and deploy in our daily work enabling embedded systems solutions, peripherals, (remote) sensing, designing system interfaces, standards, safety requirements, medical requirements, mobility with low power consumption, mesh networking, wireless technologies.

Neways relation to IoT is that Neways has all expertise in house to develop IoT hardware and firmware solutions for IoT project partners. Because of the solid Neways experience in the industrial market IoT partners can rely on robust high quality designs and state of the art manufacturing facilities with sufficient manufacturing bandwidth and logistical support to successfully conquer the IoT market.

2. Partner's role in the project

Neways role in the IoT project is integration of the project and validation of the use-cases. The main focus of the project for Neways is on the lower levels, the Gateway and the Middleware layer. The two primary use cases are logistics in the port of Valencia, and e-health monitoring of patients through an open call new use cases will be attracted.

In these projects Neways will be responsible for the integration of all modules into one system, setting up parts of the INTER-IoT Gateway and realizing the connection to the virtual world.

Project partners will benefit from the Neways broad experience dealing with critical embedded systems, mechanical-, hardware- & software-architecture, communication protocols, framework, manufacturability, interoperability, production yield and component management. Neways Technology will provide valuable feedback in terms of identification of problems and will make improvements strengthening Neways business partners' products and services.

3. Partner's strategy purpose

Neways historic strategy as a standard EMS (Electronics Manufacturing Service) provider has evolved into a strategic customer - supplier partnership strategy. Cornerstone in this partnership role is customer intimacy which is all about close cooperation with Neways customers. Goal in the project is to develop strategic partnerships with project partners that will result in usage of Neways developed hard- and firmware by partners.

4. Offered services/products in the OS Community

- Hardware development
- Firmware development
- Electronics Manufacturing Service

5. Joint Exploitation opportunities

- Rinicom, Partnering
- TU-E, domain knowledge

6. OS License and IPR considerations

Neways has no intention to build up proprietary Intellectual Property on their products.

7. Business considerations

Neways to extend business through the development of partner structures where partners have sales channels.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

Neways business model is based on manufacturing of the hardware and commercial selling of these products via business partners. This strategy ensures long term sustainability because strategic partners and Neways need each other to sustain their products / services.

9. Issues to overcome

The main issues to overcome is to find a modular system that allows the currently used standards in the IoT and allows future standards to be incorporated. INTER-IoT does not want to create a new standard but to create a framework that allows the current and future standards to be combined and used together

Identified by: Neways Technologies B.V.	Registration Date: 21/03/2017

B6 UPV

Joint Exploitation Plan	
Name of the partner: UNIVERSITAT POLITECNICA DE VALENCIA (UPV)	interiot interoperability of heterogeneous IoT platforms
Partner's type: **Public university**	**URL:** http://www.upv.es HYPERLINK "http://www.upv.es"
1. Partner description	

Universitat Politecnica de Valencia (UPV) is a dynamic, innovative, public institution, dedicated to research and teaching that keeps strong ties with the social environment in which its activities are performed and, simultaneously, has an important presence abroad. Today, over 39,000 members integrate our academic community: 35,000 of these are students, 2,387 are teachers and 1,593 belong to administration. UPVLC includes

15 faculty centers: ten schools, three faculties, and two higher polytechnic schools (Alcoy and Gandia), and five associated institutions. UPV participation in INTER-IoT comes from the Distributed Real Time Systems Lab (DRTSL) which belongs to the Communications Department. The department is composed of several research groups whose activities include a big number of fields within ICT, such as: mobile communications, distributed real time systems, antennas, broadband networks, microwaves or fiber optics. k

UPV research team technical activity is related with the development of IoT platforms (e.g. FIWARE), interoperability mechanisms at different layers (e.g. INTER-IoT and ACTIVAGE), planification algorithms, wireless networks, SDN and NFV, cybersecurity mechanisms, cybersituation awareness tools and services, geoprocessing services, embedded software, geospatial technologies in mobile environments, Web and service environments, and modelling software system.

2. Partner's role in the project

UPV has the role of project coordinator and also leader of the technical activity related with INTER-Layer. Additionally, UPV has a key role in dissemination activities, mainly in the scientific area. UPV contributes to all WP in the project:

- WP1: WP leader, coordinator of the project, coordinator of the open call, risk management and advisory board activity.

- WP2: participation in the whole VOLERE methodology, from requirements gathering, to the definition of use cases and scenarios and initial business models.

- WP3: WP leader and technical leader of the development of the AS2AS and cross-layer components of INTER-Layer. Active participation in the development of the gateway, SDN and NFV components so as in the bridges with the different platform middleware.

- WP4: UPV is a key partner in the definition of the architecture of INTER-IoT and INTER-FW, providing the link with INTER-Layer.

- WP5: participation of UPV in the WP is associated with INTER-METH definition and the link of the methodology with the use of INTER-Layer.

- WP6: UPV is involved in the transport and logistics pilot and INTER-DOMAIN. UPV will provide support to the open call third parties in order to integrate their results in the cross-domain use case.

- WP7: definition of the evaluation processes and active application of the evaluation methodology.

- WP8: involvement in every activity related with impact creation, with a focus in scientific dissemination as a research university.

3. Partner's strategy purpose

UPV research group aims to lead research activity in IoT in the institution and in the different technical universities within Spain. Research results and competences will be used to promote the university, attract more students with the founding of new Masters and new Ph.D. program or enriching the existing ones; attracting new and existing companies in order to develop new products or participate in additional projects. Moreover, technological and research advances, obtained on the basis of INTER-IoT project results, will be exploited also for technology transfer, creation of spin-offs, and to increase the UPV reputation and the capacity to attract resources from competitive research programs and private funding.

4. Offered services/products in the OS Community

Considering INTER-IoT OS Business Model, UPV as leaders of INTER-Layer will commit to carry out the following tasks: maintenance, basic support and bug fixing. Main activities will be related with the gateway, middleware and AS2AS. In the Premium version, for both INTER-FW and INTER-LAYER, UPV will offer the following professional services: training, consultancy services, personalization and integration services with other projects. UPV services will be related, as an academic institution in the provision of courses, MSc and PhD Thesis and the

development of consultancy to other research institutions and private companies.

5. Joint Exploitation opportunities

Joint exploitations opportunities will result from the collaboration with other INTER-IoT partners on specific topics: (i) INTER-FW with UniCal, TUE, PRO, RINI, SRIPAS; (ii) INTER-METH with UniCal, PRO, XLAB, SRIPAS; (iii) regarding the different application domains: Health with Unical, RINI, SRIPAS, ASLT05, NEWAYS; Smart Cities with PRO and XLab; transport and logistics with PRO, VPF, NOATUM and XLab.

6. OS License and IPR considerations

UPV did not protected any result in the Consortium Agreement and for the exploitation of the joint results will follow the IPR rules fixed by the consortium, e.g. use of APACHE 2.0 for OSS.

7. Business considerations

As a public university UPV business aim will be twofold:
- From the academic perspective, UPV aims to strengthen teaching and research programs with a special focus on PhD. UPV will benefit using the links and networks mainly established with South America what will help to attract students.
- From the industrial perspective UPV aims to provide consultancy services to medium and large enterprises wanting to use IoT in their business areas; promotion of the generation of startups and entrepreneurship activities, and the participation in the provision of services in the premium business model.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

UPV will participate in the sustainability of INTER-IoT results through other funded research projects and by the collaboration of MSc and PhD students. UPV will collaborate with different OSS communities in order to support individual components of INTER-IoT.

9. Issues to overcome

None.

Identified by: UPV	Registration Date: 27/04/2017

B7 SRIPAS

Joint Exploitation Plan
Name of the partner: SRIPAS

Partner's type:	URL: www.sripas.waw.pl HYPERLINK
Public Research Organization	"http://www.sripas.waw.pl"

1. Partner description

SRIPAS is a research institute (branch) of Polish Academy of Sciences. In the context of the INTER-IoT project, its main expertise is related to, broadly understood: (a) software engineering, and (b) semantic technologies. These areas of expertise are represented in the specific tasks that the SRIPAS participates in / leads.

2. Partner's role in the project	
SRIPAS' role in the project is twofold: (i) conduct research, and (ii) deliver conceptual and software artifacts (e.g. documents, code, formal descriptions, etc.) in the areas defined in the Grant Agreement. Furthermore, SRIPAS leads scientific dissemination.	
3. Partner's strategy purpose	
To strengthen, and to make more up-to-date, research conducted in the Institute. In this way, to make the Institute more attractive to potential graduate students (SRIPAS is a Ph.D. granting institution, with an active Ph.D. program) and future collaborators – both from the industry and in potential grant consortia.	
4. Offered services/products in the OS Community	
Ph.D. program, consulting, potential partnership with industry in seeking R&D funding.	
5. Joint Exploitation opportunities	
SRIPAS is interested in joining any of the industrial partners of the consortium, to support their exploitation activities with its expertise. Here, the expert knowledge in the area of, broadly understood, semantic technologies could be of particular value.	
6. OS License and IPR considerations	
Results produced by SRIPAS follow the general IPR policies of the Grant Agreement. In particular, we are committed to open source and the Apache 2.0 licensing.	
7. Business considerations	
Participation in INTER-IoT and access to its results (including participation in pilots) makes our Ph.D. program more competitive.	
8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.	
SRIPAS will sustain and extend results of the project through research conducted by Ph.D. students in its Ph.D. program. It will also promote the platform within the three Clusters it is a member of. Furthermore, access to knowledge and technology of the INTER-IoT project will be used to leverage future funding. This funding, in turn, will be used (in part) to update and extended the platform with new functionalities.	
9. **Issues to overcome**	
Since SRIPAS is a public research body, none of the issues that SRIPAS is facing are related to the project.	
Identified by:	**Registration Date:** 21/04/2017

B8 UNICAL

Joint Exploitation Plan	
Name of the partner: University of Calabria (UNICAL)	inter**iot** interoperability of heterogeneous IoT platforms
Partner's type:	**URL:** www.unical.it

Public University	

1. Partner description

UNICAL is an Italian Public University. UNICAL's role in the project is to provide research support and disseminate scientific results. The UNICAL contribution is provided through its leading or participation on project tasks.

2. Partner's role in the project

UNICAL participates in all the WPs of the project. Most significant contributions are focused on mobile gateway solutions to enable IoT interoperability (WP3) and the design of agent-oriented meta-modelling and framework to support IoT interoperability (WP4). Moreover, UNICAL leads the WP5 (INTER-METH) through the definition and use of software development methodologies based on agent abstractions, addressing methodological issues related to INTER-METH and how INTER- METH will use INTER-FW to fully automate IoT platform integration. Unical will also support the design of the CASE tool for the automated application of the methodologies and the INTER-Health Pilot through the integration of BodyCloud platform and services.

3. Partner's strategy purpose

UNICAL aims to improve research competences in IoT research area. Research results and competences will be used to attract more students with the founding of new Masters and new Ph.D. program or enriching the existing ones. Moreover, technological and research advances, obtained on the basis of INTER-IoT project results, will be exploited also for technology transfer, to regional/national industrial and academic community, and to increase the UNICAL reputation and the capacity to attract resources from competitive research programs.

4. Offered services/products in the OS Community

- INTER-LAYER: Mobile Gateway, Middleware;

- INTER-FW: API;

- INTER-METH: Methodology, CASE-Tool;

- INTER-Health: integration of BodyCloud platform into the pilot; design of Mobile Health Gateway.

5. Joint Exploitation opportunities

Joint exploitations opportunities are resulting from the collaboration with other INTER-IoT partners on specific topics:

- INTER-FW with UPV, TUE, PRO, RINI, SRIPAS

- INTER-METH with UPV, PRO, XLAB, SRIPAS;

- INTER-Health/INTER-Domain with UPV, RINI, SRIPAS, ASLT05, NEWAYS;

6. OS License considerations

UNICAL follows the general IPR policies of the Grant Agreement and will use Apache 2.0 license.

7. Business considerations

Open source project results, produced by the consortium, will be used as "instruments" to foster strategy purposes already described.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

UNICAL is an Italian Public Research Organization. Not applicable.	
9. **Issues to overcome**	
-	
Identified by: UNICAL	Registration Date: 28/04/2017

B9 ASL T05

Joint Exploitation Plan	
Name of the partner: ASL TO5	*interiot* *interoperability of heterogeneous IoT platforms*
Partner's type: **Public Body Organization**	**URL:** www.aslto5.piemonte.it
1. **Partner description**	
The ASLTO5 is divided into several Departments including the Prevention Department. The Prevention Department includes six structures one of which is Aliment Hygiene and Nutrition Unit. This section of Prevention Department is one that will participate in the project. Our territory is composed by 40 municipalities divide in 4 heath districts and our ASL healthcare system offer to their inhabitants several services: hospitals, conventioneer nursing homes, pharmacies, local doctor and pediatricians. The Aliment Hygiene and Nutrition Unit is divided into Aliment Hygiene Unit and Nutrition Hygiene Unit: The Nutrition Hygiene Unit promotes health supporting a proper nutrition and a healthy physical activity by offering a series of interventions such as nutritional counselling. The introduction of Internet of Things in this application field allow is to demonstrate that equal or best health objectives can be obtained using experimented technologies, because apply the health activities to population groups, result more precise and so more effective using new technologies and furthermore result more efficient and allow in this way to extend our action, with the same resources, on a more extensive population group to prevent main chronic diseases (heart disease, stroke, cancer, diabetes and chronic respiratory diseases).	
2. **Partner's role in the project**	
ASL TO5 is a partner of the project, stakeholders in the consortium and involved for the development of the Mobile Health use case concerning monitoring of lifestyles "Decentralization and monitoring of lifestyles" during the Integration and Pilot deployment to improve and overcome the traditional methods, tools and protocols.	
3. **Partner's strategy purpose**	
The collection of information on and about the subjective and objective measurements thanks to devices and the interchange of data on different platforms (health operator and citizens) constitutes the first dowel for the new standard for the management of nutritional outpatient to assist the subject for the recovery and maintenance of his health status. These standards can be the starting point for new revisions and updates in the view of the full abandonment of traditional nutritional counseling. Using the Internet of things approach in the healthcare environment, is a development which, in some cases, lack of guidelines for the integration of health data collected from different types of devices (technological environment) and the effectiveness of using such devices for health status monitoring (domestic environment) preserving and protecting the data collected, since they are	

personal data. In this context, it is important to be able to develop an interoperability system where IoT can fit.

4. Offered services/products in the OS Community

- **Nutritional Traditional Counseling:** during the first visit in the outpatient, collection, by healthcare operators, of subject's objective data (weight, height, BMI, waist circumference and blood pressure) and subjective ones (eating habits and physical activity practice), that they will be monitored during subsequent checks.
- **Nutritional Folder:** during the traditional nutritional counseling, the dietitian records data of subjects who arrive to nutritional outpatient on a nutritional folder. It is used to record health and sensitive data of subjects such as: personal data (name, surname, age), anthropometric data (weight, height, BMI, waist circumference, blood pressure), eating habits and physical activity. Data collected are protected under national law "Code regarding the protection of personal data".
- **Subject remote monitoring (Experimental Nutritional Counseling):** at subject's home, subjects can detect their objectives data through electromedical and mobile wearable devices, while using electronic questionnaires collecting subjective data.
- **Computerized nutritional folder:** a proposal for a future development, might consist in using a computerized folder, during the experimental nutritional counseling, that would allow the recording of the subjects' data in both outpatient and decentralized way through the medical devices and wearable sensors, so that a subject can be controlled in real-time and the collection of health data would provide a more efficient service at several levels by the National Health System.

5. Joint Exploitation opportunities

Introducing electronic devices, we could demonstrate the effectiveness of a possible future integration of IoT activity in outpatient nutritional counseling. Our goal is to inform and educate those who do not know or do not routinely use, such technology, showing the functionality and operation of wearable sensors and the use of smart objects, such as smartphone or tablet, and their applications. We could integrate our work with different sectors (industrial, technological, university, research, SME, etc.) focusing on the critical points, reaching citizens and the level of healthcare assistance, in order to develop a more usable IoT system enabling a new level of healthcare to reach the citizen. The use of new technologies in health care, collecting objective measures, would allow a more accurate and efficient method of monitoring, especially in the preventative care.

6. OS License and IPR considerations

The Introduction of New Technologies in the Health National Service could be reproduced by other Public or Private Services to improve and enhance the population groups health of the reference area. The Intellectual Property is the focal point so that the result of the research will produce an effective impact in the Society, to offer a competitive advantage in the market and to the stakeholders.
The innovative potential of this type of cooperation technology-healthcare is maximized wherever Health Care Centre are able to develop a pro-active role towards industry, promote it to guide their business skills on care settings and the most relevant clinical problems for healthcare organizations and patients (prevention of chronic degenerative diseases), so as to effectively combine the business and healthy skills and knowledge.

7. Business considerations

The experimentation of this innovative approach of the project, allow us to overcome the traditional method in building the relationship with subject which come to our nutritional outpatient. The new approach provides quantitative benefits about public wideness that can address to our healthcare system improving the efficiency. Benefits are also qualitative because objective measurements (weight, height, body mass index, blood pressure, waist circumference) and subjective (eating habits and physical activity practice) result more effectives and appropriates, producing a major health benefit on subjects. In particular, using mobile wearable device subjective measurement (physical activity practice) become objective ones.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

Prevention field is a tool, which demonstrates its long-term effectiveness, counteracting today the possible spread of disease that may be manifest in the future health status of a subject. The goal of prevention, however, is not addressed only to the individual but to the whole community, proving the importance of not only the promotion of an healthy lifestyle but also the preventive part of education and information for the citizen in the

field of health and nutrition. The use of INTER-IoT will allow us to offer to our population whole innovative point of view in the prevention medicine and the technologies could add value to our nutritional counseling. This approach could be translate in other preventive field, becoming a key factor to differentiate the providing services with new solutions for the integration of heterogeneous IoT solution.

9. **Issues to overcome**

The main challenge for the IoT development and implement in an health scenario is related to security for the data management and the privacy of sensible data of the subject. The main issues in term of services that provide and manage sensitive data must to guarantee the respect of Italian and European Legislation.

The EU requirements may include safety, health, and data protection: The privacy code ensures that the processing of personal data will be respect for fundamental freedoms and dignity human rights, with particular references to privacy, personal identity and personal data protection. The processing of personal data is regulated by affording a high level of protection of the rights and freedoms in accordance with principles of simplification, harmonization and effectiveness of procedures for their exercise by the person concerned, as well as for fulfillment of obligations on the part of data controllers. Every entity needs to keep an updated security policy document.

The processing of personal data using electronic tools is allowed only if they are adopted, as provided in the technical specifications: CE marking is a mandatory conformity marking, the manufacturer's declaration that the product meets the requirements of the applicable EC directives, involved in the conformity assessment procedure for products, within the European Economic Area (EEA).

It's necessary to use of an authorization system, adoption of authentication credentials and management procedures, and for every device it's mandatory to have a protection of electronic devices and data against unlawful processing of data, to unauthorized access and certain computer programs, adoption of procedures for backup copies, the restoration of the availability of data and systems.

The technical partners have to adopt of encryption techniques or identification codes for certain processing of health care system data.

Identified by: **ASL TO5**	Registration Date: 28/04/2017

B10 SABIEN

Joint Exploitation Plan	
Name of the partner: SABIEN	
Partner's type: **Research Group – Public Organization**	URL: www.sabien.upv.es

1.   **Partner description**

SABIEN Research group is part of ITACA Institute in the Universitat Politècnica de València. It is devoted to the study and implementation of new ways of healthcare delivery with a special emphasis on patient-centred systems focused on the implementation of solutions to increase the effectiveness and quality of health and wellbeing. The group has more than 15 years of experience on research project and transference of technology in the domain of patient remote monitoring and follow-up of chronic conditions, building solutions for paediatric patients and dependent aged subjects. SABIEN has been involved in the design, development and validation of UniversAAL platform, which is a solution for the interconnection and interoperability of a wide range of services

for the delivery of assistance to dependent subjects. The role of SABIEN will be to interconnect INTER-IoTplatform to UniversAAL solution and use this integration to build a service for the remote management of nutritional decompensation in the ASL T05 health department.

2. Partner's role in the project

SABIEN involvement in the project is based on two main tasks:
- Definition, development and deployment of an IoT system based on INTER-IoT and UniversAAL integrated architectures for the case of nutritional follow-up.
- Development of the business plan and exploitation strategy for the Health scenario

3. Partner's strategy purpose

Our ultimate purpose in this project is to build custom solutions for the management of nutritional status on the top of UniversAAL and INTER-IoT platform. The interest of clinical organizations in the exploitation of such technologies has increased in the recent years, but so far, a few examples are well known.

The integration of wearable sensors and the development of modules for patient-case management, directly integrated with Electronic Health Records in ASL TO5 will be a good experience to test the capabilities of SABIEN on the delivery of solutions to on the one hand empower patients and on the other hand, increase cost-effectiveness in the health care delivery.

As an academic partner, we are also interested on exploring new experiments and experiences that will lead to the production of learning materials and scientific publications.

4. Offered services/products in the OS Community

- Integration with UniversAAL platform: as one of the main developers of this platform we have the skills and knowledge to perform a fast integration of the INTER-IoT architecture with UniversAAL platform as we produce the new software modules to cover the needs of UCAL and ASL TO5.
- Semantic data storage of personal data (name, surname, age), anthropometric data (weight, height, BMI, waist circumference, blood pressure), eating habits and physical activity. This data will be stored following the national law on the protection of sensitive data.
- Integration of wearable sensors for patient remote monitoring and questionnaires fulfillment.
- Development of a web dashboard for case management and patient follow-up. The dashboard will allow health professionals to monitor patients without the need of scheduling a visit to the clinical office and moreover it will provide tools for the management of aggregated data.

5. Joint Exploitation opportunities

Our main opportunity is to show the capabilities of the research group and the solutions we are creating to cover a demanding unmet need, the remote monitoring of nutritional status. INTER-IoT project is a great opportunity to share and build a product together, both client (ASL TO5) and supplier (SABIEN/UCL), covering all the stages from design to evaluation of the Inter-Health platform.

Furthermore, we see opportunities with the other pilot with respect to the use of the INTER-IoT platform and their components, especially for academic exploitation together with the partners.

6. OS License and IPR considerations

SABIEN will use UniversAAL platform for IoT integration within the INTER-IoT paradigm. The main results produced within universAAL will be made available for free as open source. As decided within the consortium, the selected recommended license to apply to all software developed inside universAAL is the Apache Software License 2.0 (ASL 2.0). Other type of components, developed to cover the needs of ASL TO5 and UCAL, will need a special assessment on the IPR distribution based on joint inventions approach.

7. Business considerations

The commercialization of any technology that involves deployment in clinical settings and deals with health/disease related issues needs to be approved by a medical device certification body. This extent should be considered into the joint exploitation plan, as it will need special efforts and resources.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

The exploitation of IoT-Health components is compromised by a crucial factor: each clinical setting (private/public) has a different level of technology penetration and approach. This heterogeneity prevents us on defining what could be our main role in the long run for the sustainability of INTER-IoT commercialization.

However, our focus is to integrate UniversAAL with INTER-IoT, which is a platform that has been supported by the European Commission. This focus will increase the target audience of INTER-IoT, opening new gateways for co-development and co-design of new services for health and wellbeing promotion.

9. Issues to overcome
- Health solution will be focused on the needs and characteristics of ASL TO5 case. Focusing on joint exploitation we should define the set of functionalities that may be useful for other type of clients: healthcare organizations and health related technology companies.   - The regulation of medical technology in the European ecosystem should be studied in detail (medical device certification, data protection, liability).   - The platform should be designed to integrate as much as wearable devices. Focusing on one type of device will reduce the development efforts but will limit the wide-spread use of the remote follow-up solution.   - Clinical and technology partners should work together to involve external stakeholders and disseminate the progress and achievements done in the health case as a way to scale up the solution in further scenarios (other diseases - other regions)

Identified by: SABIEN	Registration Date: 21/03/2017

B11 VPF

Joint Exploitation Plan	
Name of the partner: VALENCIAPORT FOUNDATION	
Partner's type: Research Organization	URL: www.fundacion.valenciaport.com

1. Partner description

The Valenciaport Foundation for Research, Promotion and Commercial Studies of the Valencia region (Valenciaport Foundation) is a private non-profit research created in 2004 through an agreement between the most representative associations and companies of the Valencia logistics-ports community and various institutions of the Valencia region, all of which are involved in logistics and maritime transport.

VPF has participated in a large number of projects and research agreements in the fields of transport economics, logistics, port development and new technologies. In the field of information technologies, Valenciaport Foundation acts as a catalyzer of the innovation processes of the port community of Valenciaport. It actively transfers the technology employed in various research projects in which it participates to real-life applications in the sector whilst gathering in parallel the new needs of the port community to link them with the research departments of the foundation itself. It works in close collaboration with the Port Authority of Valencia to

develop valenciaportpcs, which is the port community system of Valenciaport. Adapting the functions of this platform to the new needs of the port community is of great strategic value. Valenciaport actively contributes to increase the efficiency, productivity, automation of activities, energy savings and to reduce the carbon footprint, red tape and dis-coordination of container terminals being a reference at international level. Eliminating paper and simplifying processes in general, improving processes related to surveillance and control is necessary to guarantee sufficient safety and security levels in the port are areas of particular expertise.

2. Partner's role in the project

As a research and development foundation with strong links to port actors, VPF will make use of the results with a view to expand them to other actors and ports that could take advantage of similar solutions, providing assistance and support services based on the experience gained in the project. As well as looking for innovative ways to expand these solutions and develop others related with the experience gained on the application of INTER-IoT to fill gaps in the port, transport and logistics sectors, mainly in connection with the Port Community System.

VPF, as the leader of WP2, has participated in the requirements and use cases for the use of INTER-IoT framework for port logistics and transport for intelligent trucks as well as other IoT ecosystems external to container terminals and characterize their interactions with the container terminal IoT ecosystems, considering other logistic hubs IoT ecosystems. Additionally, VPF has participated in the business model design and the analysis of legal and regulatory requirements.

Furthermore, VPF has been involved in the technical development of some modules the WP3 and WP4, and will lead the implementation of the transport pilot in the port of Valencia. It has also contributed in other task such us the methodology, evaluation or communication and dissemination.

3. Partner's strategy purpose

The strategy consists in taking IoT innovations, within the INTER-IoT Project, to solve real problems that occur in the trade, transport, logistics and port sector. To do so, we will take advantage of our current knowledge in these areas of application along with the knowledge gathered on interoperability of heterogeneous IoT platforms. Once the major logistics problems/inefficiencies have been identified, the most appropriate IoT solutions will be offered to customers (i.e. LATAM ports, shipping lines, transport companies…) so that they can transform their existing processes to be more competitive and efficient, leading to higher profits.

4. Offered services/products in the OS Community

We offer our lifelong knowledge in ports, logistics and the supply chain. Additionally, our experience in several IT projects in the fields of maritime transport and logistics help the project consortium to test the INTER-IoT solutions in a real environment (the port of Valencia and its facilities).

We also have strong networks with the port community and with several firms that work within the Valencia and Spanish region. All these companies (transport companies, container terminals, logistics operators, etc.) could be potential customers for the project solutions (i.e. interoperability between its IoT platforms) because the maritime industry is currently involved in a digitization process which demands IT solutions like the ones we provide within the INTER-IoT Project.

Therefore, we assist our partners to set up the complementary systems that will interact with the common intelligent mobility platform (i.e., RFID equipment, NFC devices, modules at local level for dynamic re-scheduling and optimization of routes, connectivity and information sharing with the PCS (valenciaportpcs.net) and TOS/MPOS of port terminals, etc.).

5. Joint Exploitation opportunities

We envisage the future necessity of these IT solutions in several Spanish ports and also in many underdeveloped and inefficient port authorities around the world (i.e. LATAM ports). Since we have done several consultancy projects in these countries, our experience and networks could help the consortium to exploit and deploy the INTER-IoT solutions in Uruguay, Argentina or Chile.

The Valenciaport Foundation, together with other IT partners can have many opportunities in these markets since these ports will surely be interested in solutions that help them to improve their productivity and performance through the use of new technologies such as the internet of things.

Additionally, we will address our value proposition to other agents that participate in the supply chain. As an example, we could focus on terminal operators, logistics centres, logistics operators, road or rail transport

companies, piloting services, towage, mooring, container depots and any other administration or operator involved within the supply chain execution.

In short, we foresee several business opportunities on many EU and international ports during the next 5-10 years. The Valenciaport Foundation, thanks to its many years of maritime and logistics expertise, could assist the other partners to identify potential clients, market needs and business opportunities in the Latin America market. We estimate the LATAM market to be big and prepared for the INTER-IoT solutions.

6.   OS License and IPR considerations

As it was signed in the consortium agreement of the project, each partner is the owner of their own developments. In case that several partners have participated in the development, it will be of the entire consortium. All the releases will be open source.

7.   Business considerations

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8.   Role on the long-term sustainability of INTER-IoT Platform for commercialization.

A community should be created in order to maintain the INTER-IoT system, where the INTER-IoT partners can be initially included. Efforts should be made to include as many stakeholders as possible in the community. This community can add new communication technologies to the gateway or new platform bridges when necessary.

9.   Issues to overcome

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Identified by: VALENCIAPORT FOUNDATION	Registration Date: 21/03/2017

B12 AFT

Joint Exploitation Plan
Name of the partner: Association pour le développement de la formation dans les transports, AFT

Partner's type: Research Organization	**URL:** www.aft-dev.com

1.   Partner description

Created in 1957 at the initiative of the French Transport Federation Union1, AFT is the organisation responsible for the development of Vocational Education and Training (VET) in the Transport and Logistics industry. Its mission is to work for companies covered by the French national collective agreement for road transport (passengers/ goods) and related activities such as logistics and forwarding, as well as industrial and commercial companies with their own means of transport (private - or own-account - transport).

AFT has signed cooperation agreements with the French Ministries for National Education, Higher Education, Transport, Labour, and Finance. It has created national and regional steering committees involving social partners, VET providers as well as public authorities dedicated to the VET policy.

It also provides the expertise, guidance documents and technical assistance for the various national commissions within the sectorial social dialogue including employers' and employees' representatives. The AFT performs its basic role of developing VET in the Transport and Logistics industry by:

- **Defining training needs (VET) and assessing the results**
- **Defining/ designing/ updating VET programs**
- **Cooperating with the French Ministry of National Education**
- **Developing European ECVET mobility**
- **Informing and advising the public (in particular young people and job seekers)**
- **Advising companies**
- **A Research and Study department to challenge the future**

2. Partner's role in the project

AFT will work at exploiting the project's results in different ways. Since we are dealing day by day with transport enterp, as well as transport association and representative of the government regarding transport issues, we are planning to use the results by communicating them to all those bodies we are working with. Since AFT is an association which goal is not to make profit, we will not exploit in a commercial way the results of the project. Nevertheless, the participation to this kind of project is very useful to us, as it allows us to be a body which diffuses innovation among the transport community. The objective is therefore to exploit the results by raising awareness on these solutions among the French transport community.

AFT, has participated in WP2, notably as leader of the Stakeholders and market analysis (T2.1) and is involved in most project WPs, notably WP4, WP6 and WP8.

3. Partner's strategy purpose

AFT will, after production and testing of the innovative INTER-ioT solutions to be developed, offer to assist French transport undertakings (who wish so) to adopt them so as to become more efficient, more competitive, while providing more modern and satisfactory solutions to their clients.

4. Offered services/products in the OS Community

AFT has strong links with transport and logistics undertakings. It has led task 2.1 related to market analysis and will be providing insight and feedback in the preparation and implementation of the port pilot.

AFT will be providing relevant transport stakeholders in France with information and insight in the use of interoperable IoT solutions tested in the framework of the project, especially in INTER-LogP.

5. Joint Exploitation opportunities

AFT sees the awareness raising of INTER-IoT products within the French transport sector as a starting point for potentially numerous exploitation activities.

A workshop-like event presenting French sectoral stakeholders with project products can be organised as soon as these have been tested within the project through the envisaged pilots.

Once the first series of companies have integrated the project products in their commercial activities, a second approach can be initiated, one where those companies can share experiences and the competitive benefits they acknowledge as resulting from their incorporation of interoperable IoT solutions developed in this project.

On this basis, AFT will continue to seek a deeper expertise on IoT solutions for transport undertakings by engaging in other European or national initiatives aiming to further develop or enhance interoperable IoT capabilities

6. OS License and IPR considerations

Our IPR vision is that that was mentioned in the consortium agreement. AFT has fully accepted the idea of working with open-source licenses. AFT has no preference as to which license to choose.

7. Business considerations

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8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

Perhaps some sort of "observatory", including project partners, specially focusing on the interoperability capability of IoT can be be created so as to gather the embryo of a community of stakeholders that could strengthen INTER-IoT core partners' expertise position in this area, notably through the recognition it would get from stakeholders.

9. Issues to overcome	
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Identified by: AFT	Registration Date: 26/04/2017

B13 NOATUM

Joint Exploitation Plan	
Name of the partner: Noatum Ports Valenciana, S.A.U., NOATUM	interiot interoperability of heterogeneous IoT platforms

Partner's type: **Logistic Company**	**URL:** http://www.noatum.com "http://www.noatum.com" HYPERLINK

1. Partner description
Noatum is owned by institutional investors, the majority of which are pension funds, advised by J.P. Morgan Asset Management Infrastructure Investment Group, and the Dutch Pension Fund Stichting Pensioenfonds ABP. Noatum Ports: Investor in strategic terminals offering efficient handling services managed by an experienced team of professionals: Bulk terminals, Container terminals, Multi-purpose terminals, Rail terminals, Ro-Ro and vehicle terminals.

2. Partner's role in the project
A NOATUM will participate in the requirement needs definition due to the pilots participation at the Container Terminal. Noatum will make available the execution of this pilots, allowing communication with the existent systems and platforms, doing and making the required tests.

3. Partner's strategy purpose
Noatum aims to take advantage of INTER-IoT potential by offering the connectivity of its logistic operations with their clients as a unique operation chain giving them a visibility of their cargo to its customers. Additionally, Noatum will use the IoT platform to offer value-added services such as reefer container monitoring, parking spaces information and just-in-time operations.

4. Offered services/products in the OS Community
NOATUM as a logistic company offers a perfect environment to test INTER-IoT developed products. NOATUM participates in the definition of interoperability elements. NOATUM is the host for development and implementation of the port pilot.

5. Joint Exploitation opportunities
NOATUM with the other ports partners (FVP, Prodevelop, UPV etc.) can work together to create, improve and sells the INTER-IoT products. NOATUM will be the reference of a real implementation of the products.

6. OS License and IPR considerations

As it was signed in the consortium agreement of the project, each partner is the owner of their own developments. In case that several partners have participated in the development, it will be of the entire consortium. All the releases will be open source.

7.	Business considerations

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8.	Role on the long-term sustainability of INTER-IoT Platform for commercialization.

A community should be created in order to maintain the INTER-IoT system, where the INTER-IoT partners can be initially included. Efforts should be made to include as many stakeholders as possible in the community. This community can add new communication technologies to the gateway or new platform bridges when necessary.

9.	Issues to overcome

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Identified by:	Registration Date: 27/04/2017

B14 TU/e

Joint Exploitation Plan	
Name of the partner: TUE	inter**iot** interoperability of heterogeneous IoT platforms
Partner's type: University	URL: www.tue.nl

1.	Partner description

TU/e is a public university of technology and delivers educational programs of all levels (bachelor, master and postgraduate programs). It participates in various research programs funded by industry, national and international funding bodies. In INTER-IoT, TU/e is an expert on smart networks and provides know-how on adaptive dependable communications. Its target is to develop technologies in that will allow IoT systems provide reliable communications in industrial contexts.

2.	Partner's role in the project

TU/e is set to deliver research output and reach out to regional partners and foster cooperation with industry. Besides publications, the research output is composed of new research programs and experimental facilities available to the whole community. TU/e will reach out to local SMEs via trainings as well as bilateral agreements on IoT research and development projects. Results of INTER-IoT will boost these efforts by increasing the readiness level of existing inhouse IoT facilities, the expertise and experience on IoT. It is TU/e's role to transfer these results to the regional and national industrial and academic community.

3.	Partner's strategy purpose

To consolidate and valorize inhouse technologies and integrate them to INTER-IoT stack. Moreover, TU/e will research new ways to mature and expand these technologies. The strategy is to strengthen the position of TU/e in Industrial IoT scientific domain worldwide and bring to education all the upcoming technologies that are to change the future of industry. This allows TU/e to sustain high level of quality education connected to industry

demands.
4. Offered services/products in the OS Community
PhD program for one student. Consulting on and development of technologies for smart adaptive dependable networks.
5. Joint Exploitation opportunities
TU/e seeks for opportunities for common output with industrial and university partners. Rinicom, UPV and Neways, as well as Valencia Port, are potential partners with common interests on adaptive networks. That could allow both common research output and integration of technologies to unique solutions.
6. OS License and IPR considerations
Results produced by TU/e follow the general IPR policies of the Grant Agreement. In particular, we are committed to open source and the Apache 2.0 licensing.
7. Business considerations
Participation in INTER-IoT and access to its results (including participation in pilots) makes our Ph.D. program more competitive. Our technologies will get mature and tested in the field boosting the interest of industry to our research output and education.
8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.
TU/e envisions integrated solutions that continuously adopt new findings and technologies. In this respect, TU/e will adopt INTER-IoT Platform to future demonstration and promotion efforts in various scientific gatherings and forums. As long as INTER-IoT platform allows the integration of our new research output, TU/e will demonstrate those technologies via that same platform.
9. Issues to overcome *TU/e identifies no issue with its exploitation plans provided that INTER-IoT delivers a working platform.*
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Identified by: TUE	**Registration Date:** 21/03/2017

ANNEX C: Third Parties Individual Exploitation Plans

C1 TU WIEN

Individual Exploitation Plan		
Name of the partner: TU WIEN		
Partner's type: **University**	**URL:** www.tuwien.ac.at	**Business Scenario selected:** ● Cross-domain
1. Partner's role in the project		
TU Wien will work on INTER-HINC (Interoperability through Harmonizing IoT, Network Functions and Clouds), as a small open call project. TU Wien will contribute to a new middleware, programming APIs and models for interoperability within resource slices. We also contribute to dissemination and exploitation of INTER-IoT, especially INTER-HINC, to various universities, industrial research labs and teaching activities.		
2. **Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)**		
We want to maximize the utilization of our techniques, bringing them to university research, industries and education activities. We aim at developing generic solutions for a widely set of applications so we will focus on cross-domain scenarios. Furthermore, our aim is to attract further funding to carry out in the research direction of interoperability for IoT, network functions and clouds slices.		
3. Which problem do you resolve?		
How to deal with interoperability within a resource slice of IoT, network functions and clouds in a dynamic way.		
4. **Which is your value promise?**		
Extensible framework, easy-to-use programming APIs, simplification of IoT cloud engineering		
5. Offered services/products from the project		
We provide INTER-HINC as a framework implementing techniques for IoT interoperability at resource slides. We offer consulting services and training for IoT engineering and for how IoT can be interoperable with cloud services and network functions		
6. Which is your target market? How big do you estimate the market?		
World-wide universities, research centres, students and integration solution companies.		
7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?		
No interview has been made		

8. **Results of interviews?**	
None	
9. **Which competitors are there and how do you differ from them?**	
There are many IoT platforms but they do not support the concept of resource slices.	
10. **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**	
12 months from now.	
11. **Which partners do you need or already have for the business implementation (outside of the consortium)?**	
Partners for individual IoT platform providers and IoT applications.	
12. **What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.**	
The exploitation opportunities are very high with respect to the concept of interoperability for resource slice of IoT, network functions, and clouds, because such integrated resource slices are emerging for today and tomorrow applications. Solving this problem is very hard but, if achieved, we can have a leading position in the market. One the other hand, integration with network functions and various provider-specific platforms at runtime is quite challenging, as the underlying technologies are currently being developed.	
13. **Which is your IPR vision?**	
Most of the software can be free, open sources. If a special work needs to be protected for commercial purpose, TU Wien supports patent and licensing models.	
14. **Which is your open source vision? Is there any restrictions and limitations?**	
We support open sources. Only for special cases, we will support special customization that can be closed sources with licensing models.	
15. **When and how do you plan to place the product on the market?**	
Within a year we can offer consulting services.	
16. **Describe your financing strategy for a 5 years' scenario**	
We continue to acquire research funding from national funding and EU and industries to support our activities.	
17. **Describe the expected impacts of your business idea**	
We mainly focus on research community (academics and industry). We expect a high scientific impact in terms of citation and reputation in research as our results will be used by other researchers and students. We expect that our results eventually can be incorporated into other products/services through we simply the development of complex IoT applications by introducing the concept interoperability for resource slices as a foundation.	
18. ***Paying customer: how many of your direct customers can turn on potential customers?***	
None at the moment.	
Identified by: TU WIEN	Registration Date: 31/05/2017

C2 INFOLYSiS P.C.

Individual Exploitation Plan

Name of the partner: INFOLYSiS P.C.	

Partner's type:	URL:	Business Scenario selected:
SME	www.infolysis.gr	Cross-domain

1. Partner's role in the project

INFOLYSiS aims at advancing the existing INTER-IoT framework with SDN/NFV functionalities towards a Software-defined end-to-end IoT infrastructure with service chaining support. The main objective of the proposed 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.

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

INFOLYSiS through its collaboration with INTER-IoT project will further develop its SDN/NFV Manager solution (currently in TRL6) in order to be suitable for commercialisation and reach TRL9. In terms of commercialisation for the IoT SDN/NFV Manager, INFOLYSiS plans to sell annual licenses to use the software at a price range that depends on the number of VNFs that will be orchestrated and the enabled features, such as service composition, monitoring etc. The price range will be defined upon appropriate market analysis. Moreover, INFOLYSiS will use two different ways for the commercialisation of the proposed IoT mapping VNFs, which will be designed and developed within the framework of INTER-IoT. The business model for direct sales planned by INFOLYSiS follows the VNF as a Service (VNFaaS) paradigm. This means that the pricing scheme will be variable depending on the use and the type of the requested VNF. Following a draft approach, the estimated offer is divided in three groups depending on the type of company and level of needed IoT functions: (i) startup (1.500 €/month), for basic mapping functions; (ii) enterprise (3.000 €/month), for small companies that need appropriate traffic steering through a variety of VNFs in order to form a specific Network Service; and (iii) corporate (≥10.000 €/month), for any kind of company that need a high performance productive setup. Please note that all the pricing levels are estimates and the final prices will be defined upon appropriate market analysis.

3. Which problem do you resolve?

The imminent arrival of the Internet of Things (IoT), which consists of a vast variety of devices with heterogeneous characteristics, means that future networks need a new architecture to accommodate end-to-end IoT networking, dealing with: i) the expected increase in data generation, ii) the problems related to the end-to-end IP networking of the resource-constrained IoT devices, iii) the capacity mismatch between devices, and iv) the rapid interaction between services and infrastructure.

This proposal aims at advancing the existing INTER-IoT framework with SDN and NFV functionalities towards a Software-defined end-to-end IoT infrastructure with IoT service chaining support. The main objective of the proposed SDN/NFV-enabled framework is to enhance the interoperability of the INTER-IoT framework in order to facilitate the interoperable management of a large number of diverse smart objects that currently operate utilizing a variety of different IoT protocols.

4. Which is your value promise?

The proposed advances are aiming at enhancing the INTER-layer of the INTER-Framework by adding SDN/NFV orchestration capabilities. In specific, the proposal focuses on integrating SDN/NFV Controller/Orchestrator (such as OpenDaylight SDN Controller and OpenBaton NFV Orchestrator) at the INTER-IoT GW, allowing the unified management of the INTER-IoT virtual network by appropriate service chaining between physical smart objects and virtual functions

5. Offered services/products from the project

IoT gateways are essential to implement the needed SDN/NFV network technologies and provide the widest integration, ensuring interoperability between different types of objects and physical technologies. Thus, INTER-IoT moving towards this direction and the state-of-the-art, considers in its architecture a hybrid model for the IoT GWs, which couple both physical and virtual parts, distributing the computing power between the local area network, network operator cloud or OTTs' (Over The Top) clouds. Although such hybrid IoT GWs are not yet commercially available, INFOLYSiS is moving even beyond the current SOTA and advances further the hybrid GWs of the INTER-FW with NFV and SDN enabling technologies as part of the network operator domain in order to be able to support virtualisation, service chaining and service isolation. By associating NFV with SDN an opportunity for the IoT infrastructure operator is created, since third parties have access to infrastructure services upon which they can build their own offers. The infrastructure services can indeed be opened to numerous third party actors such as application developers, services providers, or even IoT virtual operators.

6. **Which is your target market? How big do you estimate the market?**

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 industry and the research community to innovate, experiment and demonstrate the advantages of the integrated software-based interoperable IoT networking leading to novel services and technological benefits in the industry.

7. **How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?**

-

8. *Results of interviews?*

-

9. **Which competitors are there and how do you differ from them?**

Currently there is not any commercial competitive solution available.

10. **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**

INFOLYSiS, based on the experimental results of the INTER-IoT, will further improve the performance and the stability of the proposed mapping/proxy VNFs and the best performed will be further exploited in 1-3-year plan for bringing them to the market in a SaaS business model.

11. **Which partners do you need or already have for the business implementation (outside of the consortium)?**

INFOLYSiS has already a range of business partners from other commercial activities. A special need for a specific expertise of partner has not been spotted.

12. **What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.**

Strengths: 1) INFOLYSiS team with a mix of competencies ranging from IT to finance, 2) Technical advantage – long experience of SDN/NFV orchestration, 3) Existing network of contacts with researchers and CTOs in many companies and organizations and 4) Strong market focus based on a market driven innovation strategy.
Weaknesses: 1) New technology, 2) INFOLYSiS is a new brand and 3) The integration of IoT with SDN/NFV will require to gain awareness among the end-users in order to understand and use it. This will increase the cost for successful market introduction.
Opportunities: 1) Problems with interoperability in IoT market, the main technology driver 2) Huge global market potential, 3) Market window is wide open
Threats: 1) Lack of funding for development and expansion, 2) Standardization activities to drive the market towards a small group of IoT protocols, minimizing the existing interoperability problem,
3) Data protection and privacy regulation to make difficult the applicability of the proposed innovation in EU.

13. **Which is your IPR vision?**

Since our solution is software based, special IPR actions for knowledge protection do not apply.
However, from the commercial perspective, depending on the way of exploitation specific actions may be taken (Protection of utility model, trademark and copyright protection).

14. Which is your open source vision? Is there any restrictions and limitations?

Since we are planning to commercially exploit the developed solution, we are not planning to release our code as opens source.

15. When and how do you plan to place the product on the market?

There is a 1-3 year plan for bringing them to the market in a SaaS business model. The business model for direct sales planned by INFOLYSiS follows the VNF as a Service (VNFaaS) paradigm. This means that the pricing scheme will be variable depending on the use and the type of the requested VNF. Following a draft approach, the estimated offer is divided in three groups depending on the type of company and level of needed IoT functions: (i) startup (1.500 €/month), for basic mapping functions; (ii) enterprise (3.000 €/month), for small companies that need appropriate traffic steering through a variety of VNFs in order to form a specific Network Service; and (iii) corporate (≥10.000 €/month), for any kind of company that need a high performance productive setup.

16. Describe your financing strategy for a 5 years' scenario

Sales Forecast	Year 1	Year 2	Year 3	Year 4	Year 5
Unit Sales (VNF Subscriptions)	20	70	150	250	470
Revenues	80,000.00 €	280,000.00 €	600,000.00 €	1,000,000.00 €	1,880,000.00 €
Variable Costs					
Cost of Sales	-20,000.00 €	-70,000.00 €	-150,000.00 €	-250,000.00 €	-470,000.00 €
Fix Costs					
Personnel Cost	-150,000.00 €	-240,000.00 €	-300,000.00 €	-360,000.00 €	-420,000.00 €
Marketing and Advertisement	-8,000.00 €	-28,000.00 €	-60,000.00 €	-100,000.00 €	-188,000.00 €
Accounting and Legal	-1,600.00 €	-5,600.00 €	-12,000.00 €	-20,000.00 €	-37,600.00 €
R&D Investment	-60,000.00 €				
Total Costs	-239,600.00 €	-343,600.00 €	-522,000.00 €	-730,000.00 €	-1,115,600.00 €
Benefits	-159,600.00 €	-63,600.00 €	78,000.00 €	270,000.00 €	764,400.00 €
Personnel (Estimated Persons)	5	8	10	12	14
Net Profit	889,200.00 €				
COI	2,950,800.00 €				
ROI	**30%**				

ASSUMPTIONS
Average price of sale: 4000 €

Cost of sales= 50%
Wages & Salaries= 30000 €
Marketing & advertisement = 10%
Accounting and Legal = 2%

17. **Describe the expected impacts of your business idea**

The proposed software-defined end-to-end IoT addition with SDN/NFV capabilities on the INTER- IoT GW is expected to have the following research impact:
- Extents the set of tools, components, mediators of INTER-IoT in order to enhance the interoperability of different underlying IoT platforms via appropriate VNFs, such as mapping functions.
- Contributes to the design, implementation and integration of interoperable networking layer components (in the form of VNFs) for INTER-FW. The proposed SDN/NFV extension facilitates the deployment of virtual mapping functions and other networking layer components (such as virtual SDN switches), which are based on different standards higher-level communication standards (e.g. TCP/IP, HTTP, CoAP, etc).
- Implements an NFV-based virtualization mechanism for smart objects and platform of smart objects for INTER-FW, including orchestration mechanism for transferring VNFs (i.e. virtual objects/functions) between cloud platforms (i.e. NFVI PoPs).
- Implements NFV orchestration and cloud support mechanisms, which are integrated in INTER- FW, including support for different services, inter-cloud (inter-NFVI PoP) mechanisms applied to IoT and support for virtualization.

18. *Paying customer: how many of your direct customers can turn on potential customers?*

INFOLYSiS estimates that a 30% of the current customers could become potential customers of the novel solution.

Identified by: : INFOLYSiS P.C	Registration Date: 30/05/2017

C3 Universitat Pompeu Fabra

Individual Exploitation Plan	
Name of the partner: **Universitat Pompeu Fabra**	interiot interoperability of heterogeneous IoT platforms

Partner's type: **University**	**URL:** www.upf.edu	**Business Scenario selected:** Transport/ Logistics

1. **Partner's role in the project**
Third party

2. *Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)*

Our business scenario refers to the use case Monitoring reefer container. This scenario is focused on tracking and monitoring the container's temperature along its route, in order to obtain faster responses in front of any issue with the container's temperature.

3. **Which problem do you resolve?**

With several nodes deployed inside the container the temperature will be monitored. These nodes will form an LPLAN (Low-Power Local Access Network) working at 2.4 GHz inside the container. This LPLAN will be connected to a dual-band device (2.4 GHz and 868 MHz) that, along with other dual-band devices installed in other reefer

containers, will create an LPWAN network.

Sensor nodes working at 2.4 GHz will be responsible for collecting the temperature data, dual-band devices will transmit this information to a central gateway, which in turn will connect the physical platform with the INTER-IoT dispatcher via a WiFi, GPRS or Ehernet link.

4. Which is your value promise?

Our main innovations that will contribute to the project are summarized in two aspects:

• To design and implement a unified LPWAN and LPLAN solution for the IoT based on a hierarchical network structure and multiband support, thus adding a new level of flexibility to IoT solutions and facilitating their implementation in multiple/heterogeneous scenarios.

• Integration of the INTER-HARE solution in the INTER-IoT framework, providing full interoperability between two technologies (LPWAN and LPLAN) working at different frequency bands (868 MHz and 2.4 GHz) under the same platform.

5. Offered services/products from the project

INTER-HARE platform will create synergies between LPLANs and LPWANs, by building and testing an IoT platform easily scalable (both in coverage range and devices) and flexible (both in the considered use case and the frequency bands from employed devices). Interoperability is provided by a hierarchical two- tier network with full knowledge, coordination and centralized management of the whole system from a single point.

6. Which is your target market? How big do you estimate the market?

The applicability of INTER-HARE in multidisciplinary scenarios is one of the assets of the proposal. Hence, our target market will be focused on companies that offer solutions based on the use of Wireless Sensor Networks. We have identified the following ones in the Spanish market: World Sensing, Urbiotica, Libelium, Zolertia or Sensefields. Due to the high applicability of the solution that we propose the possible market could be very large, but, at the beginning, it is preferable to restrict it to well-known use cases. Moreover, we identify another kind of market: transport companies using reefer containers in their daily work.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

Not applicable.

8. Results of interviews?

Not applicable.

9. Which competitors are there and how do you differ from them?

Our direct competitors from the public sector are the different research groups focused on similar research areas, such as: GRCM-UPC, WNG-UPC, and WINE-UOC. We have in common, as university research groups, our long-term capacity of research. Nonetheless, we offer, as a differentiation, the combination of two important aspects for us: research and technology transfer. We try to be balanced as we are interested in adapting our research results to the societal challenges. Moreover, our research unit comprises different and transversal research fields, that allows us to offer more services compared to our competitors.

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

The first version is intended to be available at the beginning of the second trimester of 2018. The validation of this first version would take 5 months. Hence a first prototype of the product could be distributed by the end of 2018. These estimated times could be modified depending on the development of the project.

11. Which partners do you need or already have for the business implementation (outside of the consortium)?

The first version is intended to be available at the beginning of the second trimester of 2018. The validation of this first version would take 5 months. Hence a first prototype of the product could be distributed by the end

of 2018. These estimated times could be modified depending on the development of the project.

12. What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.

SWOT Analysis

Strengths

- HARE is a tested technology with very good results.

- Able to be adapted to multiple scenarios and requirements.

- Interoperability at two different bands.

- Large experience of the group.

Weaknesses

- Coverage range depending on the hardware performance.

- Harsh environments could affect the performance of the proposed solution.

INTER-HARE

Opportunities

- Multiple new end-markets interested in the solution.

- New collaboration opportunities with INTER-IoT partners.

- Possible emergence of new research fields.

Threats

- High-dependance on hardware providers.

- Possible lack of compatibility between technologies employed by the different partners.

- Challenging explanation of the added value of the solution to the final user of the pilot/platform.

13. Which is your IPR vision?

As a university research unit, we have to follow the already existing regulations and policies of the university. All the results generated by the university personnel are property of the university, unless that this research result has been obtained under an agreement with external entities. In that case, the regulations will be the ones agreed at the collaboration agreement signed by all entities.

The Universitat Pompeu Fabra, through its Innovation service, offers the possibility of evaluating the possible industrial protection of any research result able to be protected. The Innovation service evaluates the possible protection of the invention and offers the best solution to protect the research performed by the university members

14. Which is your open source vision? Is there any restrictions and limitations?

Since 2011, the Universitat Pompeu Fabra encourages all its members to publish their entire academic and research publications in open access. In that sense, the university has created an open access repository able to publish any publication of its community. Moreover, as mentioned in the previous section, we will design our solution by means of using the open access operating system Contiki.

15. When and how do you plan to place the product on the market?

The regulations of our university establish two possible ways of exploiting the research results. Moreover, the UPF will try to maximize the impact of the research on the society.

The possible ways established are:

-       Exploitation of results by third parties: by means of using a license agreement third parties are able to exploit the research results.

-       Exploitation of results by a created Spin-off: the university and its members can consider the creation a company to properly exploit the results.

16. Describe your financing strategy for a 5 years' scenario
Not applicable, as being part of a public entity.
17. Describe the expected impacts of your business idea
A remote control of the temperature of the containers will prevent in real time from any failure that can occur inside the monitored asset. Moreover, this control is performed during the whole transport. All the companies involved will take profit of the real-time information. The detection of any failure will be rapidly noticed (cold chain maintenance, temperature-sensitive goods, etc.). With the automation of the control process any failure on the temperature that could damage the content of the container can help on reducing economical losses. Moreover, an end-to-end vision of the whole transport process will be very valuable in order to control the conditions in which the goods in the container have been transported.
18. Paying customer: how many of your direct customers can turn on potential customers?
We have not identified yet any of them.

Identified by: Universitat Pompeu Fabra	Registration Date: 24/05/2017

C4 NEMERGENT SOLUTIONS, S.L.

Individual Exploitation Plan		
Name of the partner: NEMERGENT SOLUTIONS, S.L.		interiot *interoperability of heterogeneous IoT platforms*
Partner's type: SME	**URL:** www.nemergent-solutions.com HYPERLINK "http://www.nemergent-solutions.com"	**Business Scenario selected:** • Cross-domain

1. Partner's role in the project
Nemergent Solutions SL is an external participant through the INTER-IoT open call. The contribution is identified as Mission Critical operations based on IoT analytics (MiCrOBIoTA). Nemergent's portfolio includes a series of components focused on deploying mission-critical communications over modern mobile broadband networks, with special focus on the new wave of 3GPP specifications for Mission Critical Push-to-Talk (MCPTT), Mission Critical Video (MCVideo) and for Mission Critical Data (MCData). In the scope of the collaboration with INTER-IoT, Nemergent proposes to evolve the current portfolio to include the management of mission critical events by monitoring different heterogeneous IoT platforms. This is a hot topic nowadays, and the solution proposed by INTER-IoT seems suitable to accelerate the access to the technology for an external developer. Nemergent proposes to develop a "MC-IoT monitoring and analytics" that will use the INTER-FW tools to access the INTER-IoT system, and which will be integrated into the Nemergent backend and frontend components. Thus, Nemergent role will be one external application developer over the INTER-IoT platform.
2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

From the Business scenarios and Scenario use cases identified in INTER-IoT D2.4, Nemergent has identified the following items as more relevant for the proposed contribution.

INTER-LogP/Health scenarios
- **Accident at the port area // Readiness = High**

The port of Valencia has an emergency control centre (CCE) to manage incidents taking place within the port and to coordinate with other first responders (police, firefighters, ambulances, etc.). The objective is to interoperate the wearable medical devices with IoT platforms such as the road haulier company and the port emergency control centre are able to react quickly, thus reducing time responses during accidents and health prevention.

The testing of this scenario could be part of emergency simulation exercises that are executed periodically at the port area.

This use case is the starting point for MiCrOBIoTA.

The involved IoT Platforms are:
- Port authority IoT platform
- Road haulier IoT cloud platform
- Container terminal IoT platform

Nemergent aims at contributing to this use case by developing an external application that will be able to interface with the different IoT platforms involved. The external application will gather accident alarms and will be able to identify possible sources of information related to the incident. The GUI will enable the CCE staff to send the most relevant information (guided route, health monitoring, location of actuators) to the different emergency units (e.g., an ambulance) connected to the integral system.

- **Health Monitoring System // Readiness = Medium**

The objective of these scenarios are to create an IoT cloud platform that will allow passengers of different transportation modes to connect their wearable devices that monitors their ECG, SPO2, blood pressure or temperature. This platform will be connected with their respective e-health or e-care platform and it will establish a new form of triage in order to detect and tackle health problems during long distance trips. The scenario can also be extended to truckers.

If available, this use case would be useful to enrich / complement the previous use case.

In a simulated accident with a surrounding ferry, the CCE could access the Ferry IoT platform in order to gather body sensor information of the people onboard, and to provide this access / information to the first responders (e.g., ambulance staff).

INTER-LogP scenarios
- **Monitoring of containers carrying sensitive goods // Readiness = High**

IoT platform to monitor containers (managed by the owner of the container) with sensitive goods.

If interesting for the INTER-IoT consortium, the previous use cases could be extended with the monitoring of sensitive goods.

In a simulated accident scenario, the CCE (through Nemergent application) would have access to the container IoT platform and emulate an incident with dangerous freight.

This information would be collected, digested and forwarded to the relevant first responder (e.g., fire-fighter).

- **SCADA port sensor system integration with IoT platforms // Readiness = Very High**

Interoperable IoT platform using the existing SCADA system (supervisory control and data acquisition system) used to monitor different sensors, telemetry and actuators devices, such as marine buoys, navigation aids or pollution sensors) which are currently installed in the port.

If interesting for the INTER-IoT consortium, the previous use cases could be extended with the monitoring of sensitive context information of the different probes.

This information would be collected, digested and forwarded to the relevant first responders (e.g., police for evacuation, fire-fighter for early identification of risks, ambulance staff for early awareness of problems).

3. **Which problem do you resolve?**

Overall problem description
Although Mission Critical (MC) communications have been traditionally supported over private radio technologies, the current trend is to foster interoperability and a more competitive marketplace based on open standards and mobile broadband radio technologies. In the last two years, the 3GPP has significantly advanced in the normative work concerning MC-PushToTalk (MCPTT) in Release 13 and MC-Video and MC-Data

communications (such as file transfer or short data messaging) in Release 14. These technologies have been initially designed for covering the needs of the Public Safety community. Yet, new study items are now launched to extend the scope of this type of technologies to other mission critical scenarios such as railway and maritime control communications in the future Release 15.

In parallel, the 3GPP has also progressed in the definition of Internet of Things (IoT) technologies based on mobile broadband networks, resulting on Cell-IoT (C-IoT) and Narrowband IoT (NB-IoT). However, the adoption of IoT communications for mission critical operations is not mature enough to provide a reliable framework for converged and interoperable mission-critical operations. First, C-IoT and NB-IoT technologies have not reached the deployment level of other IoT technologies. Second, the adoption of IoT in MC communications has not received yet the required consideration in the standardisation process.

The anticipated benefits of interoperable "Mission Critical operations based on IoT analytics" (MiCrOBIoTa) are unquestionable. MC organisations worldwide are looking at the technology as a driver for enhanced life-saving operations, but they are facing the traditional problems of segmented markets and non-interoperable technologies. In this sense, the objectives and proposals of the INTER-IoT platform provide a perfect framework for advancing mission critical systems towards the adoption of interoperable IoT platforms with the required privacy, security and QoS requirements.

Specific problem

A typical situation in mission critical operations support systems is to include information coming from specifically deployed devices to gather environmental measurements. Examples of these devices are temperature sensors, meteorological and hydrological probes, traffic monitoring cameras, etc. These devices are currently typically supported over PMR technologies, in order to guarantee the required levels of responsiveness and resiliency. The management of these limited number devices in Control Room applications is reasonable and provides significant information to human control room operators. Yet, the increased number of IoT devices and the heterogeneity of technologies and data sources require complex decision-support systems.

In the proposed INTER-DOMAIN scenario, the Nemergent team will contribute with the MC-IoT system, which includes the new monitoring and analytics component and the evolved Control Room interface tailored to the specific needs of the use case. The Control Room interface will be adapted to show a limited number of information elements, previously filtered by the monitoring and analytics component. In the case of a simulated crisis, significant information from port logistics devices and on-body health-related sensors will provide life-saving information to the mission critical operations support system. Besides, the available mission critical communications components can be used to demonstrate the crisis handling use case.

Taking into account the overall picture and the availability of different IoT platforms, a complex use case could be created for an emergency simulation exercise. This scenario would include a typical emergency intervention, enhancing the operations support through the use of new communication technologies over commercial networks.

An example operational procedure is provided hereafter:

1.   The Port Authority receives an accident alarm at the CCE.

2.   The Port Authority accesses the MC-IoT system, which connects to different IoT Platforms (as described above and upon availability).

3.   All the information will be gathered at the Nemergent cloud MC-IoT system, which will provide different types of icons for the different sources of information, and different views targeted at different emergency response units.

4.   The Port Authority can use this platform to communicate with field response units, providing them not only with location and navigation support but also with specific context information useful for the intervention.

5.   Besides the IoT-related data processing, the extended use case will make use of the Nemergent MCPTT communication systems in order to resemble real-time communication between the different entities involved.

4.	**Which is your value promise?**

Nemergent Solutions SL, as an SME based on innovative technology components, is placed at the early stages of the service creation chain. The Nemergent team is closely related to several pioneer international research and innovation units, and especially linked to the University of the Basque Country (UPV/EHU). Additionally, Nemergent follows the standardisation process related to the new wave of mission critical systems from the early stages. These two aspects allowed Nemergent to offer a portfolio that includes one of the first MCPTT products in the world, and they are enrolled in different testing and interoperability initiatives.

The main value propositions identified in the initial business model are:

-       Homogenised treatment of heterogeneous IoT data from different platforms.

| - | Understandable metrics from massive IoT data for different vertical markets related to mission critical communications. |
| - | Integrated solution with future-proof MCPTT systems for voice communications. |

5. Offered services/products from the project

Nemergent Solutions S.L. aims at integrating a new "IoT monitoring and analytics" component in its mission critical product portfolio, and especially into the Nemergent Control Room application. Next figure illustrates the overall Nemergent mission critical applications framework that will be used in the project, and the specific extension proposed in the scope of MiCrOBIoTa.

In order to support the use case demonstration, Nemergent will provide access to different specialised equipments endowed with the corresponding SW:

- **Nemergent cloud system**
  - o **Access to INTER-IoT system.**
  - o **Filtering of data.**
  - o **Allowing access to the involved organisations (Port Authority and potentially first responders).**
- **3x Rugged LTE smartphones for field units (first responders, port staff)**
  - o **Nemergent MCPTT Client SW.**
  - o **Simple GUI for accessing relevant INTER-IoT data.**
- **1x Rugged LTE tablet for first responder (e.g., ambulance)**
  - o **Nemergent Client SW with MCPTT communication capabilities.**
  - o **Adapted GUI for displaying relevant information for the intervention.**
  - o **Tailored GUI for quick and easy sending of status and reports.**

6. Which is your target market? How big do you estimate the market?

Economical estimations for the mission-critical communication technologies
The critical communications market is expected to be worth 18 B$ by 2019 with a Compound Annual Growth Rate (CAGR) of 33% expected for the period 2013-2019.
The market includes police radios and other professional communications equipment.
The two largest market segments are command and control solutions and licensed mobile radio (LMR) terminals, which together account for over two-thirds of MC communications revenue.
Command and control is the fastest-growing segment through 2019, as emerging markets invest more heavily in control room solutions.

Mission Critical (MC) communications market forecast (B$)
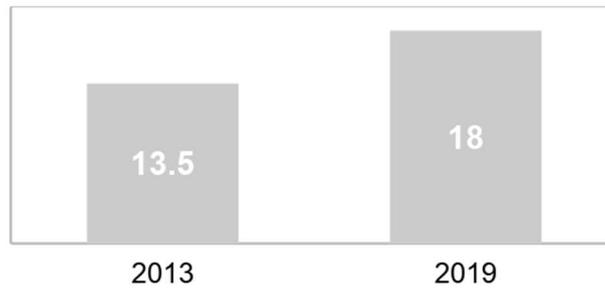
Overall Target market

Public safety organizations are among the main users of critical communications but increasingly private sectors require MC communications

Customer industries that could be interested in this solution are:

- Public Safety
- Public Transport / Railways
- Port communications
- Airport communications
- Oil / gas / energy plants
- Sport and other big evenst
- Other utilities

Position in the value chain

Nemergent is well positioned internationally as a basic technology provider, and keeps contacts and relationships with different solution providers and service providers all over the world.

The position of Nemergent in the field of IoT systems is similar to other mission critical components already available (or in progress) in the portfolio of products. Nemergent wants to be active in the early stages of interoperable IoT systems, acting as a link between innovation actions and pre-commercial activities.

Therefore, Nemergent will continue with innovative developments and early proof of concepts, reinforcing the company as one of the reference providers to accelerate third party developments and deployments.

Marketing channels

Following the discussion of the Nemergent market approach, the sustainability plan is one of the most critical aspects for such type of small company. Nemergent feels the need for going on collaborating with cutting-edge research and innovation partners, acting as early technology adopters and contributing with early developments to perform the required validation activities.

In the specific technology area proposed in this collaboration, Nemergent bets for a considerable initial marketing effort based on the "communication and dissemination activities" (point 15 in this table).

These activities would allow us to be in the roadmap of different stakeholders, which will allow us to progress o the next phase more related to proof of concepts and demos. This phase usually introduces different variables, which may require additional effort devoted to tailored developments or to specific deployment actions.

The target actors will mainly be international solution providers and mission critical service providers, who usually have the resources to evaluate new technology trends. Smaller (local / regional / national) companies will also be in the focus, although they usually follow the international trends.

The participation in international interoperability tests organised by standardisation and regulatory agents are also of utmost relevance to become a reference in the specific technology.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

Since the inclusion of IoT as a source of information for mission critical operations is a new feature in the Nemergent portfolio, we have only introduced the topic in more general discussions and contacts with collaborating partners and potential end users.

We have discussed the overall picture with a Bilbao-based consultancy company specialized in emergency

management (RKL) and with CIMUBISA, the company offering the IT services to Bilbao City Hall, who are evaluating the deployment of a new LTE-based network for Smart City.

Through our partner ETELM in France, we are evaluating similar scenarios for French Smart City projects.

As can be observed, we are yet in the early steps towards raising awareness and creating opportunities.

We had also the opportunity to participate in related discussions in international events such as EENA 2017.

8.   Results of interviews?

Technology / solution providers are very active in the area, trying to create business opportunities in the area of IoT-based mission-critical management.

However, end users are still reluctant to consider IoT as mission-critical grade due to several typical constraints such as security and reliability. Also, in the economical side, they are worried about investing in a heterogeneous IoT market that may require new investments in the future in order. Also, the interoperability aspects are usually mentioned.

9.   Which competitors are there and how do you differ from them?

Some of the big names in the Control Room sector are starting to move towards IoT-based management. In different international fairs, you can see Motorola, FREQUENTIS, NEC, Microsoft, Beta 80 and others, presenting their innovative concepts for integrating IoT.

However, most of the presentations focus on the GUI aspects or the need for data analytics, without going into details concerning the specific underlying IoT technologies / systems / platforms.

In this sense, we believe that addressing the problem in a bottom-up approach may provide a differential advantage to our solution. The focus now is on clearly understanding the needs associated to currently deployed IoT platforms, their interoperability problems and the INTER-IoT solutions. Upon the gained experience, the Nemergent product will be integrated in the backend cloud-ready systems and offered to different actors in the value chain. End users would require the complete solution (backend and frontend) while integrators or specialised control room vendors may be interested only in the backend components.

The by-design integration with the overall MCPTT / MC-X solution is also seen as a competitive advantage for our company

10.   What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

The actual time-to-market for this type of innovative project is always variable, depending on the individual project results, the overall evolution of the converged solution, the end users' awareness and needs, the economic scenario, etc.

Generally speaking, we believe that most of the end users are already well aware of the potential benefits. Yet, highly critical sectors such as Public Safety are doubtful about the applicability of these systems. Something similar applies for example to the railways signalling system.

However, other less critical sectors (or the same sector for less critical aspects) are more than willing to start testing these solutions.

From a technical point of view, we believe that the integration of the solution (at least the INTER-IoT based solution) should not go beyond the end of 2018 because the timeliness for small companies may be short.

11.   Which partners do you need or already have for the business implementation (outside of the consortium)?

As can be devised, the market spectrum is complex enough in order not to have a single simple picture of the provisioning chain.

First, most of the traditional stakeholders have not yet taken a clear position towards this new wave of mission-critical technologies. Second, the new specifications and technologies have opened opportunities to a good number of smaller companies. Thus, we are in the process of creating and dropping alliances between different players.

Second, it is clear that -at the time being- Nemergent is positioned in the early stages of the provisioning chain as technology developer and provider.

Third, since these core technologies are applicable to several verticals, we need to carefully select different partners related to different or cross- sectors.

From these discussions, we tried to provide an overall picture of the target partners, stressing those boxes where we already developed some collaboration.

Technology provider	Integrator	Service provider	MNO	MC Communication user
• Software and app development • Technological architecture E.g.: *Nemergent,*	• MC communication solutions provider • In some cases the same company is a device provider and integrator (e.g. Motorola, Kenwood)	• Service providers are players that only exist for public safety services • The service provider is in charge of managing licenses to operate public safety devices • In private MC communications integrators provide service directly to users	• Purchases the spectrum license to operate • Dedicated spectrum for public companies, open spectrum for private ones	• Purchases the spectrum license to operate • Dedicated spectrum for public companies, open spectrum for private ones
Systems and network provider • Equipment manufacturing and installation for infrastructure (RAN, mobile core antennas, base station) • Data base management E.g.: *Ericsson, Teltronic, ETELM, Atthonet…*				
Device manufacturer • Device manufacturing E.g.: *Huawei, Sonim, Funkwerk, IK4…*	• E.g.: Thales, Atos, Rivada, Motorola, Kenwood, *Frequentis*	• E.g.: Itelazpi, public organizations (Government, Ministry etc)	• E.g.: AT&T, Vodafone, Euskaltel…	• E.g.: Public safety agencies (police, medical staff, firefighters) and private companies in industrial activities

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12. What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.

Overall business case

The exploitation opportunities of the different solutions identified are decoupled of the actual network connectivity. This business model is focused on the deployment and maintenance of the service layer, offering additional capabilities over the "raw" data plans contracted by professional end users.

Thus, the scope and possible impact of the marketable solutions are different taking into account different potential target sectors:

- **Service Model 1: Integral solution including all the components. The target customers would be big clients such as administration or mobile network operators, with a portfolio of multiple target mission-critical organizations with interoperability needs. This business case could be linked to the business model of a Mobile Broadband Network operator, aimed at aiding in the implementation of mission-critical services over commercial data connections.**

- **Service Model 2: Deployment of specific components, based on value added capabilities such as group communications, QoS management or enhanced location services and IoT capabilities. Stakeholders planning deployments related to next generation IP-based mission-critical networks may be interested on incorporating different aspects of this set of capabilities.**

- **Service Model 3: Targeting small scope organizations, which may be interested in transition models towards IP-based services to enhance their daily mission-critical operations. This type of users (e.g., local administrations, municipalities, small ambulance companies, etc.) may want to exploit their data plans with enhanced multimedia-enabled services in an integrated way.**

Preliminary SWOT analysis

Strengths

- **Generic design of mission-critical services over modern radio technologies.**

- **Enabler for interoperability systems.**

- **Aligned with industry movements towards MCPTT.**

Weaknesses

- **License: Although the core components are licence-free, some other components are based on open source solutions (i.e. CMS/GMS) or third-party solutions (i.e., INTER-IoT).**

- **Stability: The stability of the new modules should be comprehensively assessed so as to be a marketable product.**

- Awareness of end users: Although end users are more and more aware of the future transition to these types of technologies, most of them are still reluctant to integrate them in the highly critical operations. The industry needs to prove that the market is mature enough.

- Reliability / security of IoT: This is the typical concern shown by end users.

Opportunities

- Provision of mission-critical services based on modern radio technologies, with the approaches of the provision of scalable OTT services:

- As product or/and as an engineering/knowledge transference product to major vendors and clients.

- Both as a product but specially as an engineering outcome: There is a necessity of transmitting it to stakeholders, administration, etc.

Threats

- Competence / reputation / track record.

Standardization trends: The 3GPP has focused on the incorporation of mission-critical capabilities in LTE-A Pro. The same could happen for NB-IoT / future massive IoT systems based on 3GPP specs. If those are widely adopted, the competitive advantage of the interoperable IoT solution may not be needed.

13. Which is your IPR vision?

Generally speaking, the current portfolio is based on open specifications. The timeliness and quality of the developments are differential here.
Specific components such as internal QoS/QoE management schemes need to be protected, but we usually look for agreements with our research partners.

14. Which is your open source vision? Is there any restrictions and limitations?

The company is generally willing to contribute to the interoperability of systems. To the date, we have contributed with specific traces and SW components through our website. This also allowed us to gain some international awareness.
The trade-off between different vectors is always needed to evaluate, including protecting the developments, opening new opportunities, fostering the community and relying on complex licensing schemes.

15. When and how do you plan to place the product on the market?

DDescribe your communication, dissemination, marketing actions, commercialization strategy (strategy alliance and key partners, sales strategy, etc.)
Communication and dissemination activities related to the proposed collaboration are relevant both for the applicant and for the INTER-IoT consortium as a whole. Thus, there will be a specific task in the work plan devoted to these activities and with the necessary effort (12.5% of the total effort). Moreover, part of the budget for travels is reserved for dissemination activities.
The main targets for communication and dissemination activities are:
- To disseminate the participation of Nemergent Solutions in the INTER-IoT open call for collaborations, mainly through its website (http://www.nemergent.com) and social media channels (twitter, facebook).
- To exploit the acquired knowledge in the different international events / plugtests where the Nemergent team is active. Tentative activities are:
  o To discuss the signalling and media plane results with 3GPP and ETSI representatives.
  o To provide activity report during ETSI MCPTT Plugtests of 2017 (month 32 of MiCrOBIoTa) and 2018 (expected in month 154 of MiCrOBIoTa).
  o To provide activity report during ETSI NG112 Plugtests of 2018 (expected in month 13 of MiCrOBIoTa).
  o To promote the discussion of IoT in mission critical operations in the scope of EENA, with special interest in the EENA-organised events EENA Conference 2017 (month 1 of MiCoBIoTa) and 2018 (expected in month 132 of MiCoBIoTa).
- To potentially participate in INTER-IoT-promoted events, workshops and meetings.
Being a "small collaboration", the presented budget limits to four travels during the collaboration lifetime

assuming three project-related meetings. Therefore, the dissemination level will in some extend depend on the availability of funds and will likely require additional cost to be assumed by Nemergent.

16. Describe your financing strategy for a 5 years' scenario

The summarised company financing strategy at 5 years is shown in the following charts.

Most of the incomes are considered from

- Direct sales (testing equipments)

- The exploitation of services and service deployments.

- Development of ad-hoc / tailored projects (private or publicly funded).

Generally speaking, the motivation of the company is to focus on core products. New innovation vectors (such as IoT) will only be considered if we consider them relevant for the overall strategy.

MCPTT revenue by service/product type (€)
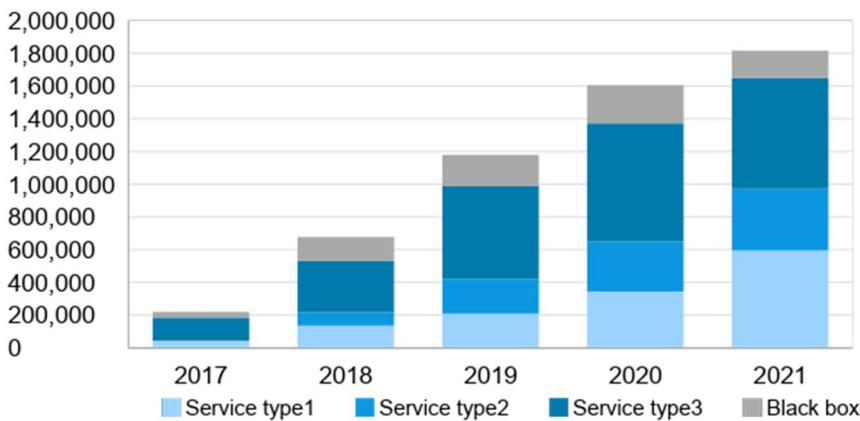
New projects demand (#)
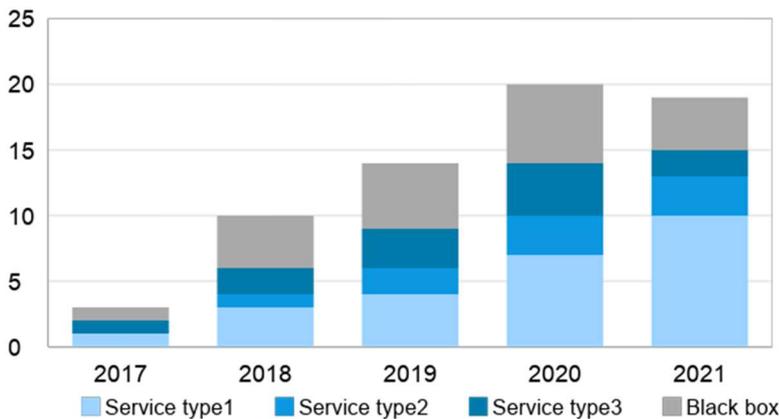
Peak Financing: 44 k€
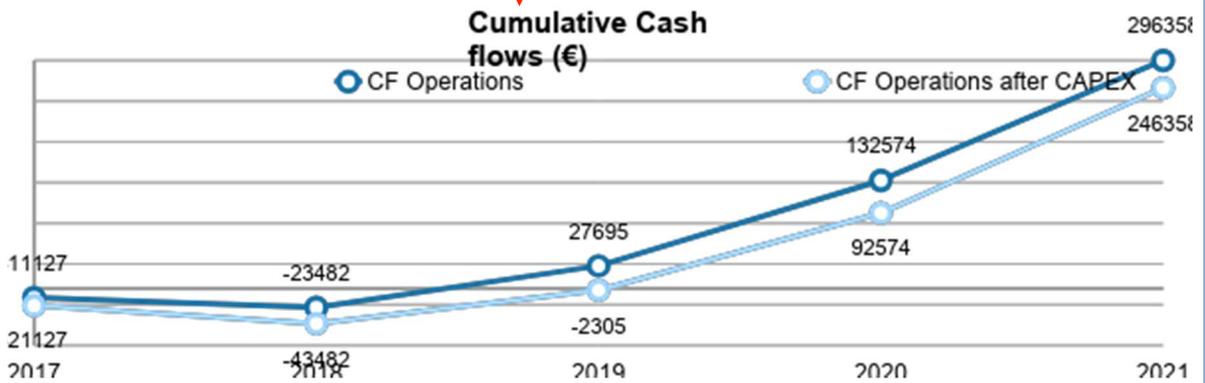
Cumulative Cash flows (€)

| 17. | Describe the expected impacts of your business idea |

The expected impact of the proposed collaboration are categorised in four items:

1) Benefits to Nemergent Solutions, in the area of adding the new IoT-driven mission critical operations support component to its applications framework.

2) Fostering the need for an interoperable IoT market, by disseminating the pilot results.

3) Benefits to industry and society.

4) Benefits to INTER-IoT consortium and its individual participants.

1) Expected benefits to Nemergent Solutions

By proposing this collaboration, the main business-related objective of Nemergent Solutions is to add a new means of communications that will support mission critical operators in their decision-making process with more automated and information-enriched interface.

It is clear that this filed is already being considered by most of the mission critical organisations, who are facing the lack of interoperable IoT systems. Rather than implementing specific plug-ins for each IoT technology, the proposed solution will make use of the INTER-IoT benefits to enable a smoother adoption of heterogeneous IoT systems.

The outcomes of the collaboration would allow Nemergent to gain expertise and international positioning, becoming one of the first technology providers with this kind of solution.

2) Fostering the interoperable IoT market

The outcomes of the collaboration, and especially the outcomes of the proposed INTER-DOMAIN scenario, will provide us a good material to disseminate the unprecedented benefits of interoperable IoT platforms.

Showing the maturity and feasibility of the solution is a key factor to foster the interoperable IoT market.

While we will focus on the applicability to the mission critical sector, the extrapolation to other sectors will be straightforward. For this aim, it is of utmost importance to clearly remark the benefits of the INTER-IoT approach to external system developers, and why this approach will not require a complete re-design in the future upon potential wide deployment of one or other IoT solution.

Finally, Nemergent plans to disseminate the collaboration results through the current activities in standardisation organisms. Different staff components have ongoing activities in the 3GPP, ITU-T and ETSI, mainly related to interoperable technologies and mission critical systems. These activities could be helpful to foster new studies related to interoperable IoT systems.

3)   Expected benefits to industry and society

The proposed heterogeneous scenario is expected to show a good level of maturity and feasibility of the INTER-IoT approach. Besides the own benefits to the consortium, we consider relevant to provide evidences about the maturity of the technology and influence the decision makers, especially those placed in the service chain closer to the end users.

Concerning the mission critical sector, companies such as Nemergent usually act as technology providers, developing innovative solutions and performing proof of concepts. The technology is then evaluated by third party companies, who act as technology providers to big clients or as service providers themselves.

The idea in this collaboration is to influence these final service providers, creating the need to integrate these IoT-driven information systems in their daily operations. If we success in this aim, the whole provisioning chain will benefit (from individual IoT HW and SW providers to interoperability enablers) from the results of the collaboration.

Finally, if we achieve these objectives, the society will eventually benefit from the results of the collaboration through the deployment of enhanced mission critical support systems.

4)   Benefits to INTER-IoT consortium and individual participants

First of all, the proposed collaboration would contribute to fulfil some of the INTER-IoT open call objectives, such as "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" and in some extent "design, implementation and integration of interoperable data and semantics layer components for INTER-FW.

The application of an attractive use case such as the proposed mission critical management scenario, and the addition of the background expertise and products of Nemergent team to the pilot, will provide an excellent visual interface to the validation activities. Nemergent will provide the necessary support to the pilot activities and results reporting, and will enable the access to the developed components by third parties.

Additionally, the INTER-IoT consortium as a whole could benefit from the influence to the end users, as discussed in the previous subsection. Finally, the proposed collaboration may lead to future relationships between the Nemergent team and different individual INTER-IoT partners, especially with those more related to the applicability of IoT systems to mission critical operations.

18. Paying customer: how many of your direct customers can turn on potential customers?

Although we don't have background to gauge this aspect yet, we estimate the following churn rates for the different types of projects:
-          Recurrence rate for blackbox projects is 50% (50% churn rate) and for services 75% (25% churn rate)

Identified by: NEMERGENT SOLUTIONS, S.L	Registration Date: 29/05/2017

C5 IRIDEON, S.L

Individual Exploitation Plan	
Name of the partner: IRIDEON, S.L	interiot interoperability of heterogeneous IoT platforms

Partner's type: SME	URL: www.irideon.eu	Business Scenario selected: Cross-domain

1.   Partner's role in the project

Contribute to the INTER-IoT project with a new open tool called SENSHOOK, to enable full interoperability of our Senscape® IoT platform with other IoT platforms and services, and fully exploit the unique selling points of our existing technology

2.   Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

1.   Sale of Senscape® licenses to 3rd party developers, with a yearly fee for updates and support, with SENSHOOK always provided as an open-source software. Types of Senscape® licenses: (1) Open Source, to encourage universities and research centres to contribute with new hardware and software extensions to the Senscape® ecosystem; (2) Library, development of Senscape® embedded applications using binaries; (3) Source code, to allow modification of the Senscape® core libraries, with a confidentiality agreement.
2.   The provision of services, e.g. to develop custom solutions, with SENSHOOK installed as a component of an in-house or private cloud or b) as-a-service. Costs for the development of the new application will be borne by IRIDEON, with an agreed minimum number of devices to be manufactured by IRIDEON. IRIDEON will charge a monthly fee based on the number of devices connected to the server.
3.   Provide own products based on Senscape®, with SENSHOOK installed as a software component of the final solution. In the course of the project we will pilot one of these product. Smart Mosquito Trap

3.   Which problem do you resolve?

Most organizations lack the lack the resources and personnel with the skills to develop robust IoT systems, given its complexity and recent emergence and growth. IoT frameworks and platforms are available from a number of providers to help developers to develop new IoT solutions, but they suffer from a series of problems and limitations:

•   Most use non-standard, proprietary interfaces, resulting in long and costly development cycles to integrate devices having different communication protocols and data formats. Powerful interface standards exist, but they are complex, and since they were developed before the emergence of IoT, are not well suited to its demands for light communication protocols and simple embedded processors.

•   New IoT server technologies for storing, analyzing and representing data from remote devices are available, there has been little progress in IoT server communication protocols, data formats and data transformation.

•   Individual sensors may require special settings. E.g. electrochemical gas sensors have unique values for zero offset and gain, which must be programmed for each sensor. Currently, there is no established solution to automatically transform such sensor data before processing and analysing it. As such, solutions are often developed in an ad-hoc manner and with poor performance.

•   Current solutions support many types of data protocols between the remote devices and the server, but

do not support advanced features, such as remote firmware updates, sensor configuration, and remote instrument features, for use with simple, low-cost, low power embedded devices.

4. Which is your value promise?

Based on our experiences, and a preliminary business assessment, we have concluded that to meet our customer needs, and to unlock the full commercial potential of our Senscape® products and services, we need to develop our own middleware: SENSHOOK. SENSHOOK will allow IRIDEON deliver an open, interoperable, disruptive, standards-based tool for the development of end-to-end IoT applications according to the INTER-IoT framework. This will allow us to address a wider range customers and applications, and to grow our revenue and the company, via more customer projects, via licensing of Senscape® platform, and exploitation of SENSHOOK as an open tool to easily integrate Senscape® hardware products in an in-house or private cloud solution, or as-a-service.

The novelty and advantages of SENSHOOK include:

• Adapts one of the major international standards for the control and reading of smart transducers: IEEE1451, and makes it compatible with existing lightweight data communication protocols and data formats used in IoT applications.

• Quick and easy integration of all Senscape® hardware devices, supporting Senscape® unique and advanced features.

• Full interoperability with 3rd party IoT platforms and services.

• Sensor-centric approach, in which each sensor or actuator can be discoverable, accessible, and usable via TEDs described in the standard, and sensor data can be automatic and correctly transformed before being processed and analyzed for an upper application layer.

• Developers do not need be 100% aware of the particular characteristics/specifications of each sensor, which will reduce analysis errors, and simplify the publication and sharing of results.

5. Offered services/products from the project

1. Senscape® licenses to 3rd party developers, with a yearly fee for updates and support, with SENSHOOK always provided as an open-source software.

2. The provision of services, e.g. to develop custom solutions, with SENSHOOK installed as a component of an in-house or private cloud or b) as-a-service.

3. Provide a Smart Mosquito Trap based on Senscape®, with SENSHOOK installed as a software component of the final solution.

6. Which is your target market? How big do you estimate the market?

Market for Senscape® + SENSHOOK

By 2020, the number of internet-connected devices is expected to reach 50 billion. For every internet- connected PC or smartphone there will be up to 10 other types of devices sold with native internet connectivity. The worldwide market for IoT is expected to grow to $7.1 trillion in 2020. Smart cities, smart health, and smart factories using IoT will make a positive impact upon society, and the economy. The market volume for embedded systems will outpace other system types, reaching shipments of more than 10 billion units by 2020. Machine-to-Machine (M2M) technology adoption is also increasing rapidly, with more than a billion devices at work in smart meters, industrial control, mobile healthcare, video surveillance, automotive and telematics solutions, and smart buildings, etc.

Market for Smart Mosquito Trap

Our focus is on IMS (Invasive Mosquito Species) responsible for MBD (Mosquito Borne Diseases). We target the market of professional monitoring traps used by private and public bodies to set-up surveillance networks of IMS. The EU is a leading world producer and consumer of traps and lures used for these surveillance programmes.

This market is fragmented and includes products like insecticides, repellents, bed nets, and traps, with players ranging from global corporations to regional SMEs. The different pest control products are often used in combination to each other. The global vector control market in 2006 was estimated to be 9.3 billion US$105. Between 2009 and 2014 the global market registered a 2.5% annual growth rate, and it is expected to reach 5.2% by 2019106. The need of pest control services grew tremendously over the decade because of increased awareness and outbreak of many communicable diseases between 2001 and 2014. The policies that followed

also mandated a strong monitoring, regulation, and management of pest and other insects, which could affect humans and also impact the economy107. The growth of this market is also associated with climate change, which is leading to an increase of mosquito activity in native habitats and to the invasion of new areas, like in Europe and North America. Market pull is due to the increasing cases of disease outbreaks: in number, virulence and deaths

7. **How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?**

So far we have identified 68 potential leads, conducted 36 interviews, of which 18 are potential clients for Senscape® + SENSHOOK and 4 are potential clients for the Smart Mosquito Trap

8. *Results of interviews?*

Of the 18 potential prospects that we have identified, the following business opportunities are already being negotiated for future developments of new IoT products with Senscape® + SENSHOOK:
- Smart pedestrian crossing
- Smart car collision preventer
- Smart basket holder for supermarkets
- Smart Bath Screen

9. **Which competitors are there and how do you differ from them?**

Limitations of state of the art:

-Lack of complete solutions to facilitate integration of to external sensors into a mobile application.
-Don't allow non-specialist IoT companies to rapidly set-up, and operate customized sensor-based mobile applications.
-Rigid designs which to not readily support user adaptation/modification.
-Data generated is often in a non-standard format, non-validated, and insecure format.

Advantages of Senscape®+ SENSHOOK:

-End-to-end framework to move data from sensors to mobile platforms, and from the mobile platform to the cloud.
-Helps non-specialist IoT companies to create custom applications quickly and cheaply.
-Flexible design based on plug & work sensors and software extensions, which can be reused in multiple designs.
-Use of international standards to facilitate publication and sharing of data. With data protection and security.

Our main competitors and competitor solutions are summarized as follows:
1. Proprietary development kits from semiconductor manufacturers (Incl. TI, Atmel, Microchip, etc.)
- Based on proprietary hardware and firmware
- Requires significant technical skills, with a steep learning curve
- Require extensive system validation before use
- Integration with mobile apps and Cloud software solutions are not provided
2. Open source hardware platforms (Incl. Arduino, Raspberry Pi, BeagleBone, ARM mbed, etc.)
- Based on hardware extensions available on-line and firmware provided by the community
- Use proprietary hardware interfaces to connect peripherals. Plug&work is not supported
- Appropriate for small-scale projects, where only a few units will be produced
- Provide a social network with some platforms (e.g. Arduino) with 1 million+ of users
3. Mobile based applications (Incl. AllSeen Alliance, Alljoyn, Open Data Kit, etc.)
- Industrial alliances which aim to establish industry standards
- Provides a framework for mobile applications, connecting smartphone and smart devices
- Smart devices and sensors must be integrated by the user. Not plug&work.
- Targeted to large enterprises for use in consumer goods (TVs, fridges, smart lighting, etc).

10. **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**

18 months

11. Which partners do you need or already have for the business implementation (outside of the consortium)?

We have a collaboration agreement with the University Pompeu Fabra (UPF) in Spain to develop hardware and software for Senscape® and act as a lead-user and promoter for Senscape® within the academic community.
We also have letters of intent from SMEs for the use of Senscape® in their commercial solutions.
We have contacts with sensor manufacturers for the development of plug&work sensor solutions and joint plans to develop new products based on Senscape®.

12. What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.

Strengths	Opportunities
• Experienced management team with extensive network and domain-specific knowledge. • Strong technical and data team. • Easy integration of the solution. • Protection from competitors and would-be copiers. • Own R&D capabilities • Consolidated R&D network of stakeholders • Standards based open framework • Willingness to pay: time and money savings • International sales team already operative	• Exceptional growth perspectives because the product can be scaled extremely fast and worldwide. • New features and additional business models creating additional revenue streams • Technology replicable to other industry applications • Invest in a specific manufacturing line & production team • IoT and OGC standards promoted by the EC
Weaknesses	**Threats**
• Sales team has to be expanded. • Need to improve our network outside Europe • Disruptive nature of the product may require training of, and adaptation by customers. • Marketing actions will require process demonstrations and publication of results. • Low R&D budget	• High commercial costs to enable a fast market replication in multiple target sectors • Competitors threaten our technological leadership. • Some competitors dump prices of their • hardware boards • Potential clients blocked by exclusivity agreements • Competitive technologies may arise

13. Which is your IPR vision?

Key IPR items are: 1) the SENSHOOK open tool, 2) SENSOS operating system, and 3) the design of our baseboards. We have carried out a freedom to operate analysis, and do not foresee any IPR conflicts.
Strategy for IPR protection: The Senscape® framework (source code) will be protected as a trade secret and enjoy copyright protection as original work under the Directive 2009/24/EC on the legal protection of computer programs. Design documents on our hardware platforms will be distributed, under a Creative Commons license or under an open source hardware license with the same effect.
SENSHOOK will be provided as an open-source software and available in GitHub for free downloading
Regulatory and standards issues: The Senscape® framework will comply with IEEE 802 IoT standards, IEEE 1451 (Smart Transducer Interface Standard) and IEEE 11073 family of standards for medical-device communication. We will follow the IEEE P2413 working group, responsible for designing the standard for an Architectural Framework for the Internet of Things (IoT). The Senscape® hardware will comply with the required EC Directives including the EMC and LVD Directives.

14. Which is your open source vision? Is there any restrictions and limitations?

IP	Specific limitations and/or conditions for implementation	Specific limitations and/or conditions for Exploitation
SENSHOOK	None. Will be provided as an open-source software	None. Will be available in GitHub for free downloading
Senscape Hardware Platforms and shields: Gecko, Tuatara and Flying Dragon	None	Must be manufactured by IRIDEON
SensOS: Senscape embedded operating System and embedded libraries	None (only .lib provided)	Requires license from IRIDEON
IEEE1451 Java Connector	None (only .jar provided)	Requires license from IRIDEON

15. When and how do you plan to place the product on the market?

Our plan for the commercialization is based on:

1.   The sale of Senscape® licenses (four types) to other companies and an annual fee* in most cases for system updates and support:

•   Open Source licenses, to encourage the community of developers to contribute with new sensors and software extensions to extend the Senscape® ecosystem.

•   Distribution licenses*, allowing third-parties to use and distribute Senscape® as is.

•   Library licenses*, which include an Application Programming Interface (API) to develop custom software extensions.

•   Source code licenses*, to allow modification of the Senscape® framework. Will only be granted in exceptional circumstances and will include confidentiality agreements.

2.   The direct sale of Senscape® solutions (including baseboards, plug&work sensors, hardware accessories, and software applications) via the Senscape® on-line marketplace and a 10% fee charged on sales made through the marketplace by approved third party vendors.

3.   The provision of services, e.g. for the development of bespoke solutions.

Communication and Dissemination objectives	Actions	Timing
All activities will acknowledge the support of the EC and of INTER-IoT. The project will be promoted targeting various audiences (industry, referral partners, associations and institutes, the general public, academia, public and private entities, and consortia of other projects) including groups beyond the project's own community: • Present relevant results of the project to target audiences • Promote the benefits of the project to the wider community • Make SENSHOOK a recognized project and product • Establish regular contact with media • Bridge project with public/societal stakeholders • To build end-user's trust in our solution • To enhance our brand reputation	Setup project website	M3
	Preparation of marketing material	M6-M12
	Publications in magazines and professional journals	M6-M18
	Advertising in relevant blogs and social media.	M6-M18
	Presentation of results in professional events and workshops,	M6-M18

16. Describe your financing strategy for a 5 years' scenario

Our initial analysis predicts growth of approximately €1 million in sales annually in Y2 and Y3 and €3 million in Y4-5. We predict a total gross profit in the range of €4.6 million over a 5-year period, and the creation of 15 new positions.

Year->	Y1	Y2	Y3	Y4	Y5
Sales (k€)	325	1,005	2,370	5,990	9,630
Expenses (k€)	560	1,061	2,018	3,505	4,977
Gross profit (k€)	-235	-56	352	2,485	4,653
EBITDA	-175	2	408	2,539	4,705
NPV (k€)	-372	-371	-92	1,485	4,140
ROI	-0.57	-0.25	-0.01	0.44	0.83
# Employees	6	8	10	12	15

17. Describe the expected impacts of your business idea

Economic
- *Predicted sales of €4-6 million over 5 years, with NPV of €4,1 million and ROI 0,83;*
- *Eliminate costs of initial design steps*
- *Fasten prototyping and industrialization phases reducing labor intensive tasks;*
- *Reduction of costs of R+D+I;*
- *Reduction of manufacturing related costs.*

European
- *Help fill a knowledge gap in IoT market;*
- *Contribution to improve knowledge and promotion of IoT in the common market;*
- *Contribution to efficiently promote the development of IoT products made in Europe;*
- *Addresses priorities of EC's Flagship Programmes to 2020.*

Social
- *Reduce the burden of SoA development and manufacturing which renders SMEs less competitive and unable to generate growth;*
- *Help expand business opportunities for SMEs and support employment with the manufacture and distribution of IoT products;*
- *Creation of new tool for the benefit and productivity of engineers.*

Standards
- *Compliance with IEEE 802 IoT standards*
- *Compliance with IEEE 1451 (Smart Transducer Interface Standard)*
- *Aligned with IEEE P2413 working group, responsible for designing the standard for an Architectural Framework for the Internet of Things (IoT).*
- *Senscape® hardware complies with the required EC Directives including the EMC and LVD Directives.*
- *Implementation of INSPIRE, GEOSS, and OGC/SWE standards.*

Advancement of science and technology
- *Helps non-specialist scientists to create custom electronic applications quickly and cheaply;*
- *Flexible design based on plug&work sensors and software extensions, which can be reused in multiple experimental designs;*
- *Use of international standards to facilitate publication and sharing of data of scientific and technical value;*
- *Collaboration with universities and research centers to add cutting edge-features and technologies (e.g. advanced signal processing, energy harvesting, etc.).*

Environmental/Health
- *Sustainable use of off-the-shelf electronic components;*
- *Sustainable use of materials in electronics manufacturing;*
- *Lower energy costs in development and manufacturing iterations*

18. Paying customer: how many of your direct customers can turn on potential customers?

We currently have a conversion rate of 30%.

Identified by: IRIDEON, S.L	Registration Date: 03/06/2017

C6 Athens University of Economics and Business – Research Center (AUEB)

Individual Exploitation Plan		
Name of the partner: Athens University of Economics and Business – Research Center (AUEB)		
Partner's type: **University**	**URL: www.aueb.gr** **http://mm.aueb.gr**	**Business Scenario selected:** • m-health

1. Partner's role in the project

External collaborator

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

Recently, the ACHILLES project members started the process of spinning-off a start-up that will offer access control as a service for the IoT. The effort received the "Research Impact Award" of the Ennovation 2016 Digital Innovation and Entrepreneurship contest in December 2016. ACHILLES results will be exploited towards the further improvement of the innovation capacity of this start-up and will improve its portfolio. Moreover, the ACHILLES project will pursue the adoption of the ACHILLES approach by other initiatives, such as research projects, open platforms, and open IoT operating systems.

3. Which problem do you resolve?

ACHILLES addresses the following problems:
• **Access control**
• **User authentication**
• **Thing identity verification**
• **Secure channel establishment between end-users and Things**

All these are challenging problems in the context of the IoT. Things are usually small devices with limited storage capacity, power, energy, and processing capabilities, in order to be inexpensive and practical. In many cases Things are "exposed" to tampering, whereas in many application scenarios, after Things are deployed, it is not easy to access them. Things usually are not able to perform "heavy" tasks, such as complex cryptographic operations. Storing user credentials or any other sensitive information in a Thing creates security risks, adds storage overhead, and makes security management an impossible task. When it comes to interoperable applications, Things (or even gateways) cannot interpret complex business roles and processes. Moreover, companies are not willing to share sensitive information about their users with a Thing (or a gateway), even if this information is required by an access control mechanism, neither do they want to invest in yet another security system.

4. Which is your value promise?

ACHILLES will accelerate the development process, will provide better security to IoT products, and will allow the development of products with high interoperability. By enabling the reuse of existing user management system, ACHILLES will provide cost reduction, easier security policy management, and faster deployment. By supporting the ACHILLES approach, enterprises will gain competitive advantage and will obtain new revenue streams.

5. Offered services/products from the project

The ACHILLES project will extend the INTER-IoT platform to provide gateway/Thing mutual authentication, user/gateway (or Thing) mutual authentication, and access control. The ACHILLES project will provide software for Things, end-user applications, Java OSGi modules for the INTER-IoT gateway, and it will leverage INTER-FW API and Tools so that end-users will be able to create, modify, and access protected services. The ACHILLES OSGi modules will target the D2D layer of the INTER-LAYER

6. Which is your target market? How big do you estimate the market?

ACHILLES targets three types of customer segments: Enterprises that offer IoT solutions and wish to enhance the security of their products (and henceforth will be referred to as developers), enterprises that wish to integrate their user management system into an IoT solution (and henceforth will be referred to as integrators), and enterprises that offer user management as a service (e.g., social networks) and wish to leverage their service by including the ACHILLES approach and protocol (and henceforth will be referred to as providers).
Developers:
Many enterprises offer IoT systems (e.g., home automation, smart agriculture). The security of these systems is often based on proprietary solutions. However, this has many drawbacks: these solutions are not thoroughly investigated, they cannot be easily integrated into existing infrastructure, and usually impede application development. ACHILLES aims to be an open standard that can be seamlessly embedded into IoT platforms.
Integrators:
Enterprises usually maintain multiple user management systems (e.g., for their employees, for their customers, etc.). An enterprise that wishes to integrate IoT in its production line, or as a B2B/B2C service, will be reluctant to develop and (more importantly) maintain yet another user management system. Using ACHILLES, these enterprises will be able to incorporate their existing user management system in an IoT solution.
Providers:
Many enterprises base their business/products on user management (e.g., social/professional networks, identity providers, federation systems). These enterprises will be able to offer innovative services to their customers by integrating ACHILLES. These enterprises will not offer new IoT products; instead they will allow IoT innovators to build products that leverage the providers' services

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

No interviews have been carried out so far

8. Results of interviews?

N/A

9. Which competitors are there and how do you differ from them?

ACHILLES differs from existing competing solutions by introducing less overhead for Things, better privacy for the end-user, easier security management, and better support for interoperable services.
DCAF (Delegated CoAP Authentication and Authorization Framework) is an IETF Internet Draft with goals very similar to ACHILLES. DCAF defines a protocol for delegating client authentication and authorization in a constrained environment. A Thing can use this protocol to delegate authentication of clients and management of authorization information to a trusted, more powerful, Server Authorization Manager (SAM). A SAM authenticates clients and creates symmetric encryption keys which are then delivered both to (authorized) clients and to Things. These keys are used for establishing a Datagram Transport Layer Security (DTLS) channel between the client and the Thing. In DCAF, a Thing and a SAM should belong to the same administrative domain, they should share a secret, they should have loosely synchronized clocks, and there should always be a communication channel between them. With ACHILLES, ACPs (which implement functions similar to SAMs) can be independent entities, they do not have to be synchronized with the Things, and neither do they have to communicate directly with the Things. As a matter of fact, in our system an ACP does not have to know that it performs a user authentication and authorization on behalf of a Thing. In DCAF when a user requests authentication and authorization from a SAM, he should include in his request the resource in which he is interested. With ACHILLES, users include in their authentication/authorization messages a Thing identifier,

therefore, an ACP learns less fine-grained information about the user.

A common method for implementing an access control system is the usage of policies that define the roles (or attributes) that a user should have in order to access a resource. This method is commonly referred to as Role-Based Access Control (RBAC) (or Attribute Based Access Control (ABAC) when attributes are used instead of roles). RBAC has been explored in the context of the IoT (e.g., by Lee at). In this context, access control policies are defined directly in a Thing, or in a centralized gateway, which acts as an interface to Things. User authentication is performed either by storing user credentials in the Thing/gateway or by using a federated identity system, such as OAuth (e.g., as used by Cirani et al.) or OpenID (e.g., as used by Blazquez et al.). Storing access control policies in Things (or even in gateways) has many scalability and security issues: policy management becomes difficult, the access control system cannot be easily re-used by diverse applications, support for users belonging to different administrative domains is hard, and user privacy can be jeopardized.

Another approach for implementing access control is by using the so-called capabilities tokens. A capabilities token defines the operations that a user is authorized to perform over an object. Capabilities tokens are issued and digitally signed by a third trusted entity. Capabilities-based access control (CBAC) has been studied in the context of the IoT by many research efforts (e.g., by Seitz et al.). CBAC is more lightweight, more scalable and more secure compared to RBAC/ABAC. ACHILLES resembles a CBAC system, however, it has a key difference: in ACHILLES, the trusted party that authenticates users decides if they abide by an access control policy and responds with (roughly) a 'yes' or 'no,' rather than authenticating the users and responding with their capabilities. With ACHILLES, Things do not have to be able to interpret complex token formats and trusted parties do not have to be aware of the services a user wants to access.

10.	What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

We anticipate that the first release of our platform (M6) will be ready for the market.

11.	Which partners do you need or already have for the business implementation (outside of the consortium)?

The key partner of the ACHILLES team is the INTER-IoT consortium. The team will receive advice and guidelines from the consortium members that will lead to the successful completion of the project. The ACHILLES team has developed software for the RIOT OS and has developed relationships with the corresponding community. Finally, the team is in close collaboration with the Athens Center for Entrepreneurship and Innovation (ACEin), which provides the team with valuable business consulting and services.

The team will also pursue partnership with other research projects, IoT solution providers, and telecom operators.

12.	What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.

The ACHILLES SWOT Analysis follows:

Strengths
- Team competence and experience
- Unique value preposition
- Ahead of the competition

Weaknesses
- Research-oriented team
- Lack of partnerships with "big players"

Opportunities
- New, open-source operating systems for the IoT
- Ongoing standardization efforts by the IETF
- Ongoing H2020 research projects

Threats
- Fragmented IoT ecosystem
- Security vulnerabilities of the proposed protocol

13.	Which is your IPR vision?

The software we have produced up to now is and what we plan to develop for INTER-IoT will be open-source. But we also plan to produce some non-free software (to be licensed) that will implement interaction with proprietary user management systems.

The team currently does not have plans for patents.

14. Which is your open source vision? Is there any restrictions and limitations?

A proof of concept version of our system is already freely available under the Apache 2.0 license. Moreover, related scientific results are already published and freely available. The team will embrace an open-source strategy to attract and engage more developers.

15. When and how do you plan to place the product on the market?

We anticipate that the first release of our platform (M6) will be ready for the market.

In the context of the ACHILLES project, a wide variety of open-source, (L)GPL licensed (or similar), software and documentation will be provided to the public. To this end, a website, public repositories (such as GitHub) and their corresponding tools (e.g., wiki, forum, bug tracking tools) will be used and provided to the community. Moreover, in the same spirit, the team will make available to the public the project's scientific publications and other derivative white papers.

Beyond the end of the project, the team will pursue a standardization process for the ACHILLES protocol and market exploitation. With respect to the market segments, the team will rely on Web sales for selling its product and services. Collaboration with customers will take place using online collaboration tools (such as, Web conferencing tools, remote desktop access software etc.), and, if necessary, consulting with members of our team, visiting customer premises.

16. Describe your financing strategy for a 5 years' scenario

For the first 18 months (during this project's lifetime) we plan to depend mainly on research funding that will allow us to develop initial prototypes and start seeking external funds (e.g., angel investors) and first market adopters to get through until year 2 or 3. We expect to rely from year 3 and onwards on market revenue and further investment funds.

17. Describe the expected impacts of your business idea

ACHILLES will improve the security of the INTER-IoT platform
With ACHILLES, the INTER-IoT platform will be able to provide access control, authentication, and authorization, using existing tools, lightweight and secure algorithms, without putting trust in Things. ACHILLES will also enhance end-user privacy since no sensitive information is required by Things and gateways in order to provide protected resources. Finally, the ACHILLES project will improve security management, since access control modification requires no communication with Things or gateways.

ACHILLES will contribute to maturing and integrating IoT interoperability
The ACHILLES approach has been designed with interoperability in mind. With ACHILLES, Things and gateways do not have to understand complex business logic and structures: access control management, user authentication and authorization are delegated to third entities (which may as well be controlled by each individual company). With ACHILLES, B2B services can be easily and securely implemented: a company does not have to expose any information about its users; it has only to provide a pointer to an access control policy implemented in an ACP with which it has a business relationship (or owns).

ACHILLES will facilitate the overall spreading and expansion of the INTER-IoT ecosystem
Security concerns may impede (INTER-)IoT adoption. With ACHILLES, INTER-IoT adopters can rest assured that they expose no private information to Things and gateways, they do not lose the governance of their user management system and they have full command of the access control specification and management.

ACHILLES will foster innovation and will create new business opportunities
With ACHILLES, application developers do not have to worry about the security of their services. By delegating access control and user authentication to ACPs, applications have only to follow a simple protocol. Even better, by incorporating ACHILLES into INTER-IoT gateways, service providers may rely on the security solutions provided by the gateway. The ACHILLES approach creates also new business opportunities as it creates a potential new market segment, that of the ACP ecosystem.

18. Paying customer: how many of your direct customers can turn on potential customers?

Currently, the team has no direct customer	
Identified by: AUEB	Registration Date: 28/05/2017

C7 University of Twente (UT)

Individual Exploitation Plan		
Name of the partner: University of Twente (UT)		
Partner's type: **University**	**URL:** www.utwente.nl	**Business Scenario selected:** • Transport/ Logistics • m-health • Cross-domain
1. Partner's role in the project		
Research collaborator. Developer of an Early Warning System (EWS) on top of INTER-IoT application layer.		
2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)		
Accidents in the port area [9].		
3. Which problem do you resolve?		
C1: How to process sensor data using ontologies and standards such as SAREF, W3C SSN, OASIS EDXL-DE (distribution) and EDXL-RM (sensor allocation)? C2: How to integrate sensor data with domain-specific ontologies and standards? In the emergency domain, relevant ontologies and standards include OASIS EDXL for alerting (CAP), situation reporting (SitRep), tracking victims (TEP) and hospital availability (HAVE); and can include e-Health, logistics and environmental.		
4. Which is your value promise?		
Contrary to traditional EWSs, we innovate by integrating semantic technologies with syntactic interoperability standards and big data technologies (SOA, REST, pub-sub cloud and local brokers, rule-based CEP).		
5. Offered services/products from the project		
• Application: IoT EWS to detect and alert accidents with trucks in the port area [9] • IPSM: Ontology alignment (semantic translations) of SSN x SAREF		
6. Which is your target market? How big do you estimate the market?		
Emergency management solutions based on IoT integration. Huge.		
7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?		
None interviews with clients in the context of INTER-IoT project.		

8. **Results of interviews?**
None
9. **Which competitors are there and how do you differ from them?**
IoT solutions' companies, as IBM and AWS, among numerous providing integration solutions for emergency management and healthcare. Our EWS differ by the high level of interoperability enabled by our framework. It integrates a number of researches on big data technologies (SOA, REST, pub-sub cloud and local brokers, rule-based CEP) leveraged by semantic technologies (ontologies).
10. **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**
Within 1 year after the final deployment in INTER-IoT
11. **Which partners do you need or already have for the business implementation (outside of the consortium)?**
IoT platform owners, such as FIWARE.
12. **What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.**
Strengths: high technological foundations and research based **Weakens: rely on a number of open-source components, which can demand a high cost for maintenance (e.g. if a component is discontinued or deprecate)** **Opportunities: emergency management and healthcare markets has a rising demand for IoT solutions** **Threats: other companies specialized in interoperability and semantic technologies are growing fast in the market of emergency management and healthcare.**
13. **Which is your IPR vision?**
Research based on open source components, so there is no intent for IPs.
14. **Which is your open source vision? Is there any restrictions and limitations?**
We believe the open source market can be sustainable through services (e.g. consultors and programmers).
15. **When and how do you plan to place the product on the market?**
The UT provides infrastructure and specialized support for startups, especially in this case which the collaboration is based on the research of a PhD student. Therefore, after the graduation (Dec/2018), a company related to UT can be created and the EWS offered as a product along with consultant service.
16. **Describe your financing strategy for a 5 years' scenario**
If necessary, request funding for research agencies in the Netherlands and/or make partnerships with existing companies in the market.
17. **Describe the expected impacts of your business idea**
Research: beyond the state-of-the arts, including a PhD thesis.
18. *Paying customer: how many of your direct customers can turn on potential customers?*
N.A
Identified by: University of Twente	**Registration Date: 30/05/2017**

C8 Consiglio Nazionale delle Ricerche - Istituto di Tecnologie Industriali e Automazione

Individual Exploitation Plan		
Name of the partner: Consiglio Nazionale delle Ricerche - Istituto di Tecnologie Industriali e Automazione		
Partner's type: Research Organization	**URL:** www.itia.cnr.it	**Business Scenario selected:** Transport/ Logistics

1. Partner's role in the project

Design and Development of a semantic middleware to enhance semantic interoperability of IoT devices.

2. **Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)**

The idea behind this research work goes in the direction to find scalable technological solution to answer the continued growth of objects connected to the IoT network. SM enables the involved Smart Objects to cooperate synergistically based on a shared semantic model. A prototype of the platform will be implemented and validated to prove the correctness of the approach. Finally, the evaluation of its quality of service requirements in terms of latency, efficiency, and scalability will be conducted in a real case study by means of a defined benchmark.

3. Which problem do you resolve?

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. 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 way, it allows a more flexible and adaptable characterization of the data subscribers' needs and of the data providers' capabilities, while it enhances the interoperability between all the involved devices.

4. **Which is your value promise?**

The idea behind the proposal is that an approach integrating different IoT devices, networks, platforms, services and applications also at a semantic level, with a domain agnostic middleware provides a new model of collaboration among the involved IoT data sources, regardless their information representation formats. Moreover, the Semantic Middleware leverages an effective semantic model that also supports design and development activities, allowing to reduce the development cost, while also increasing interoperability, quality and portability. In this way, reuse and integration of existing and future IoT systems will be facilitated by the Semantic Middleware creating a de facto global ecosystem of interoperable IoT platforms.

5. Offered services/products from the project

The result of the proposed project is software application (product) enhancing semantic interoperability.

6. Which is your target market? How big do you estimate the market?

The focus is on a target market concerning the software applications enhancing the semantic interoperability. The potential reference area is huge but not easy to estimate numerically.
Customer Segments

• **IoT platforms owners/providers**	
• **IoT devices owners/providers**	
• **IoT platform integrators**	

7.   **How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?**

-

8.   **Results of interviews?**

-

9.   **Which competitors are there and how do you differ from them?**

The publish/subscribe middleware currently available in literature well adapt to the needs to synchronize the changing information among decoupled physical and virtual components distributed within an IoT platform. However, they lack mechanisms to express both the data requests from the devices and the notifications events in a flexible and expressive way, obligating the subscriber to know the topic offered by the publisher and to be able to process natively the published messages. Indeed, to the best of the knowledge, solutions currently available in literature support only static mechanisms of selection of the data to be exchanged, which are based on predefined syntactical subjects, while they do not consider different expressivity requirements normally needed in the definition of complex scenarios such in the AAL domain.

10.   **What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?**

Within 6 months of the end of the project, we will release an updated version of Semantic Middleware as a finished product and is fully functional (TRL 9).

11.   **Which partners do you need or already have for the business implementation (outside of the consortium)?**

On the one hand, CNR-ITIA will make available its expertise acquired through various different research projects. On the other hand, it will leverage the cooperation with other industrial and scientific partners. In addition, we consider particularly important the possibility to integrate synergistically ITIA-CNR efforts with the partners' initiatives of INTER-IoT project.

12.   **What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.**

Strengths -) Consolidated CNR-ITIA's skill on Semantic Technologies Weaknesses -) **Opportunities** Enabling of an effective and efficient semantic event-driven model to support design and development in the field of IoT; thus, reducing the development cost, while also increasing interoperability, quality and portability **Threats** -) Lack of killer application for the semantic databases (in IoT environment database should be capable to handle huge data in the form of Big Data)

13.   **Which is your IPR vision?**

No restrictions on the released artifacts (e.g. software).

14.   **Which is your open source vision? Is there any restrictions and limitations?**

No restriction

15.   **When and how do you plan to place the product on the market?**

A set of dissemination activities will be carried out according to a plan defined in a specific work package of the project. The strategy will define: (i) Presence with technical papers, demonstrations, or talks at relevant international conferences, workshops, technical events, industrial forums, industrial dissemination events and

cooperation with European stakeholders; (ii) Production of leading-edge research material suitable for publication in international journals specialized in ICT, manufacturing and health as well as web based media; (iii) Cooperation and cross-fertilization with other projects in the related areas.

16. Describe your financing strategy for a 5 years' scenario
The business strategy will leverage private and public financing.

17. Describe the expected impacts of your business idea
Initially, the impact will be on the research as the main contribution of the project is a prototype, as the resulting product of the project can be framed between the values 5 and 6 of the Technology readiness levels (TRL). After the completion of the project, the idea is to take the actions needed to get it to TRL 9, which allow to realize a finished and fully functional product in the real environment.

18. Paying customer: how many of your direct customers can turn on potential customers?
-

Identified by: CNR-ITIA	Registration Date: 31/05/2017

C9 AvailabilityPlus GmbH

Individual Exploitation Plan		
Name of the partner: AvailabilityPlus GmbH		interiot interoperability of heterogeneous IoT platforms
Partner's type: **Industry Organization, SME, (Research Organization)**	**URL:** www.docraid.com	**Business Scenario selected:** • Transport/ Logistics • (m-health) • (Cross-domain)

1. Partner's role in the project
Open call participant, offering cross layer, cross domain IoT security services

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)
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.

3. Which problem do you resolve?
SecurIoTy will solve data privacy and protection issues as well as security concerns, thus reducing a major barrier for the successful proliferation of Internet of things.

4. Which is your value promise?
SecurIoTy supports all security dimensions: Confidentiality, Integrity, Availability, thus providing the basis for expansion of IoT in general and of the INTER-IoT ecosystem in particular.

5. Offered services/products from the project

SecurIoTy is a smart cyber security solution to secure the internet of things using crypto proxy technology addressing all security dimensions: confidentiality, integrity and availability. SecurIoTy will provide an important building block for the establishment of safe, reliable and large scale IoT systems.

6. Which is your target market? How big do you estimate the market?

IoT security is a cross vertical, cross use case, cross platform international challenge. Issues in IoT security must be solved in order to have IoT proliferate. Spending on security in the IT market is estimated to be between 15%-45% depending on the study consulted. It is sensible to expect the same ratio of spending on security in IoT. Recent studies suggest, that only about 35% of the average industry has started digitization products.

That is roughly a third of a typical company's products and operations that could be digitized have been. Whenever a product or operation is digitized, the question of how to protect that product and operation has to be answered. There is much space to be covered. This is where SecurIoTy comes in. SecurIoTy addresses the need for securing products and operations across-industries, across borders, in international corporations, in governments, SMEs, teams, and users of cloud services such as storage, email, IoT and others. SecurIoTy addresses anybody who understands the risk of a data breach, that is the CEO, CTO, CFO, CMO, IT security officers, data protection officers et al.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

We have evaluated studies reflecting thousands of interviews from Gartner, PWC, KPMG et al., we personally have interviewed in the order of 20 companies to identify needs.

8. Results of interviews?

IoT services are a business imperative, but the #1 reason not to embrace IoT/cloud solutions are data security concerns.

9. Which competitors are there and how do you differ from them?

Unlike data encryption services from cloud application service providers such as Amazon, Azure or Symantec, SecurIoTy is based on crypto proxy technology. We protect data at rest and in transit. We even have a zero-knowledge policy, i.e. the user defines the level of security needed up to the point where we a service provide have no chance to look at cleartext data (the user gets to keep and manage the encryption key material).
Corporations benefit from SecureIoTy in the following ways:
- Use benefits of cloud services without compromising security, compliance and data protection
- Protection against physical-, cyber-, and legal threats
- Data protection during transport and storage
- Distribute data across multiple jurisdictions
- Protect IoT, file exchange, email and other use cases
- Fast roll-out, keep legacy infrastructure

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

After the PoC has been completed we should be able to offer market ready services, that is within 18 months.

11. Which partners do you need or already have for the business implementation (outside of the consortium)?

We need PoC partners such as the Port of Valencia to validate and fine tune our approach. We also need access to sensor and device suppliers. In a perfect scenario, we also find distribution channels in other European countries to complement our existing network. We would be interested in participating in the cross-domain pilot use case at the port of Valencia (INTER-LogP). For example, during the transport of goods and other entities, sensor as well as actuator data has to be read, transmitted and stored. Some of this data will be sensitive data and could be protected with the SecurIoTy crypto proxy.

12.	What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.

Strength:
Management Team: we are highly focused and specialized
We have established a customer base using our crypto proxy technology, we can this knowledge to leverage the IoT market

Weaknesses:
We don't have the resources for big marketing campaigns

Opportunities:
Security is paramount for the safe and reliable operation of IoT connected devices. It is, in fact, the foundational enabler of IoT. SecurIoTy will provide an interoperable transparent security layer.

Threats:
Our customers are other corporations. Sales cycles, decision processes and investment cycles tend to be long compared with the decision cycles of an SME. Cash flow can become an issue.

13.	Which is your IPR vision?

We produce software which is difficult to protect in the EU and other territories. Software patents in Europe and in the USA are close to impossible to obtain, also their value is highly disputed. One reason for this is that technical details have to be released, potentially speeding up competitors in their efforts to innovate.

14.	Which is your open source vision? Is there any restrictions and limitations?

The core of our development is proprietary crypto proxy software. The adaptations and interface needed to interact with our security platform will be open source.

15.	When and how do you plan to place the product on the market?

Revenue is generated based on a SaaS Model. SecurIoTy is cloud based. Revenues are based on a recurring base fee plus recurring license fees. Payment is based on users or devices. On-premise is differently priced than off-premise.

16.	Describe your financing strategy for a 5 years' scenario

We bootstrap our marketing and sales efforts.

17.	Describe the expected impacts of your business idea

The INTER-IoT project aims at the design, implementation and experimentation of an open cross-layer framework, an associated methodology and tools to enable voluntary interoperability among heterogeneous Internet of Things (IoT) platforms. Security of such a framework is paramount for the safe and reliable operation of IoT connected devices. It is, in fact, the foundational enabler of IoT. Security at the device, network and application levels is critical to the operation of IoT. SecurIoTy will provide an interoperable transparent security layer.

18.	*Paying customer: how many of your direct customers can turn on potential customers?*

Our crypto proxy technology is in active use in enterprise file sharing and email systems. Some of these customers also run IoT projects. We expect however, that the intersection will be small and that IoT will define a new market segment for us.

Identified by: AvailabilityPlus GmbH	Registration Date: 30/05/2017

C10 e3tcity S.L.

Individual Exploitation Plan

Name of the partner: e3tcity S.L.		

Partner's type: SME	URL: www.e3tcity.com	Business Scenario selected: Transport/ Logistics

1. Partner's role in the project

E3tcity will supply 26 devices to control streetlighting in Valencia Port

2. Which is your strategy purpose? Business scenario selected. Which type of business model do you envision (B2B, B2C, etc.)

Our purpose is to provide INTER-IoT environment with real devices so that the platform can show its real power

3. Which problem do you resolve?

We solve the communication between any offline device and internet.

4. Which is your value promise?

Our value is to offer a reliable product focused on deployment, with real manufacturing capabilities

5. Offered services/products from the project

Devices included in the proposal:
- LS40: Outdoor streetlight controller with enhanced sensor capabilities. Turns streetlights into a Smart point of the city or facility, improving existing services and giving new ones.
- LB40: Indoor central controller that can measure and control a whole facility
- LC40: Outdoor streetlight controller designed to be cost effective.

6. Which is your target market? How big do you estimate the market?

Target market are SMEs already supplying services to towns, process improvement of private companies, device manufacturers and telecommunications providers. All of them provide expectations of more than 1000 million market.

7. How many interviews have you carried out till the moment? How many user stories have you collected? Are you satisfying the need of the customers?

More than 20 towns are using our technology, with around a hundred of interviews.

8. Results of interviews?

Many interests and several pilot facilities to test technology for bigger projects.

9. Which competitors are there and how do you differ from them?

There are some companies doing similar systems but focused on technology. Our focus is deployment, so that the system can be installed in thousands of locations

10. What level of technology do you expect to have at the end of the project (TRL). Which is your time estimation to bring your product to the market?

Already in the market

11. Which partners do you need or already have for the business implementation (outside of the

consortium)?
We look for partnerships with our strategical providers and customers. Natural partnerships already stablished are our manufacturers in Spain and Taiwan, streetlights manufacturers, and telecommunications providers.
12. What strengths and risks do you foresee for your business idea. Describe the SWOT Analysis.
Strengths ● **Reliable products** ● **Fast time to the market** ● **Already used in many towns Weaknesses** **Weaknesses** ● **Young company** ● **Small capital Opportunities** **Opportunities** ● **Market expanding** ● **Many interests from the market Threats** **Threats** ● **Competition** ● **Delay in market maturity**
13. Which is your IPR vision?
We own our products and software developments. In INTER-IoT we agree to open the SW pieces needed to connect our proprietary cloud to INTER-IoT platform
14. Which is your open source vision? Is there any restrictions and limitations?
Our cloud is already developed and proprietary. Little developments needed for this project will be open source
15. When and how do you plan to place the product on the market?
Already in the market, with several marketing actions per year such as fairs, mailings, and press news.
16. Describe your financing strategy for a 5 years' scenario
We have made several capital
17. Describe the expected impacts of your business idea
E3tcity technology will allow SW platforms to reach offline sensors and systems for many applications and use cases.
18. Paying customer: how many of your direct customers can turn on potential customers?
All of them, market is expanding in many directions so applications are unlimited by now.
Identified by: e3tcity, S.L · **Registration Date: 29/05/2017**

ANNEX D: Third Parties Joint Exploitation Plans

D1 TU WIEN

Joint Exploitation Plan

Name of the partner: TU WIEN	
Partner's type: **University**	**URL: www.tuwien.ac.at**

1.   Partner description

TU Wien (also known as Vienna University of Technology) (TUW) looks back on a long tradition at the leading edge of scientific research and education: Founded in 1815 as k.k. Polytechnisches Institut (Imperial and Royal Polytechnical Institute), it was divided into 5 faculties in 1865. One year later, the first freely elected rector was inaugurated. In 1872 its name changed to Technische Hochschule (College of Technology), and in 1902 the first doctorates were awarded. The institution has borne its current name Technische Universität Wien (TU Wien) – since 1975. In 2004 TU Wien reached full autonomy through the University Act 2002.

This project will be carried out by the Service Engineering Analytics team (rdsea.github.io), led by Prof. Hong-Linh Truong, at the Distributed Systems Group (DSG), Institute of Information Systems, Faculty of Informatics. We have a track record research in cloud computing, IoT, edge/fog computing, elasticity monitoring and analysis, multi-cloud deployment, middleware and collective adaptive systems of software, things and people, through various EU projects like H2020 U-test, FP7 FET SmartSociety, and FP7 STREP CELAR. TUW has investigated intensively the integration and elasticity of IoT, clouds, network functions, and people

2.   Partner's role in the project

TU Wien will work on INTER-HINC (Interoperability through Harmonizing IoT, Network Functions and Clouds), as a small open call project. TU Wien will contribute to a new middleware, programming APIs and models for interoperability within resource slices. We also contribute to dissemination and exploitation of INTER-IoT, especially INTER-HINC, to various universities, industrial research labs and teaching activities.

3.   Partner's strategy purpose

Our goals are to validate scientific work, which proposes new techniques to deal with interoperability, to provide knowledge for consulting services, to educate students and to train PhD, university
researchers. Furthermore, we would like to create joint effort and networking for future EU project proposals

4.   Offered services/products in the OS Community

We provide INTER-HINC as a framework implementing techniques for IoT interoperability at resource slides. We offer consulting services and training for IoT engineering and for how IoT can be interoperable with cloud services and network functions

5.   Joint Exploitation opportunities

Through joint publications, joint experiments, tutorials for industries and practitioners, and future EU proposals

6. OS License and IPR considerations
Most of our software can be free, open sources. If a special technique needs to be protected for commercial purpose, TU Wien will support patent and licensing models.

7. Business considerations
We consider business in a world-wide setting.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.
It would help to strengthen the middleware and offering services for commercialization w.r.t. consulting services, industrial exploitation, and knowledge transfers.

9. Issues to overcome
Funding for keeping human resources to continue to maintain and develop services/products.

Identified by: TU Wien	Registration Date: 31/05/2017

D2 INFOLYSiS P.C.

Joint Exploitation Plan	
Name of the partner: INFOLYSiS P.C.	interiot interoperability of heterogeneous IoT platforms
Partner's type: SME	URL: http://www.infolysis.gr/
1. Partner description	
INFOLYSiS P.C. (www.infolysis.gr) is an innovative start-up company specialising in Information and Communication Technologies (ICT), based in Athens, Greece. INFOLYSiS is committed to driving research results forward, achieving market introduction and commercialization in the following fields of expertise: Network Management and Monitoring, Software Defined Networking (SDN) and Network Functions Virtualisation (NFV), Internet of Things (IoT), Wireless and Satellite networks, Media-oriented and Content Delivery Networks and Quality of Experience (QoE) and Quality of Service (QoS) assessment. INFOLYSiS team includes highly qualified associate engineers of multiple ICT background, which have a strong focus on R&D with a long track record in EU- and national-funded research initiatives. They have actively participated in a number of ICT R&D projects and have authored or co-authored over 100 papers in international refereed journals and conferences. The company's business area includes system engineering and integration of SDN/NFV services (including IoT aspects), business intelligence, technoeconomic studies, digital marketing, R&D consultancy, and executive training. Especially in the field of IoT, INFOLYSiS portfolio includes two relevant IoT GW products for home automation and unmanned ground vehicles	
2. Partner's role in the project	
INFOLYSiS aims at piloting the INTER-Domain scenario of INTER-IoT, building on top of the following INTER-IoT use cases: ● **Business Scenario #9: Accident at the port area (INTER-LogP)** ● **Business Scenario #10 Health monitoring system with passengers aboard a ferry (INTER-LogP/Health)**	

- **Business Scenario #30: IoT access control, traffic and operational assistance (INTER-LogP)**
- **INTER-LAYER Scenario #41: SDN communications: functions virtualization and central management**
- **Scenario #55 SDN communications: traffic routing**

The proposed pilot considers an emergency situation where vessels with casualties are approaching the port where the health units/rescue teams should be prioritized/coordinated depending on the health condition of each casualty. The implementation and use of the SDN paradigm by SOFOS will speed up IoT connections, provide interoperability among different IoT health devices and centralize the management between the vessels domains and the port domain. Moreover, the SDN applicability will allow the prioritization of IoT data flows using traffic engineering, achieving a general overview of the whole network at any time. SOFOS pilot will provide at the first responders commander, who will coordinate the rescue teams, a unified view of IoT data visualisation. More specifically, the proposed SDN/NFV-enabled IoT GW will be used to provide interoperability between e-Health IoT systems on the different vessels with the coordination center at the port with scope to provide a common unified view of the patients/casualties and the location of the available rescue teams. For this purpose, a virtual mapping function that implements an existing interoperability standards commonly used in healthcare information systems will be deployed by the SDN/NFV orchestrator, offering interoperable and continuous data transmission, allowing to the coordinator to allocate at each available rescue unit the appropriate casualty.

3. Partner's strategy purpose

INFOLYSiS through its collaboration with INTER-IoT project will further develop its SDN/NFV Manager solution (currently in TRL6) in order to be suitable for commercialisation and reach TRL9.

In terms of commercialisation for the IoT SDN/NFV Manager, INFOLYSiS plans to sell annual licenses to use the software at a price range that depends on the number of VNFs that will be orchestrated and the enabled features, such as service composition, monitoring etc. The price range will be defined upon appropriate market analysis. Moreover, INFOLYSiS will use two different ways for the commercialisation of the proposed IoT mapping VNFs, which will be designed and developed within the framework of INTER-IoT. The business model for direct sales planned by INFOLYSiS follows the VNF as a Service (VNFaaS) paradigm. This means that the pricing scheme will be variable depending on the use and the type of the requested VNF. Following a draft approach, the estimated offer is divided in three groups depending on the type of company and level of needed IoT functions: (i) startup (1.500 €/month), for basic mapping functions; (ii) enterprise (3.000 €/month), for small companies that need appropriate traffic steering through a variety of VNFs in order to form a specific Network Service; and (iii) corporate (≥10.000 €/month), for any kind of company that need a high performance productive setup. Please note that all the pricing levels are estimates and the final prices will be defined upon appropriate market analysis.

4. Offered services/products in the OS Community

The proposed collaboration is fully in line with the aforementioned INTER-IoT challenge, since it aims at advancing the existing INTER-IoT framework with SDN and NFV functionalities towards a Software-defined end-to-end IoT infrastructure with IoT service chaining support. Thus, the proposal promotes the design and implementation of an Open Cross-Layer Framework for Interoperability of IoT Platforms through the agility brought by the combination of NFV and SDN, which allow software defined interoperable modules that map IoT protocols (such as 6Lo, CoAP, DICE, ACE, etc…) to standard IP networking to be automatically deployed and programmed at the INTER-IoT platform, bridging/providing interoperability at the underlying heterogeneous IoT platforms. In this way, the interoperability between different IoT platforms is achieved by establishing standard IP networking links and rules, which can be further handled by the middleware components and the middleware platforms of the INTER-FW, achieving unified and interoperable data transmission from all the underlying heterogeneous IoT platforms, with appropriate mobility and routing towards the application/service layer of the INTER-FW.

In terms of use and utilization of INTER-IoT components, the proposed collaboration aims at exploiting and advancing the hybrid INTER-IoT GW with SDN/NFV orchestration and virtualization capabilities.

Therefore, the proposed solution is totally in line with the INTER-IoT overall architecture and objectives, aiming at advancing the layer (and cross-layer) interoperability in order to provide a global continuum between heterogeneous IoT platforms, considering software defined interoperable modules for mobility and routing, as well as the implementation of smart IoT application service gateway with virtualization capabilities. Moreover, the INTER-IoT framework is significantly improved by the proposed SDN/NFV-enabled framework, because it

enhances the envisioned interoperability of the INTER-IoT framework and facilitates the interoperable management of a large number of diverse smart objects that currently operate utilizing a variety of different IoT protocols.

Finally, the proposed solution will facilitate through the unified management of heterogeneous IoT platforms, the definition of a common ontology which will facilitate access to the heterogeneous data, which will be collected and managed by the integrated IoT platforms. This ontology may be defined as an extension of already defined data modelling languages, used for the orchestration needs of the SDN/NFV domain, such as YAML. Similarly, in combination with the NFV orchestration module, the proposed solution facilitates the definition of a combined CASE-driven engineering methodology driving the application of the IoT platform interoperability framework in a unified way with the NFV/SDN orchestration.

5. Joint Exploitation opportunities

Depending on the viability of the INTER-IoT platform as a pan-European IoT platform, INFOLYSiS solution may become a technology enabler of IoT interoperability and therefore become a business partner of the INTER-IoT solution.

6. OS License and IPR considerations

Since our solution is software based, special IPR actions for knowledge protection do not apply. However, from the commercial perspective, depending on the way of exploitation specific actions may be taken (Protection of utility model, trademark and copyright protection).

7. Business considerations

Strengths: 1) INFOLYSiS team with a mix of competencies ranging from IT to finance, 2) Technical advantage – long experience of SDN/NFV orchestration, 3) Existing network of contacts with researchers and CTOs in many companies and organizations and 4) Strong market focus based on a market driven innovation strategy.

Weaknesses: 1) New technology, 2) INFOLYSiS is a new brand and 3) The integration of IoT with SDN/NFV will require to gain awareness among the end-users in order to understand and use it. This will increase the cost for successful market introduction.

Opportunities: 1) Problems with interoperability in IoT market, the main technology driver 2) Huge global market potential, 3) Market window is wide open

Threats: 1) Lack of funding for development and expansion, 2) Standardization activities to drive the market towards a small group of IoT protocols, minimizing the existing interoperability problem, 3) Data protection and privacy regulation to make difficult the applicability of the proposed innovation in EU.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

Interoperability is the crucial missing piece to the progress of IoT, as INTER-IoT project spots out. Currently, most IoT data are not used, due to the lack of interoperability, limiting down the potential economic value of IoT sector, given that interoperability is required for 40% on average and for nearly 60% of the deployed IoT platforms.

Towards maturing and integrating IoT interoperability, INFOLYSiS proposes to enhance the tools of INTR-IoT FW with an agile, highly automated IP network enabled by SDN and NFV. Specifically, the network performance requirements for supporting IoT interoperability demand SDN and NFV in order to put the interoperable IoT features and functions in place to drive large scale and multi-domain deployments. Softwarisation and virtualization (through the SDN/NFV paradigm) can be used to solve many of the scalability and interoperability problems previously plaguing the IoT sector, especially around flexibility, customization, sensors, security and analytics. More specifically the proposed SDN/NFV enhancement matures and integrates in INTER-IoT FW the following interoperability issues:

The ability to monitor and manage devices using the common management and monitoring layer of the NFV Orchestrator.

The ability to test APIs using common approaches and mechanisms via VNFs acting as mapping functions.

The ability to push and pull information from devices using the same interfaces, by steering the data flow by the SDN controller.

The ability to secure devices using third-party security software, which is deployed as virtual functions and orchestrated by the NFV Orchestrator.

Interoperability between IoT is extremely complex, but by creating a common IP network layer (instantiated by

SDN and NFV enabling technologies) is seen as the key place to provide interoperability between the underlying IoT device layer and the middleware/application layer, since applications to be developed will be easy to interact with the IoT devices through the INTER-FW API, which will be implemented through the instantiation of appropriate VNF mapping functions.

9. **Issues to overcome**

INFOLYSiS has not spotted any issue to overcome.

Identified by: INFOLYSiS P.C.	Registration Date: 30/05/2017

D3 Universitat Pompeu Fabra

Joint Exploitation Plan	
Name of the partner: Universitat Pompeu Fabra	interiot interoperability of heterogeneous IoT platforms
Partner's type: University	URL: www.upf.edu

1. **Partner description**

The Research Unit of Wireless Networks (WiNets), which belongs to the Engineering and Information Technologies and Communications Coordination Academic Unit (http://www.upf.edu/web/etic), is a multidisciplinary research unit mainly focused on the wireless (sensor) networks and their impact on the society. Basically, we are focused on the design and evaluation of new MAC and network protocols. These designs are done under multiple restrictions, such as Quality of Service or energy efficiency. The main issues covered are autoconfiguration, autoadaptation and cooperation, considered as the principal basis for the IoT. WiNets has wide experience in successful R&D project development, at national and EU levels.

2. **Partner's role in the project**

Third party.

3. **Partner's strategy purpose**

Our main purpose is that our INTER-HARE platform allows the INTER-IoT system to encompass in a transparent way and under the same platform two technologies (LPWAN and LPLAN) working in different frequency bands (868 MHz and 2.4 GHz).

4. **Offered services/products in the OS Community**

Design a new LPWAN technology flexible enough to transparently encompass both the LPWAN devices and multiple LPLANs while ensuring overall system's reliability.

5. **Joint Exploitation opportunities**

The main opportunity of the joint exploitation of both technologies (i.e., the INTER-IoT system with the INTER-HARE platform) is the ability to provide final customers with an end-to-end platform to easily integrate a great range of connected devices under the IoT ecosystem.
Specifically, the INTER-HARE protocol stack will be designed in order to fulfill the requirements of INTER-IoT and,

hence, INTER-HARE is always understood as part of INTER-IoT. The project itself intends to encompass the information collected from a set of LPWANs and transmit it to the INTER-IoT Gateway. Our development will be a complement able to be integrated in a common business plan in any of the use cases scenarios that the INTER-IoT consortium has identified. Hence, the common exploitation of both projects will be one of our premises.

6. OS License and IPR considerations	

The Innovation service of the university analyses in each case the IPR needs on every research executed by its personnel. In this case, in which the research is developed by many institutions, it is necessary to set an agreement among the different involved entities in order to protect the performed work. From our part, we offer this service in order to evaluate the best options that we could have to protect the results of the common project.

7. Business considerations	

The regulations of our university establish two possible ways of exploiting the research results. Moreover, the UPF will try to maximize the impact of the research on the society.
The possible ways established are:
- Exploitation of results by third parties: by means of using a license agreement third parties are able to exploit the research results.
- Exploitation of results by a created Spin-off: the university and its members can consider the creation a company to properly exploit the results.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.	

The roles that UPF could play for providing future support for the commercialization of the INTER-IoT platform are defined as follows:
- Consulting services to re-design and deploy part or the totality of the modules developed in a specific scenario.
- Technical maintenance of a real deployment under the restrictions of a previously signed Service Level Agreement.
- Training activities with regard to the technologies employed in the developed platform.

9. **Issues to overcome**	

-

Identified by: Universitat Pompeu Fabra	Registration Date: 24/05/2017

D4 NEMERGENT SOLUTIONS, S.L.

Joint Exploitation Plan	
Name of the partner: NEMERGENT SOLUTIONS, S.L.	interiot interoperability of heterogeneous IoT platforms
Partner's type: SME	URL: www.nemergent-solutions.com
1. Partner description	

Nemergent Solutions S.L. (nemergent) (http://www.nemergent.com/) is a recently established company quite

active in the prototyping and testing of 3GPP R13 MCPTT systems. The headquarters of the company are in Bilbao, Basque Country, Spain.

The company integrates a founding team with large experience in designing and prototyping novel Public Safety solutions over mobile broadband technologies, with an agile development team with vast experience in Internet technologies. The company core business areas are new generation mission critical systems and next generation citizen-to-authority (NG112/NG911) and emergency management technologies.

Nemergent's portfolio includes a complete MCPTT system made up of early implementations concerning MCPTT clients, MCPTT AS and MCPTT management servers. The server-side components are designed as NFV components, fostering agile and flexible deployments. The innovation-driven nature of the company promotes the establishment of research links with different UE, IMS and EPC leading companies.

In a short time, Nemergent has been able to gain considerable international visibility related to pre-commercial functional and interoperability testing, such as participation in the first ETSI MCPTT Plugtest and deployment of the Nemergent MCPTT AS in the US PSCR laboratory.

Following the current tendencies, the company roadmap considers the evolution of the current portfolio towards the integration of IoT technologies as a key source of real-time information for the prevention and management of safety incidents. In this path, the proposals of the INTER-IoT project offer a good opportunity to gain the insights about what different heterogeneous IoT platforms can provide.

2. Partner's role in the project

Nemergent Solutions SL is an external participant through the INTER-IoT open call. The contribution is identified as Mission Critical operations based on IoT analytics (MiCrOBIoTA).
Nemergent's portfolio includes a series of components focused on deploying mission-critical communications over modern mobile broadband networks, with special focus on the new wave of 3GPP specifications for Mission Critical Push-to-Talk (MCPTT), Mission Critical Video (MCVideo) and for Mission Critical Data (MCData).
In the scope of the collaboration with INTER-IoT, Nemergent proposes to evolve the current portfolio to include the management of mission critical events by monitoring different heterogeneous IoT platforms. This is a hot topic nowadays, and the solution proposed by INTER-IoT seems suitable to accelerate the access to the technology for an external developer.
Nemergent proposes to develop a "MC-IoT monitoring and analytics" that will use the INTER-FW tools to access the INTER-IoT system, and which will be integrated into the Nemergent backend and frontend components. Thus, Nemergent role will be one external application developer over the INTER-IoT platform.

3. Partner's strategy purpose

From the Business scenarios and Scenario use cases identified in INTER-IoT D2.4, Nemergent has identified the following items as more relevant for the proposed contribution.

INTER-LogP/Health scenarios

- **Accident at the port area // Readiness = High**

The port of Valencia has an emergency control centre (CCE) to manage incidents taking place within the port and to coordinate with other first responders (police, firefighters, ambulances, etc.). The objective is to interoperate the wearable medical devices with IoT platforms such as the road haulier company and the port emergency control centre are able to react quickly, thus reducing time responses during accidents and health prevention.

The testing of this scenario could be part of emergency simulation exercises that are executed periodically at the port area.

This use case is the starting point for MiCrOBIoTA.

The involved IoT Platforms are:

- Port authority IoT platform

- Road haulier IoT cloud platform

- Container terminal IoT platform

Nemergent aims at contributing to this use case by developing an external application which will be able to interface with the different IoT platforms involved. The external application will gather accident alarms and will be able to identify possible sources of information related to the incident. The GUI will enable the CCE staff to send the most relevant information (guided route, health monitoring, location of actuators) to the different emergency units (e.g., an ambulance) connected to the integral system.

- **Health Monitoring System // Readiness = Medium**

The objective of these scenarios is to create an IoT cloud platform that will allow passengers of different transportation modes to connect their wearable devices that monitors their ECG, SPO2, blood pressure or temperature. This platform will be connected with their respective e-health or e-care platform and it will establish a new form of triage in order to detect and tackle health problems during long distance trips. The scenario can also be extended to truckers.

If available, this use case would be useful to enrich / complement the previous use case.

In a simulated accident with a surrounding ferry, the CCE could access the Ferry IoT platform in order to gather body sensor information of the people onboard, and to provide this access / information to the first responders (e.g., ambulance staff).

INTER-LogP scenarios

- **Monitoring of containers carrying sensitive goods // Readiness = High**

IoT platform to monitor containers (managed by the owner of the container) with sensitive goods.

If interesting for the INTER-IoT consortium, the previous use cases could be extended with the monitoring of sensitive goods.

In a simulated accident scenario, the CCE (through Nemergent application) would have access to the container IoT platform and emulate an incident with dangerous freight.

This information would be collected, digested and forwarded to the relevant first responder (e.g., fire-fighter).

- **SCADA port sensor system integration with IoT platforms // Readiness = Very High**

Interoperable IoT platform using the existing SCADA system (supervisory control and data acquisition system) used to monitor different sensors, telemetry and actuators devices, such as marine buoys, navigation aids or pollution sensors) which are currently installed in the port.

If interesting for the INTER-IoT consortium, the previous use cases could be extended with the monitoring of sensitive context information of the different probes.

This information would be collected, digested and forwarded to the relevant first responders (e.g., police for

evacuation, fire-fighter for early identification of risks, ambulance staff for early awareness of problems).

4. Offered services/products in the OS Community

Nemergent Solutions S.L. aims at integrating a new "IoT monitoring and analytics" component in its mission critical product portfolio, and especially into the Nemergent Control Room application. Next figure illustrates the overall Nemergent mission critical applications framework that will be used in the project, and the specific extension proposed in the scope of MiCrOBIoTa.

In order to support the use case demonstration, Nemergent will provide access to different specialised equipment endowed with the corresponding SW:

- **Nemergent cloud system**
  - **Access to INTER-IoT system.**
  - **Filtering of data.**
  - **Allowing access to the involved organisations (Port Authority and potentially first responders).**
- **3x Rugged LTE smartphones for field units (first responders, port staff)**
  - **Nemergent MCPTT Client SW.**
  - **Simple GUI for accessing relevant INTER-IoT data.**
- **1x Rugged LTE tablet for first responder (e.g., ambulance)**
  - **Nemergent Client SW with MCPTT communication capabilities.**
  - **Adapted GUI for displaying relevant information for the intervention.**
  - **Tailored GUI for quick and easy sending of status and reports.**

5. Joint Exploitation opportunities

In the scope of the collaboration with the INTER-IoT consortium, common synergies are identified from a preliminary analysis. Nemergent will be able to accelerate the access to good number of IoT platforms in a simplified way, which may open new business scenarios (e.g., different contacts have been made taking in the scenario of developing Smart Cities). Yet, Nemergent will require the support / licensing from the INTER-IoT consortium to deploy services with the currently available platforms or potentially new IoT platforms in the future.

At the same time, the INTER-IoT consortium (or some individual members, depending on the foreground

agreements) would benefit of future Nemergent activities since specific modules and support will be required.

It is clear that, in any case, common commercial activities are needed in order to develop productive business models for both parts.

In the process of designing the business model, the INTER-IoT consortium / partners are identified at two levels. Next figure presents the outcome of the business model design following the CANVAS model. The relationships with the INTER-IoT consortium are identified in gray color.

The Business Model Canvas

Designed for: **MICrOBIoTA** Designed by: **Nemergent Solutions** Date: 23/05/2017 Version: 1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
Integrators	Technology development	Integration with MCPTT	Specialized technical support through integrator	IoT platform owners with Mission Critical issues
Business developers	Technical assistance	Understandable metrics from massive IoT data for multi-sector vertical markets		
INTER-IoT partners	Standardization, industry fora and interoperability pilots	Homogeneized treatment of heterogeneous IoT data from different platforms		

Key Resources
- Specialized technical staff in MC operations
- Specialized technical staff in 3GPP specifications
- IT systems

Channels
- Pre-sale activity
- Industry forums and dissemination activities
- Web site
- INTER-IoT partners

Cost Structure
- SW licenses and HW/SW fees
- INTER-IoT components
- Travel expenses
- Human resources
- Fixed costs

Revenue Streams
- Technical support and upgrades
- Enhanced control room with MCPTT and inter-IoT capabilities

First, we identify two possible market models for the product resulting from the MiCrOBIoTa project.

Individual exploitation of the evolved Control Room system, requiring the adaptation of the connector to the specific underlying IoT platforms. This situation may happen when the service provisioning is through a third party integrator not allowing in INTER-IoT components, when the target IoT platform is not supported by INTER-IoT, or when the economics of the INTER-IoT licensing do not fit the overall economical picture.

Joint exploitation of the MC-IoT system, including the integrated access to the underlying IoT platform(s) through the INTER-FW system. This situation will allow us to avoid the necessary re-engineering efforts and a quicker exploitation of the solution. The SW licensing cost and fees need to be carefully evaluated.

Second, we identify different communication and marketing channels. As explained in the individual exploitation plan, Nemergent is initially positioned as technology provider in the value chain. Up to now, most of the exploitation activities are linked to third parties with better track record and direct communication with end users. Therefore, the two exploitation channels identified are:

Individual or joint channels not related to INTER-IoT partners.

Potential opportunities resulting from the INTER-IoT collaboration. Different INTER-IoT partners cope with the

role of end users or integrated solution providers, which could bring common opportunities.

6. OS License and IPR considerations
Generally speaking, the current portfolio is based on open specifications. The timeliness and quality of the developments are differential here. Specific components such as internal QoS/QoE management schemes need to be protected, but we usually look for agreements with our research partners.

7. Business considerations
Although we truly believe on the innovation proposals related to this project, the market is still in its early stages. End users are generally positive with the ideas and mock-ups presented (also by competitors) but the eventual adoption of the products depend on many collateral aspects, such as the current product lifecycles and the international economical situation.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.
As third party in the role of external application developer, Nemergent does not feel the need to participate in the sustainability of the core INTER-IoT platform. However, we could contribute to the requirements / design / early testing of the future evolutions of the related components such as the INTER-FW, or to the evolution of key features such as the semantic aspects.

9. Issues to overcome
Potentially, certification aspects for highly critical systems or communications. Security and reliability aspects would need to be guaranteed.

Identified by: : NEMERGENT SOLUTIONS, S.L	Registration Date: 29/05/2017

D5 IRIDEON ,S.L

Joint Exploitation Plan
Name of the partner: IRIDEON ,S.L

Partner's type: SME	URL: www.irideon.eu

1. Partner description
IRIDEON S.L. (www.irideon.eu) is a Spanish-German company, founded by a multidisciplinary team of engineers with experience in industry and academia. Since 2014 this team provides technical consultancy services and solutions to companies and research organizations throughout Europe, primarily in the field of information and communications technologies (ICT) and sensor systems. We also assist companies in the design, fabrication, assembly and housing of ready-to-market electronic products. To this end, we have developed a disruptive, standards-based platform for the development of fast time-to-market IoT solutions, called Senscape®. We are continuously developing the Senscape® platform and its hardware and software components, as a means to provide rapid, customized sensor-based mobile applications for our clients. One of the key aspects of our business model is to use our proprietary Senscape® platform to develop disruptive

sensor-based mobile applications for sectors including health, environment, agro-food, security, energy, transport, etc. Public and private entities all over Europe already use solutions provided by IRIDEON. We are a young and small gazelle company, with a consolidated international presence and an outstanding and diversified customer base.

Some of our customers: UPF (Spain), UPC (Spain), Queen Mary Univ. London (UK), Institute for Microelectronic and Mechatronic Systems (Germany), LensWista AG (Germany), Bioapplications Ltd (Greece), Solardynamik GmbH (Germany), Chargezone Ltd (UK), Plugwise (Netherlands), Biosystemes (France), Dunaga Kft (Hungary), Aegean (Turkey), Avia-GIS BVBA (Belgium), Nazca IT Solutions B.V. (Netherlands), Plasmachem GmbH (Germany), AB Liros Electronic (Sweden).

2. Partner's role in the project

We will contribute to the INTER-IoT project with a new open tool called SENSHOOK, to enable full interoperability of our Senscape® IoT platform with other IoT platforms and services, and fully exploit the unique selling points of our existing technology.

3. Partner's strategy purpose

1. Sale of Senscape® licenses to 3rd party developers, with a yearly fee for updates and support, with SENSHOOK always provided as an open-source software. Types of Senscape® licenses: (1) Open Source, to encourage universities and research centers to contribute with new hardware and software extensions to the Senscape® ecosystem; (2) Library, development of Senscape® embedded applications using binaries; (3) Source code, to allow modification of the Senscape® core libraries, with a confidentiality agreement.
2. The provision of services, e.g. to develop custom solutions, with SENSHOOK installed as a component of an in-house or private cloud or b) as-a-service. Costs for the development of the new application will be borne by IRIDEON, with an agreed minimum number of devices to be manufactured by IRIDEON. IRIDEON will charge a monthly fee based on the number of devices connected to the server.
3. Provide own products based on Senscape®, with SENSHOOK installed as a software component of the final solution. In the course of the project we will pilot one of these products. Smart Mosquito Trap

4. Offered services/products in the OS Community

1. Senscape® licenses to 3rd party developers, with a yearly fee for updates and support, with SENSHOOK always provided as an open-source software.
2. The provision of services, e.g. to develop custom solutions, with SENSHOOK installed as a component of an in-house or private cloud or b) as-a-service.
3. Provide a Smart Mosquito Trap based on Senscape®, with SENSHOOK installed as a software component of the final solution.

5. Joint Exploitation opportunities

UPV- Senscape® + SENSHOOK can be used as a tool in their Master and PhD programmes
Prodevelop- Use Senscape® + SENSHOOK to provide IoT sensing applications embedded as ground nodes in their geospatial solutions
VPF- Provide the Smart Mosquito Trap solution based on Senscape® + SENSHOOK. Container ports must have implemented surveillance networks to detect invasive species carried in transported goods, being mosquitoes one of the most important ones. The Health Agencies of Spain expect that at any time the mosquito responsible for the spread of Zika Virus (Ae Aegypti) in South, Central and North America, and Southeast Asia, will soon arrive transported in cargo ships. making Ports part of the first line of surveillance and defense
XLAB- As hardware developers we are natural key partners of this company, which can benefit from IoT applications developed with Senscape® + SENSHOOK

6. OS License and IPR considerations

Key IPR items are: 1) the SENSHOOK open tool, 2) SENSOS operating system, and 3) the design of our baseboards. We have carried out a freedom to operate analysis, and do not foresee any IPR conflicts.
Strategy for IPR protection: The Senscape® framework (source code) will be protected as a trade secret and enjoy copyright protection as original work under the Directive 2009/24/EC on the legal protection of computer programs. Design documents on our hardware platforms will be distributed, under a Creative Commons license or under an open source hardware license with the same effect.

SENSHOOK will be provided as an open-source software and available in GitHub for free downloading
Regulatory and standards issues: The Senscape® framework will comply with IEEE 802 IoT standards, IEEE 1451 (Smart Transducer Interface Standard) and IEEE 11073 family of standards for medical-device communication. We will follow the IEEE P2413 working group, responsible for designing the standard for an Architectural Framework for the Internet of Things (IoT). The Senscape® hardware will comply with the required EC Directives including the EMC and LVD Directives.

7. Business considerations

Based on our experiences, and a preliminary business assessment, we have concluded that to meet our customer needs, and to unlock the full commercial potential of our Senscape® products and services, we need to develop our own middleware: SENSHOOK. SENSHOOK will allow IRIDEON deliver an open, interoperable, disruptive, standards-based tool for the development of end-to-end IoT applications according to the INTER-IoT framework. This will allow us to address a wider range customers and applications, and to grow our revenue and the company, via more customer projects, via licensing of Senscape® platform, and exploitation of SENSHOOK as an open tool to easily integrate Senscape® hardware products in an in-house or private cloud solution, or as-a-service.

The novelty and advantages of SENSHOOK include:

• Adapts one of the major international standards for the control and reading of smart transducers: IEEE1451, and makes it compatible with existing lightweight data communication protocols and data formats used in IoT applications.

• Quick and easy integration of all Senscape® hardware devices, supporting Senscape® unique and advanced features.

• Full interoperability with 3rd party IoT platforms and services.

• Sensor-centric approach, in which each sensor or actuator can be discoverable, accessible, and usable via TEDs described in the standard, and sensor data can be automatic and correctly transformed before being processed and analyzed for an upper application layer.

• Developers do not need be 100% aware of the particular characteristics/specifications of each sensor, which will reduce analysis errors, and simplify the publication and sharing of results.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

IRIDEON will contribute to INTER-IoT project by providing a new open tool for the INTER-LAYER building block, which will allow the evolution of products based on INTER-IoT, but at the same time will allow us to evolve our products in order to add new interoperability features. By contributing to the development of INTER-IoT, IRIDEON will can address new IoT scenarios in which different IoT platforms, apart from those based on Senscape®, are involved, and also in those in which more than one application domain is addressed.

Senscape® Interoperability with INTER-IoT will be done at device level. Senscape® IoT devices will be accessed/controlled through a unifying interface and integrated into any of the following IoT platforms: FIWARE, OPENIOT, OM2M and/or MW2MW. This interoperability solution at device level will be achieved through a Device to Device Gateway (D2D Gateway)

9. Issues to overcome

• *Sales team has to be expanded.*
• *Need to improve our network outside Europe*
• *Disruptive nature of the product may require training of, and adaptation by customers.*
• *Marketing actions will require process demonstrations and publication of results.*
• *Low R&D budget*

Identified by: IRIDEON , S.L	**Registration Date: 03/06/2017**

D6 Athens University of Economics and Business – Research Center (AUEB)

Joint Exploitation Plan	
Name of the partner: University	interiot interoperability of heterogeneous IoT platforms
Partner's type:	**URL: http://www.aueb.gr** **http://mm.aueb.gr**

1. Partner description

The Athens University of Economics and Business (AUEB) is a dynamic institution of higher education in Greece, founded in 1920. It comprises eight departments, grouped into three schools; the departments of Informatics and Statistics form the School of Information Sciences and Technology. There about 200 faculty, about 8000 undergraduate students and about 4000 graduate students. AUEB participates in the project through the Mobile Multimedia Laboratory (MMlab) led by Prof. Polyzos. In the MMlab 6 faculty members, 2 PostDocs, 4 PhD students and many MSc and undergraduate students are currently collaborating in research projects.

The MMlab, has expertise and experience in wireless mobile multimedia networking, in economic and incentive mechanisms, in business and economic modelling, in privacy, security & trust issues and technologies, and in relevant software implementation & integration activities. It has been part of many recent research efforts and projects in Future Internet design, especially in Information-Centric Networking (ICN). Before joining AUEB, Prof. Polyzos and his group at UCSD, were among the pioneers of IP-based wireless and mobile communications, collaborating on many Internet studies with the San Diego Supercomputer Center, a key node on the original Internet backbone and for the evolution of the Internet.

The MMlab has a strong track record in EU projects, participating with key roles in projects such as POINT (H2020), PSIRP, PURSUIT, EIFFEL (FP7) MMAPPS, DBGlobe, M3I (FP6), and the Networks of Excellence: Euro-NF (FP7), Euro-FGI, Euro-NGI (FP6). In addition, it has received funding and has completed or is participating in other research projects: e.g., national (I-CAN), industrial (e.g., the Microsoft Research US funded ARCHANGEL) and European Space Agency funded ones (e.g., φSAT: the Role of Satellites in the Future Internet, Service Delivery over Integrated Satellite and Terrestrial Networks, and the Network of Excellence SatNEx-IV).

The MMlab has obtained considerable expertise in the field of IoT through its participation in various research projects. With Microsoft Research funding, in project ARCHANGEL, MMlab investigated security issues in e-health services based on IoT technologies. In the recently completed national project I-CAN, MMlab developed ICN-based solutions for improving IoT access networks, including for IoT and D2D communication. For the H2020 POINT project, MMlab extends a large scale ICN testbed to include IoT devices and gateways, designs and implements CoAP-to-ICN gateways, and designs solutions for improving IoT performance, providing security and realizing interoperability using ICN. Finally, in the European Space Agency funded project SatNEx-IV, MMlab investigates how ICN and SatCom can help realize and support the IoT, extending coverage and improving various properties.

In 2016 Prof. Polyzos introduced and taught (with the support of MMlab members) a new advanced graduate course on the IoT, where students had the chance to experiment with the RIOT operating system, as well as with the FIT IoT testbed. Moreover, MMlab members have supervised a number of M.Sc. theses in the field of IoT. Finally, the MMlab, through Dr. Nikos Fotiou, has contributed to the Charm-Crypto cryptographic library.

Recently, the MMlab started the process of spinning-off a start-up that will offer access control as a service for the IoT. The effort received the "Research Impact Award" of the Ennovation 2016 Digital Innovation and Entrepreneurship contest in December 2016. Finally, Prof. Polyzos and Dr. Fotiou, have considerable experience in the field of access control. Their access control solution, originally developed for ICN (and which is the basis of the ACHILLES approach), has received a best paper award and it is mentioned as a candidate solution in RFCs 7476, 7945, and 7927.

2. Partner's role in the project

External collaborator

3. Partner's strategy purpose

Recently, the ACHILLES project members started the process of spinning-off a start-up that will offer access control as a service for the IoT. The effort received the "Research Impact Award" of the Ennovation 2016 Digital Innovation and Entrepreneurship contest in December 2016. ACHILLES results will be exploited towards the further improvement of the innovation capacity of this start-up and will improve its portfolio. Moreover, the ACHILLES project will pursue the adoption of the ACHILLES approach by other initiatives, such as research projects, open platforms, and open IoT operating systems.

4. Offered services/products in the OS Community

The ACHILLES project will extend the INTER-IoT platform to provide gateway/Thing mutual authentication, user/gateway (or Thing) mutual authentication, and access control. The ACHILLES project will provide software for Things, end-user applications, Java OSGi modules for the INTER-IoT gateway, and it will leverage INTER-FW API and Tools so that end-users will be able to create, modify, and access protected services. The ACHILLES OSGi modules will target the D2D layer of the INTER-LAYER

5. Joint Exploitation opportunities

The ACHILLES team will participate and contribute to INTER-IoT's exploitation activities. Moreover, it will pursue the establishment of partnerships with INTER-IoT consortium members.

6. OS License and IPR considerations

The software we have produced up to now is and what we plan to develop for INTER-IoT will be open-source. But we also plan to produce some non-free software (to be licensed) that will implement interaction with proprietary user management systems.
The team currently does not have plans for patents.

7. Business considerations

ACHILLES targets three types of customer segments: Enterprises that offer IoT solutions and wish to enhance the security of their products (and henceforth will be referred to as developers), enterprises that wish to integrate their user management system into an IoT solution (and henceforth will be referred to as integrators), and enterprises that offer user management as a service (e.g., social networks) and wish to leverage their service by including the ACHILLES approach and protocol (and henceforth will be referred to as providers).

Developers

Many enterprises offer IoT systems (e.g., home automation, smart agriculture). The security of these systems is often based on proprietary solutions. However, this has many drawbacks: these solutions are not thoroughly investigated, they cannot be easily integrated into existing infrastructure, and usually impede application development. ACHILLES aims to be an open standard that can be seamlessly embedded into IoT platforms.

Integrators

Enterprises usually maintain multiple user management systems (e.g., for their employees, for their customers, etc.). An enterprise that wishes to integrate IoT in its production line, or as a B2B/B2C service, will be reluctant to develop and (more importantly) maintain yet another user management system. Using ACHILLES, these enterprises will be able to incorporate their existing user management system in an IoT solution.

Providers

Many enterprises base their business/products on user management (e.g., social/professional networks, identity providers, federation systems). These enterprises will be able to offer innovative services to their customers by integrating ACHILLES. These enterprises will not offer new IoT products; instead they will allow IoT innovators to

build products that leverage the providers' services.	
8. **Role on the long-term sustainability of INTER-IoT Platform for commercialization.**	
The ACHILLES project will contribute to the following with respect to the sustainability of the INTER-IoT Platform for commercialization: • It will enable the integration of existing user management systems into INTER-IoT based IoT platforms. • It will facilitate Thing configuration and security management, including Thing to gateway authentication and handling of security breaches. • It will facilitate interoperability, innovation, and B2B services. • It will Provide open tools and APIs for creation and access of protected resources.	
9. *Issues to overcome*	
• *Formal verification of the proposed protocol.* • *Integration with INTER-IoT platform.* • *Official establishment of the spin-off company*	
Identified by: AUEB	Registration Date: 28/05/2017

D7 University of Twente (UT)

Joint Exploitation Plan	
Name of the partner: University of Twente (UT)	
Partner's type: **University**	**URL: www.utwente.nl**
1. **Partner description**	
The SCS group (http://scs.ewi.utwente.nl/) within the Computer Science department of the UT develops methods and techniques for IT-systems design that balance efficient and effective services, system security and user safety. The "Services" subgroup especially considers the design of distributed and decentralized software systems that are able to provide smart services to their users based on context- and situation-awareness. The group has a long experience in the field of context-aware systems, e-Health interoperability standards, model-driven engineering, ontology-driven conceptual modeling and design science for software engineering. The SCS research profile is aligned to the INTER-IoT requirements, such as addressing semantic interoperability in the INTER-DOMAIN scenarios.	
2. **Partner's role in the project**	
Research collaborator. Developer of an Early Warning System (EWS) for the INTER-IoT application layer addressing the scenario of accidents at the port area.	
3. **Partner's strategy purpose**	
Apply the research on IoT interoperability in real scenarios of data integration.	
4. **Offered services/products in the OS Community**	
● **Application: IoT Early Warning System (EWS) to detect and alert accidents with trucks at the port area**	

[9]   ●   IPSM: Ontology alignment (semantic translations) of SSN x SAREF
5.   **Joint Exploitation opportunities**
Submission of joint research, resulted from the collaboration, to conferences and journals. Support research events, as workshops and courses.
6.   **OS License and IPR considerations**
The services/products offered will follow the Open-source model.
7.   **Business considerations**
Open source market can be sustainable through services (e.g. IT consultants).
8.   **Role on the long-term sustainability of INTER-IoT Platform for commercialization.**
IT consultant
9.   **Issues to overcome**
•   *C1: How to process sensor data using ontologies and standards such as SAREF, W3C SSN, OASIS EDXL-DE (distribution) and EDXL-RM (sensor allocation)?* •   *C2: How to integrate sensor data with domain-specific ontologies and standards? In the emergency domain, relevant ontologies and standards include OASIS EDXL for alerting (CAP), situation reporting (SitRep), tracking victims (TEP) and hospital availability (HAVE); and can include e-Health, logistics and environmental.*

Identified by: INTER-IoT-EWS	Registration Date: 01/05/2017

D8 Consiglio Nazionale delle Ricerche - Istituto di Tecnologie Industriali e Automazione (CNR-ITIA)

Joint Exploitation Plan	
Name of the partner: Consiglio Nazionale delle Ricerche - Istituto di Tecnologie Industriali e Automazione (CNR-ITIA)	inter**iot** interoperability of heterogeneous IoT platforms
Partner's type: **Research** **Organization**	**URL:** www.itia.cnr.it
1. **Partner description**	
As an institute of the National Research Council, CNR-ITIA has the institutional tasks of performing, promoting, disseminating and improving research activities for the scientific, technological, economic and social development of the Country. CNR-ITIA, as a promoter of industrial innovation, performs strategic activities of Scientific Research and Technological Development for the Competitiveness and Sustainability of Italian and European Manufacturing Industries. People involved in the project deals in particular with the "Digital Factory". Current challenge in manufacturing engineering consists in the synchronization of product, process and factory lifecycles. The latter are integrated through a factory-level framework, in order to strengthen the	

competitiveness and to support the development of new employment, prosperity, sustainability and social cohesion.

2.	**Partner's role in the project**

Design and Development of a semantic middleware to enhance semantic interoperability of IoT devices.

3.	**Partner's strategy purpose**

-

4.	**Offered services/products in the OS Community**

The result of the proposed project is software application (product) enhancing semantic interoperability.

5.	**Joint Exploitation opportunities**

The Semantic Middleware is a value driver, i.e., a technological component which contributes to extracting value from the value nodes (here meant as all the devices connected to third-party platforms integrated with INTER-IoT) in order to obtain a value added from the whole platform of platforms. All value nodes exchange values with one another, so that the business model is not oriented to a particular point of view, i.e., by identifying value pillars, managers will be able to broaden their views on business model development and procedures from a single-company perspective to a broader, ecosystem context.

6.	**OS License and IPR considerations**

No restrictions on the released artifacts.

7.	**Business considerations**

Since one of the main objectives of the project is the validation of the developed prototype in order to prove the adequacy of the technological choices made, the resulting product can be framed between the values 5 and 6 of the Technology readiness levels (TRL). After the completion of the project, the idea is to take the actions needed to get it to TRL 9, which allow to realize a finished and fully functional product in the real environment. These actions to the next levels of TLR-scale support the realization of the project objectives, which aim to develop components of usability, adaptability, extensibility, flexibility and portability, making it easier and potentially faster the technology transfer of the product Semantic Middleware towards different fields.

8.	**Role on the long-term sustainability of INTER-IoT Platform for commercialization.**

CNR-ITIA is willing to invest on industrialization and distribution of the product, covering the entire innovation chain, from industrial research up to engineering, industrialization and marketing. On the one hand, CNR-ITIA will make available its expertise acquired through various different research projects. On the other hand, it will leverage the cooperation with other industrial and scientific partners. In addition, we consider particularly important the possibility to integrate synergistically CNR-ITIA efforts with the partners' initiatives of INTER-IoT project.

The industrial exploitation plan includes the following actions:
- Within 6 months of the end of the project, we will evaluate the possibility to register the trademark Semantic Middleware. Also, we will define a marketing strategy to bring the final product to a large group of end users, exploiting various channels.
- Within 6 months of the end of the project, we will release an updated version of Semantic Middleware as a finished product and is fully functional (TRL 9).

The market target will affect the following Customer Segments:
- IoT platforms owners/providers
- IoT devices owners/providers
- IoT platform integrators

9.	**Issues to overcome**

-

Identified by: CNR-ITIA	**Registration Date: 31/05/2017**

D9 AvailabilityPlus GmbH

Joint Exploitation Plan	
Name of the partner:	interiot interoperability of heterogeneous IoT platforms
Partner's type: **Industry Organization, SME, (Research** **Organization)**	**URL: www.docraid.com**

1. Partner description

AvailabilityPlus GmbH (APlus) is an SME based in Berlin. AvailabilityPlus was founded by Professor Miroslaw Malek from Humboldt University Berlin and Dr. Guenther Hoffmann. AvailabilityPlus GmbH is developing software to protect industrial and private users against cyber threats. We cover enterprise file sharing (EFS), email protection, sharepoint protection, IoT security and vulnerability assessment. Our products include DocRAID®, SAFEMAIL and SHIP-IT®. Enforcing data security, access, and availability is central when sharing information in health-related services, at multiple endpoints such as IoT systems, for data at rest and in transit. DocRAID® solves the problem of loss of data control, business data leaks and cyber- attacks against business-relevant and private data. DocRAID® deploys on-premise, off-premise and on hybrid storages. DocRAID® is a zero-knowledge service provider, i.e. we know nothing about the data we store and transfer.

The AvailabilityPlus team has been able to build significant expertise over the past ten years in the domain of IT-, information- and cyber-security. The team has developed methodology as well as software for the analysis, the handling and protection of critical infrastructure such as health care systems and other complex IT systems. Major clients include the German Federal Ministry of Information Security (BSI), our methods and software can be downloaded from their website.

DocRAID® is a multi-award-winning enterprise file sharing system to securely save and share documents. It solves data protection issues in the EU/US and also makes it easy to support governance and compliance regulations. You host it on-premise or off-premise in our data centers. One of the USPs we offer is to CloudRAID the data across multiple jurisdictions which will give additional protection against state and legal sponsored attacks.

SAFEMAIL is an email crypto proxy that makes it easy to protect your emails and get up and running within minutes. There is no complex and expensive PKI required and there is no process change attached.

SHIP-IT® was developed for the German Federal Ministry of Information Security (BSI). It models complex IT systems and finds automatically vulnerabilities in your IT architecture.

APlus is an open call participant, offering cross layer, cross domain IoT security services.

2. Partner's role in the project

We will be offering cross layer, cross domain IoT security services

3. Partner's strategy purpose

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.

4. Offered services/products in the OS Community

SecurIoTy is a smart cyber security solution based on our DocRAID® crypto proxy technology to secure the internet of things, addressing all security dimensions: confidentiality, integrity and availability. SecurIoTy will provide an important building block for the establishment of safe, reliable and large scale IoT systems.

5. Joint Exploitation opportunities

We need PoC partners such as the Port of Valencia to validate and fine tune our approach. We also need access to sensor and device suppliers. In a perfect scenario, we also find distribution channels in other European countries to complement our existing network. We would be interested in participating in the cross-domain pilot use case at the port of Valencia (INTER-LogP). For example, during the transport of goods and other entities, sensor as well as actuator data has to be read, transmitted and stored. Some of this data will be sensitive data and could be protected with the SecurIoTy crypto proxy.

6. OS License and IPR considerations

We produce software which is difficult to protect in the EU and other territories. Software patents in Europe and in the USA are close to impossible to obtain, also their value is highly disputed. One reason for this is that technical details have to be released, potentially speeding up competitors in their efforts to innovate.

7. Business considerations

The INTER-IoT project aims at the design, implementation and experimentation of an open cross-layer framework, an associated methodology and tools to enable voluntary interoperability among heterogeneous Internet of Things (IoT) platforms. Security of such a framework is paramount for the safe and reliable operation of IoT connected devices. It is, in fact, the foundational enabler of IoT. Security at the device, network and application levels is critical to the operation of IoT. SecurIoTy will provide an interoperable transparent security layer.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.

Security is paramount for the safe and reliable operation of IoT connected devices. In order for IoT to become widespread, security issues have to be resolved. SecurIoTy will address all IoT security dimension such as confidentiality, integrity and availability for data in transit and at rest.

9. Issues to overcome

n/a at this point in time

Identified by: AvailabilityPlus GmbH	Registration Date: 30/05/2017

D10 e3tcity S.L.

Name of the partner: e3tcity S.L.

Partner's type: SME	URL: www.e3tcity.com

1. Partner description
E3tcity manufactures devices adapted to IoT concept. The company focuses on Smart City and Smart Facilities markets.

2. Partner's role in the project
E3tcity will supply 26 devices to control streetlighting in Valencia Port

3. Partner's strategy purpose
Our purpose is to provide INTER-IoT environment with real devices so that the platform can show its real power

4. Offered services/products in the OS Community
Devices included in the proposal: - LS40: Outdoor streetlight controller with enhanced sensor capabilities. Turns streetlights into a Smart point of the city or facility, improving existing services and giving new ones. - LB40: Indoor central controller that can measure and control a whole facility - LC40: Outdoor streetlight controller designed to be cost effective.

5. Joint Exploitation opportunities
E3tcity devices expand INTER-IoT capabilities by providing real field sensors and control devices. Any IoT project can be implemented by using both elements.

6. OS License and IPR considerations
All developments already done by e3tcity, including its devices and its own platform and user applications will remain property of e3tcity.

7. Business considerations
E3tcity has already deployed many devices in several cities.

8. Role on the long-term sustainability of INTER-IoT Platform for commercialization.
There is a natural partnership between platform and devices providers. INTER-IoT is intended to gather a whole ecosystem of device manufacturers, while e3tcity is interested in be compatible with as many platforms as possible.

9. Issues to overcome
First: implementation of the integration, that will be carried out in this project.

Identified by: e3tcity S.L.	Registration Date: 29/05/2017

Identified by: e3tcity S.L.   **Registration Date: 29/05/2017**

ANNEX E: Draft Inter-IoT Joint ownership agreement

Between

and   …(hereinafter referred to as **Partner 1 Acronym**) with VAT ….….., with fiscal address in ……….. no. ….. established before notary of ………. Mr. ………….. on (day) …… (month) …………. (year) ………, registered in the commercial registry of …………….. on (day) …… (month) …………. (year) ………, represented by Mr. ………………. acting as ……………… with ID . …………….., duly authorized by deed registered before notary of ………….. Mr. ……………….. on (day) …… (month) ………….. (year) ………,

and   …(hereinafter referred to as **Partner 2 Acronym**) with VAT ….….., with fiscal address in ……….. no. ….. established before notary of ………. Mr. ………….. on (day) …… (month) …………. (year) ………, registered in the commercial registry of …………….. on (day) …… (month) …………. (year) ………, represented by Mr. ………………. acting as ……………… with ID . …………….., duly authorized by deed registered before notary of ………….. Mr. ……………….. on (day) …… (month) ………….. (year) ………,

Each of **Partner 1 Acronym**, **Partner 2 Acronym**,… and **Partner N Acronym** shall be referred to as a "**Party**", and collectively, as the "**Parties**".

The Parties, mutually recognizing each other's legal capacity to execute this Agreement (as defined below). All the representatives have the necessary legal power to subscribe on behalf of their respective organizations this agreement and, for this purpose

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1. The Parties have been participants in the European Project with proposal number 687283 and title INTEROPERABILITY OF HETEROGENEUS IOT PLATFORMS (INTER-IoT), hereinafter referred to as the "**Project**".

2. As a result of the combined work undertaken during the Project the researchers of the **Partner1, Partner 2**,… have generated a result related to a **result description**, referred to as the "**NAME OF THE RESULT**"). NAME OF THE RESULT consists of (description (to include any reference to background results (CA) and results (former foreground))

3.Parties consider **NAME OF THE RESULT** to be a combined work and a jointly owned Result of all Parties, for which Parties herby will agree upon a joint ownership agreement as meant in article 8.1 of the Consortium Agreement of the Project.

4. The owners of **NAME OF THE RESULT** will be the Partner 1, Partner 2.

5. The authors of the Result (**Software, Document, whatever type**) are XXX from Partner 1; YYY from Partner 2.

IT IS HEREBY AGREED to settle the joint ownership of <mark>NAME OF THE RESULT</mark> according to the individual contribution of each Party and subscribe and adhere to the present Co-ownership Agreement according to the following

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CLAUSES

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First- JOINT OWNERSHIP OF <mark>NAME OF THE RESULT</mark>.

Rights and title to <mark>NAME OF THE RESULT</mark> will be jointly owned by the Parties in the following proportion:

PARTY	OWNERSHIP (%)
Partner 1	XX%
Partner 2	XX%
....	XX%

The inherent rights and obligations to the same being split in an identical proportion between the Parties.

Second- REGISTRATION

Each Party may, at its own expense and upon prior written notice to the other Parties, register <mark>NAME OF THE RESULT</mark> and the documentation resulting in a national registry of Intellectual Property or other entity which provides deposit and protection services. In this registry, the authorships and co-ownership percentages specified in clause one will be respected. Any international registration will be discussed and agreed upon in writing between all Parties prior to such registration.

Third- OWN USE AND PARTICIPATION IN RESEARCH PROJECTS AND NON-COMMERCIAL USES.

Parties may use <mark>NAME OF THE RESULT</mark> free of charge for their own non-commercial research and teaching purposes, including as background in collaborative research programs with third parties (Horizon 2020, etc.), as well as those actions with technology companies related to the technology validation (MTAs, Development and Research Agreements, etc.). Nevertheless, the signing of any (commercial) license or of any other exploitation agreement to a third party shall be governed as contemplated in this Agreement.

Fourth- LEAD, NEGOTIATION, TRANSFER AND PROFIT SHARING.

It is the intention of Parties to license jointly their rights for commercialization of <mark>NAME OF THE RESULT</mark>. Partner 1 shall take the lead in identifying potential licensees and negotiating license agreements for the commercial development and exploitation of <mark>NAME OF THE RESULT</mark>, will consult with and keep the other Parties fully informed concerning its efforts to identify potential licensees, commercialization and its negotiations relating to any option or license agreements regarding commercial use. All Parties will inform about possible leads they become aware of and revert third parties that wish to obtain a commercial license to <mark>NAME OF THE RESULT</mark> to Partner 1.

The license agreement to commercialize <mark>NAME OF THE RESULT</mark> will be signed by all the co-owners, will include the right of sublicensing and will establish a fair compensation..Approval of the license agreement may only be withheld by the other parties if, within 15 (fifteen) days after receiving the

last draft of such agreement, they can provide justification in writing that such agreement would create a serious conflict especially in respect to their status, policies, activities or missions.

No Party shall issue any royalty-free or paid-up or royalty bearing licenses or assign their rights in **NAME OF THE RESULT** to any third party, notwithstanding any other provision of this Agreement, without the prior written consent of the other Parties.

This Agreement does not confer any right to use any name, trade name, trademark, or other designation of any of the Parties (including contraction, abbreviation or simulation of any of the foregoing) in advertising, publicity or other promotional activities without the prior written consent of the respective Party**.**

After deducting up to 10% (ten percent) for commercial efforts and administrative overhead (with a limit of 5,000€ (five thousand Euros) per commercial license agreement from gross proceeds accruing from licensing **NAME OF THE RESULT**, for Partner 1 Licensee shall distribute Net Revenues, according to the ownership-percentages as set forth in the first clause of this Agreement.

In the event that a Party or the Parties together advance the development of **NAME OF THE RESULT** via activities outside the Project, the Parties may, by written agreement, adjust the relative share of Net Revenues received by each Party based on the relative contribution of the Parties to such advancement of **NAME OF THE RESULT**. Should the Parties fail to reach agreement on a proposed adjustment of Net Revenues, the Parties shall keep adhering to the distribution set forth in the first clause of this Agreement.

For the purpose of this Agreement "**Net Revenues**" means gross proceeds received from the licensing of **NAME OF THE RESULT** pursuant to this Agreement, after deduction of administrative overhead of aforementioned 10% (ten percent) for commercial efforts and administrative overhead (with a limit of 5,000€ (five thousand Euros) per commercial license agreement.

Fifth- TERM

This contract shall come into effect from the date on which it is signed by the last Party and shall remain in force for as long as the intellectual property ownership rights that the results of statement 1 were to give rise to.

Sixth- SURRENDER OR ABANDONMENT

Either of the parties may surrender its rights and obligations arising from this agreement, being obliged to expressly notify the other party in sufficient time for it to exercise its corresponding rights.

Any surrender or abandonment of the rights arising from this agreement shall be made in writing and shall be attached to this agreement, forming part of it.

In any event, the renouncing body shall ensure that all the researchers who are included on the Software Registration as authors undertake to cooperate in the processing required for providing their signature on documents and notifying any possible change of address, ensuring they are contactable at all times. The renouncing body shall comply with the obligations acquired up to that time.

Seventh- MISCELLANEUS

No waiver by the parties hereto of any breach or default of any of the covenants set forth herein may be deemed a waiver as to any subsequent and/or similar breach or default.

This Agreement constitute the entire agreement, both written and oral, between the parties, and they supersede all prior and contemporaneous agreements respecting the subject matter of this Agreement, written or oral, expressed or implied.

In case of differences of interpretation between the header of a clause and the clause itself, the header will be considered non-existent.

If any provision of this Agreement is declared in a final non-appealable order by a court of competent jurisdiction to be invalid, illegal, unenforceable, or void, then the Parties shall be relieved of all obligations arising under such provision, but only to the extent that such provision is invalid, illegal, unenforceable, or void in the jurisdiction. If the remainder of this Agreement is capable of substantial performance, then each provision not so affected shall remain binding upon the Parties hereto to the extent permitted by law.

The relationship between Parties is that of independent contractors. Parties are not joint venturers, partners, principal and agent, master and servant, employer or employee, and have no relationship other than as independent contracting Parties. No Party shall have the power to bind or obligate the other in any manner.

Eighth- COMMUNICATIONS

All notices, requests, demands or other communications required or permitted to be given or made hereunder shall be delivered or sent to the intended recipient hereof at its address or facsimile number set out below:

Partner 1

Attn.:

Address:

Tel:

email:

Partner 2….

Ninth.- JURISDICTION

The Parties shall be committed to solve any conflict that may arise from the contract in an amicable way. The Parties agree that in case of a court dispute, they abide and shall be subject to the jurisdiction of the competent court of justice in Brussels. This agreement will be governed by the law of Belgium.

And as proof of consent, the Parties sign this Agreement on the date and in the place shown below.

Partner 1 City, *date*	**Partner 2** City, *date*	**Partner 3** City, *date*
Mr/Ms Position	Mr/Ms Position	Mr/Ms Position

ANNEX F: Llava Matrix (2nd iteration)

F1 RINICOM

CUSTOMER SEGMENT	General Practitioners	Care Home
COMMOND NEED	• Provide patient care in the community • Monitor patient vital signs remotely • Traveling to assess patients takes a lot of time Drivers • Increase in demand (population growth) • Push for cost savings	• Provide patient care as directed by a GP • Increase the profile of their care home Drivers • Aging population • More competition in the care home market means care homes need to differentiate themselves.
VALUE PROMISE	Using INTER-IoT Gateway will allow cost saving optimization of community care patient monitoring.	Using the Inter-IoT Gateway will improve the quality of care offered at the facility by providing the patient's GPs with regular vital signs.
SOLUTION	INTER-IoT Gateway	
VALUE NETWORK	GPs control the patient treatment-clinical value Community team controls data collection-low cost data collection value	Care home workers-provide an added community service to remove the need for GP callouts.

ALTERNATIVES	GP does the visit		GP does the visit	
	Data is communicated by another means		Data is communicated by another means	
WILLINGNESS TO PAY (*)	**BASIC**	**PROFESSIONAL**	**BUSINESS**	**ENTERPRISE**
	xxxx € (monthly)	xxxx € (monthly)	xxxx €(monthly)	**xxxxx€ (year)**
				Customization

(*) The price has not yet been decided

F2 PRODEVELOP

CUSTOMER SEGMENT	Smart Agriculture	Smart Industry 4.0	Smart Cities	Port Authorities/ Terminals
COMMOND NEED	- Integration between heterogenous devices and systems - Interoperability with other IoT Platforms - Access to multiple IoT Platform's services	- Integration between heterogenous devices and systems - Interoperability with other IoT Platforms - Access to multiple IoT Platform's services	- Integration between heterogenous devices and systems - Interoperability with other IoT Platforms	- Integration between heterogenous devices and systems - Interoperability with other IoT Platforms

VALUE PROMISE	**IoT Agri Interoperable Solution** allows the integration of heterogeneous devices and systems, the interoperability with other IoT Platforms and real time data processing and analyses to improve the environmental efficiency on Agriculture practices.	**IoT Industry Interoperable Solution** allows the integration of heterogeneous devices and systems, the interoperability with other IoT Platforms, real time data processing and analyses to improve the efficiency, security and environmental efficiency on the Industry management.	**OPTION 1: "IoT Port Interoperable Solution** allows the semantic integration of heterogeneous devices and systems, the interoperability with other IoT Platforms, real time data processing and analyses to improve, the daily operational and decision tasks on the Port and Terminals management (security, environment efficiency, etc.)" **OPTION 2: "IoT Port Interoperable Solution** improves daily operational and decision support, thus management and business results through the interoperability and integration of heterogeneous IoT Platforms, the connection with unconnected IoT Platforms and the access to multiple IoT Platform's services. **IoT Port Interoperable Solution** allows the Port Authorities and Terminals to offer their final customers, information about real time events for cost and risk reduction and a more efficient transport service."
SOLUTION	(On premise/ On the cloud) (INTER-FW+Middleware +IPSM) Device management IoT Platform Integration	(On premise/ On the cloud) INTER+ Middleware + IPSM) Device management IoT Platform Integration	(On premise/ On the cloud) (FW+ Middleware + IPSM) Device management IoT Platform Integration
VALUE NETWORK	Cloud Provider FIWARE Member Sensor providers		
ALTERNATIVES	INDRA TELEFONICA (FIWARE) IKUSI		EMETEL IKUSI

WILLINGNESS TO PAY	On premise: License+ Support and training services In the cloud: SaaS with a monthly/yearly subscription fee (*)	On premise: License+ Support and training services In the cloud: SaaS with a monthly/yearly subscription fee (*)	On premise: License+ Support and training services In the cloud: SaaS with a monthly/yearly subscription fee (*)

(*) The price has not yet been decided

F3 XLAB

CUSTOMER SEGMENT	**IoT Appliance Manufacturers**	**Industry 4.0**

COMMON NEED	• Need of reliable technology and know-how to connect IoT platforms of different nature • Middleware developers that can establish the IT communication between IoT platforms of different nature and aim • Easy to use and well documented IoT solutions		• Need of reliable technology developers and know-how consultancy to connect IoT platforms of different nature serving different aims in the production line • Innovative approach to increase the industries competitiveness in the IoT market • "Plug-n-play" technology that does not require much expertise	
VALUE PROMISE	• Access to state-of-the-art technology and know-how • Technology validated by use-cases • Reproducibility and scalability		• IoT enablement of industrial processes • lower costs and higher efficiency	
SOLUTION	**INTER-MW + Bridges**		**Consultancy and customization**	
VALUE NETWORK	Easy to use IoT platform integrator permitting the engagement and contribution of the OSS community.		Premium (payed) support, offering consultancy and customization in building new bridges.	
ALTERNATIVES	None so far		None so far	
WILLINGNESS TO PAY*	(*)	(*)	(*)	

* the pricing models are not decided yet

F4 NEWAYS

CUSTOMER SEGMENT	Agriculture	Automotive	Industry	Medical	Semicon
COMMOND NEED	Connected smart sensors IoT Gateways IoT Middleware Hosting	Connected smart sensors IoT Gateways IoT Middleware Hosting	Connected smart sensors IoT Gateways IoT Middleware Hosting	Connected smart sensors IoT Gateways IoT Middleware Hosting Data security	Connected smart sensors IoT Gateways IoT Middleware Hosting Data security
VALUE PROMISE	Predictive maintenance Remote diagnostics tCoO reduction Sellable data collection Track & trace	Predictive maintenance Remote diagnostics Sellable data collection	Predictive maintenance Remote diagnostics tCoO reduction	Predictive maintenance Remote diagnostics tCoO reduction	Predictive maintenance Remote diagnostics tCoO reduction

SOLUTION	**Development & re-use of smart sensors, gateways, middleware & hosting solutions**

VALUE NETWORK	**Step**	**Explanation**	**Role / benefit for**
	Data analysis	Key for machine manufacturer & end user	3rd party
	Hosting	Stable, repetitive money flow with little investment	Neways
	Machine end users	Drive down machine cost with IoT (availability)	Machine end user & manufacturer
	Machine manufacturers	Drive down operational cost with IoT	Machine manufacturer
	Smart sensor manufacturers	Enable technology-low added value	Neways

ALTERNATIVES	Neways differentiates from competitors by: • Intellectual Property transfer to the customer where competitors keep this (& thus can hijack customer) • Strong focus on customer intimacy (life cycle Partner)

WILLINGNESS TO PAY	Subscription fee ++ Functionality +	Subscription fee +/- Functionality -	Subscription fee ++ Functionality +	Subscription fee ++ Functionality ++	Subscription fee - Functionality -

F5 ABC

CUSTOMER SEGMENT	**Manufacturing**
COMMOND NEED	• Develop Industry 4.0 products • Automate and improve goods production and shipping • Shorten as much as possible down time • Ability to gather data from smart objects • Customise products Drivers • Demand of specific goods • Push for cost savings • New business models
VALUE PROMISE	Using INTER-IoT solutions legacy developments and connection with external systems can be realized with a reasonable expense and in a short time.

SOLUTION	INTER-IoT technologies to bind different systems. No need to re-do everything, just develop the specific bridges and interfaces using different INTER-IoT components.
VALUE NETWORK	Industrial companies, technology providers.
ALTERNATIVES	If keeping legacy systems, cumbersome and expensive point-to-point bridge. If renewing everything, big-bang deployment
WILLINGNESS TO PAY	Too much dependent on the specific client, implementation and Project.

F6 SABIEN

CUSTOMER SEGMENT	eHealth
COMMOND NEED	- Integration between heterogenous devices and systems - Access to multiple IoT Platform's services - Management of devices and data collected by wearable sensors
VALUE PROMISE	**InterHealth** allows the integration of heterogeneus devices and systems and real time data processing to improve the follow-up of patients and monitor worsening episodes. Data is automatically collected, digitalized and stored, available to perform data visualization adn analytics on aggregated clinical/personal data.

SOLUTION	InterHealth(B2B)
	(On premise/ On the cloud)
	(FW +Middleware +IPSM)
	Device management
	IoT Platform Integration
	Professional Web Tool
VALUE NETWORK	Cloud Provider
	FIWARE Member
	BodyCloud
ALTERNATIVES	Philips
	GE
WILLINGNESS TO PAY	**BUSINESS**
	UNKNOWN

F7 VPF

CUSTOMER SEGMENT	**Port and logistic**

COMMOND NEED	• Integration of IoT platforms in port companies • Interoperability of messages and data among different port companies • Deployment of smart sensors to gather all kind of data • Monitorization of assets
VALUE PROMISE	• Design of business models for the introduction of IoT in ports, transport, trade and logistics • Knowledge transfer to Port & Logistics businesses and IoT opportunities and solutions • Setting up of a Smart-Port solutions package for being introduced in different ports • Consulting, decision making support, project and change management • Business integrator services
SOLUTION	Consultancy services for: • Knowledge transfer for Port & Logistics businesses and IoT opportunities and solutions • Design of business models for the introduction of IoT in ports, transport, trade and logistics • Setting up of a Smart-Port solutions package for being introduced in different ports • Proven solutions through previous pilots, proof of concept and demonstrations
VALUE NETWORK	• IoT platform and device providers • Cloud provider • Software development company
ALTERNATIVES	Consultancy and integrator companies in port and logistic environment
WILLINGNESS TO PAY	Payment per consultancy or technical service

F8 UPV

CUSTOMER SEGMENT	Academic (IT students & professionals)	Business Firms interested in implementing new technologies (IoT) and the integration of IoT systems. Any application domain that involves the integration of IoT systems.
COMMOND NEED	Acquisition of background knowledge on IoT, IoT developments and integration of IoT systems. Practical knowledge of integration technologies for Io (employing the Inter-IoT SaaS suite in practical exercises)	Integration technologies for IoT systems (Inter-IoT SaaS suite)
VALUE PROMISE	Theoretical and hands-on knowledge of the latest technology in IoT, addressing the two also in a practical way employing the Inter-IoT SaaS suite. Best way to learn the latest integration technologies and interoperability solutions at all levels. In the case of professionals, it offers powerful tools for solving the integration and interoperability problem among IoT systems, a main barrier in IoT development (Inter-IoT SaaS service and knowledge on how to use it). Practical hands-on excercises. Practical integration of IoT systems and IoT platforms at different levels,	Integration and interoperability of IoT systems at all levels in real time through the use of the INTER-IoT framework as SaaS hosted in the cloud, providing on-demand service and on-demand resources. Thus, integration of IoT systems and IoT platforms at different levels, one of the most important challenges for IoT development. SaaS service for the INTER-IoT framework, that allows the integration and interoperability of IoT platforms and IoT data at all levels. It will provide the only integration framework that offers a layered approach at all levels, offering a very tight integration, has a special focus on security and offers real-time universal semantic translation.

	one of the main challenges for IoT development. Components are the master course and the SaaS suite, that will be used in practical classes for integrating real IoT systems. Focus on integration, security and interoperability, differently to other courses. Only integration framework that offers universal semantic translation, and thus universal semantic interoperability among any pair of IoT platforms.	
SOLUTION	**MASTER IN IoT** +SaaS Inter-IoT solution	**SaaS INTER-IoT SUITE**
VALUE NETWORK	Cloud provider	Cloud provider
ALTERNATIVES	(Master) 3 other online official masters of IoT in Spain (UPM, Salamanca University, AHU), though none of them addresses very important aspects in IoT such as **integration**, **interoperability** and **security**. (SaaS) There Is no other similar suite for IoT interoperability and security at all levels. The only similar alternative is to install and implement the Inter-IoT framework instead of using the	(SaaS) The only other alternative is to install and implement the Inter-IoT suite instead of using the cloud SaaS

	cloud INTER-IoT SaaS.			
WILLINGNESS TO PAY	**SaaS** 20 € (year)	**+ Master** 2000 € (1 year)	**SaaS** 20 € (year)	

F9 UNICAL

CUSTOMER SEGMENT	**Graduated students**
COMMOND NEED	To understand the main organizational, technical, technological and business aspects of the Internet of Things in the context of different application domains, such as e-Health, building automation, Smart Grid, Smart City, Industry 4.0.
VALUE PROMISE	Create the ecosystem of IoT expertise suitable to enhance the technological innovation level of the Italian public and private organizations, the competitiveness, the employment and the economy
SOLUTION	**Institution of a new INTER-IOT Master Programme for post-graduate students**

VALUE NETWORK	The Master is supported by
	ICAR-CNR: https://www.icar.cnr.it/
	NTT Data S.p.A.: http://it.nttdata.com/news/cosenza/index.html
	Omnia Energia S.p.A.: https://www.omniaenergia.it/
	MR&D S.P.A.: www.mrd-institute.com
	Fair Winds Digital S.r.l.: http://www.fairwindsdigital.it/
	ITHEA S.r.l.: http://www.relatech.com/web/ithea/
	Digimat S.p.A.: https://www.digimat.it/
	eSurv S.r.l.: http://www.esurv.it/
	SenSysCal S.r.l.: http://www.sensyscal.it/
	SCAI Group: http://www.grupposcai.it/en/
	DOMUS District (coordinato da TIM S.p.A.)**:** http://www.distrettodomus.it/
	Data Science Center, University of Derby (UK): http://www.pesri.net/blog/?p=3553
ALTERNATIVES	UNICAL identified as competitors other Public University or Research Organization.
WILLINGNESS TO PAY	Master fee € 2.000,00

F10 TU/e

CUSTOMER SEGMENT	Education & Research	
COMMOND NEED	• Realistic environment for IoT protocols, hardware and application development and testing • Fast iterative development of IoT applications, protocols and hardware	•
VALUE PROMISE	Inter-IoT Gateway allows for integration of any IoT application, protocol and hardware in a single unified IoT environment.	
SOLUTION	Inter-IoT Gateway and Middleware Device Management Experiment Scheduling Testing data collection Offline and online processing	
VALUE NETWORK	IoT device manufacturers Home Gateway providers Application providers	

ALTERNATIVES	FIT-IoT Lab			
	TWISTbed			
WILLINGNESS TO PAY				

F11 SRIPAS

CUSTOMER SEGMENT	**companies or research institution** that wants to achieve interoperability on data and semantics level between several IoT artefacts or align data models (standards).	**All IoT market and smart factory, smart city and smart logistics, including smart hospitals** and others of the kind, which is are all rising markets
COMMOND NEED	- To integrate data from heterogenous sources expressed in different semantics so that a common understanding can be achieved. This will enable common processing and analysis of integrated data - To enable exchange of meaningful messages between IoT artifacts that have data models with different semantics; translation on-the-fly of stream data - To reuse the alignments (translation rules) prepared for popular standards between different use cases without the need to adjust the translation each time integration solution is developed	
VALUE PROMISE	Interoperability between many IoT artifacts using different data models and semantic. Alignment format (IPSM-AF) for storing alignments between ontologies that can be reused. Aligning and translating to central ontology require less effort that when providing mechanisms to translate to other IoT artifacts ecosystem. .	

SOLUTION	IPSM – Inter Platform Semantic Mediator. Component for semantic translation (RDF graph rewriting) of RDF messgaes with both publish-subscribe communication infrastructure and REST interface. The translation is based on alignments and in most use cases included central modularized ontology as a common model.
VALUE NETWORK	IPSM can be deployed as standalone component or it can be installed e.g along INTER-MW. Alignments are prepared and controlled by semantic engineer that is part of integration team.
ALTERNATIVES	Semantic translation of stream data – not known. Reduction of the problem to providing only one-to-one syntactic translation between two artifacts (much less efficient).
WILLINGNESS TO PAY	Business – potentially for support and assistance in alignment creation

F12 AFT

CUSTOMER SEGMENT	**Transport and Logistics companies** Globally, every company involved in transport and logistics operations from the initial supplier to the final costumer. Acting in the flows of materials or information.
COMMOND NEED	Being able to have a clear vision of their activities, upstream and downstream, in real time. Being able to forecast the incoming elements (goods or information) in order to plan their activity. To have a communication and cooperation between all exploitation software (TMS, WMS, TOS, ERP'S…)
VALUE PROMISE	Providing solutions/products/modules allowing to obtain a visibility and interaction of the information end to end in the Supply Chain.
SOLUTION	**INTER-LogP: Advice/assistance services** To be defined to each case which scheme suits best the need:

	• Might be an opensource solution being adapted by the company developers in order to fit. • Might be a standard solution with standard features • Might be a standard solution, adapted and customized by our developers in order to fit to the company needs.
VALUE NETWORK	We would make a separation in three categories of partners in the project: IT, Business and Academic. • Academic: in charge of disseminate results of this applied research project • Business: in charge of research of market needs, communication around Inter-IOT solutions/products/modules • IT: In charge of developing solutions/products/modules both standard and customized + pilots for testing
ALTERNATIVES	Not applicable
WILLINGNESS TO PAY	Depending on alternatives and on the company needs (different if standard or customized item).

F13 ASL T05

CUSTOMER SEGMENT	**End Users Health Operator**	**Public Administration**	**End Users Subjects**
COMMON NEED	Chronic Disease Prevention	Integration and implementation of new technologies in the Heath Care System (eHealth)	Facility Access to the Health System
VALUE PROMISE	**InterHealth** allows to the health operator the monitoring through the integration of medical devices and systems and real time data processing to improve the follow-up of subjects and monitor worsening episodes. Data is automatically collected, digitalized and stored, available to perform data visualization and analytics on aggregated clinical/personal data both for subject and for health operator.		

SOLUTION	Management of subjects 's health status through the integrated system composed by Software (Professional Web Tool), application on smartphone (Bodycloud), medical bluetooth devices (scale and sfigmomanometer) and online questionnaire on app.		Management of own health status thanks to the decentralized monitoring at home through the app on the smartphone and the detection of measures by the medical bluetooth devices (scale and sfigmomanometer).
VALUE NETWORK	Decentralized monitoring of the subjects followed with the nutritional counselling in the outpatient	Improvement in the outpatient management Increase of the number of access/number of subjects with the same number of health operators Saving economic resources	The subject is always in contact with health operator and during the nutritional counselling in the out-patient can receive direct support and information for a proper lifestyle.
ALTERNATIVES	ASL TO5 identify itself such as Public Organization in the National Health System, so it detects as its main competitors other Public Organization in the Nutrition area that works with telemonitoring. Otherwise ASL TO5 cannot identify such as its competitors Private Companies that offer a not gratuitous service in the Health sector.		
WILLINGNESS TO PAY	Not applicable		

F14 NOATUM

CUSTOMER SEGMENT	NOATUM will not sell a product but offer add-value to their clients.

COMMOND NEED	Connectivity of its logistic operations with their clients as a unique operation chain giving them a visibility of their cargo to its customers.
VALUE PROMISE	NOATUM plans to use the IoT platform to offer value-added services such as reefer container monitoring, parking spaces information and just-in-time operations.
SOLUTION	INTER-LogP: NOATUM as a logistic company offers a perfect environment to test INTER-IoT developed products.
VALUE NETWORK	Not applicable
ALTERNATIVES	Not applicable
WILLINGNESS TO PAY	Not applicable