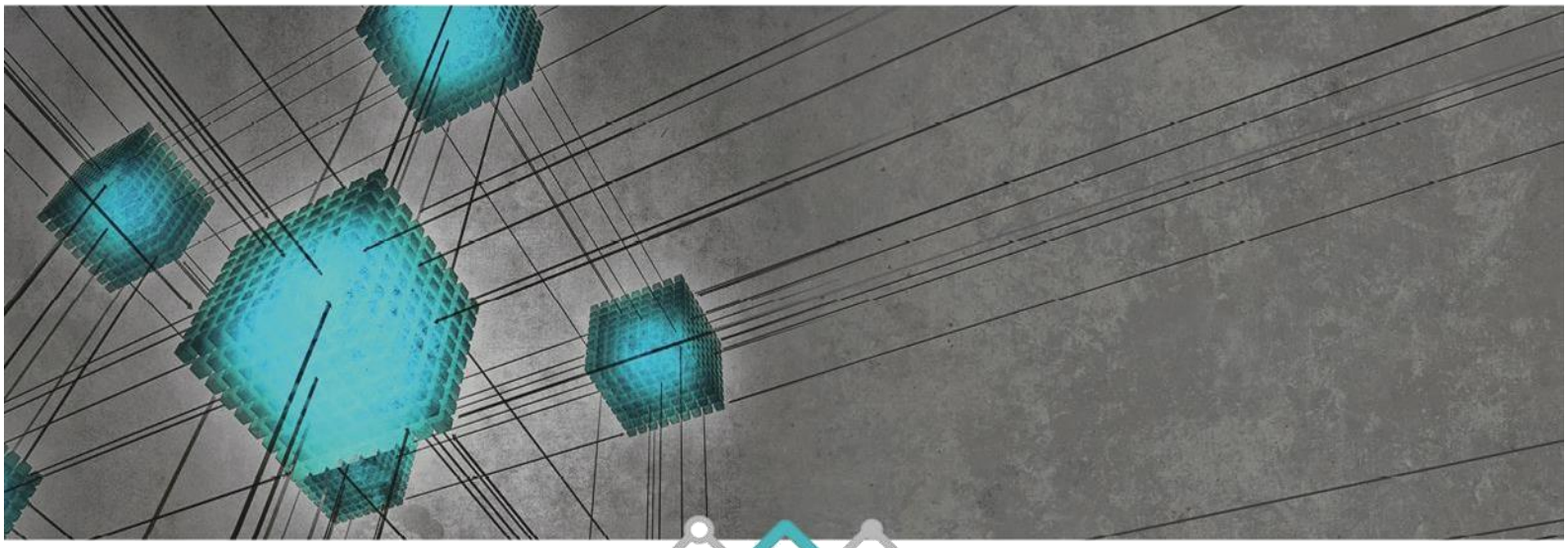

interiot

INTEROPERABILITY
OF HETEREOGENEUS
IOT PLATFORMS.

D2.4

Annex. Use cases manual

December 2016

INTER-IoT

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

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

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

INTER-IoT has been financed by the Horizon 2020 initiative of the European Commission, contract 687283.

INTER-IoT

Annex. Use cases manual

Version: Final

Security: Public

December 26. 2016

The INTER-IoT project has been financed by the Horizon 2020 initiative of the European Commission, contract 687283

Disclaimer

Annex A Scenarios

Annex A contain the results of Task 2.4 investigations destined to describe the scenarios identified for the INTER-IoT project. The identification of scenarios has been intended as a key step for designing of the five products identified in the project.

This annex is a full part of task 2.4 activities. However, in order to enhance clarity as well as to make the D2.4 more easily readable by avoiding over flooding it with too much data in the same document, it has been decided to include the scenarios' templates in a separate document.

In line with the clarity objective, as well as to enhance the readability of the information, the scenarios' identification templates have been listed below in Annex A following the INTER-IoT domain oriented products adopted for Task 2.4 (INTER-LogP, INTER-Health and INTER-DOMAIN).

The summative information contained in this document constitutes an annex to INTER-IoT D2.4 but furthermore, during the phase of development of the project, partners will be asked to provide additional information using the same identification templates, if ever and whenever new scenarios are encountered in the lifetime of the project. Additional information will be uploaded on the JIRA repository.

Although all the information is available in the JIRA repository and the deliverable contains the summary and a detailed study of the information gathered, we have decided to include the filled scenarios' identification templates as an annex with the raw information at the time of submitting this document, in order that readers with no access to JIRA can access to the same information.

INTER-LogP scenarios

[INTERIOT-507] IoT support for transport planning and execution Created: 14/Apr/16 Updated: 19/Oct/16 Resolved: 14/Apr/16	
Identifier:	2
Name:	IoT support for transport planning and execution
Description:	Transportes Torres is a road haulier that provides road transport services of containers in the port of Valencia. It is part of the port community and it receives container gate-in and gate-out orders from its clients through ValenciaportPCS. The company can also receive transport orders through this system although they can also be received by other means. The company uses a fleet management software from the company Movildata. This software is used by the transport planner of the company to organise the trucks' transport voyages and routes of the trucks with the work orders received. To do this, it uses the location of the trucks, the available driving hours and the estimated time to finish the work orders already assigned. The company has already half of its fleet equipped with devices provided by the same company but it wants to install other devices from different manufacturers, able to interoperate with his software, in the trucks which are not already equipped. Sometimes the company also subcontracts the transport services from other truckers and they want to temporarily consider them as part of their fleet for carrying out the same operations as in their own fleet. An interoperable IoT cloud platform is seen as a solution to manage the different devices connected in the physical trucks by interfacing with the virtual trucks represented in this platform. Devices in the truck include always a GPS unit and optionally a low power printer, connected to the trucks' power supply via a DC/AC adapter and other sensors connected via Bluetooth, Wi-Fi or other communication protocols (i.e. a CAN-BUS Bluetooth adapter, a digital tachograph, anti-theft sensors). Communications are established using a 3G/4G telecommunication network. Data from sensors are synchronized with the virtual truck represented in the IoT cloud platform every 10 seconds. The driver can interact with the devices of the truck and receive processed data from the IoT cloud platform through an APP (i.e. through its mobile phone or a tablet installed in the truck). The truck owner can provide access to a subset of its virtual truck data stored in its IoT cloud platform when it is subcontracted by Transportes Torres (i.e. position, available driving hours, availability for the service) and the transport planner of Transportes Torres can send to the virtual truck the transport and route details and print the transport order document on the on-board printer. The driver is notified about the assignment of a work order, it can also print any documentation stored on the cloud in its on-board printer, monitor the parameters of its voyage and examine its route through its APP. All this information is also available at the same time to the transport planner and to the truck's owner (in the case it is a different organisation). The IoT cloud platform is able to estimate the arrival time of the truck given the actual position and the destination using own or external services, and it communicates the estimated time of arrival to the destination companies' IoT cloud platform or operation management software, providing access to a subset of their virtual truck data. ValenciaportPCS can also receive this estimated time of arrival. These platforms can provide feedback to the IoT platform about the estimated time of attendance. This data can be automatically notified to the

	authorised parties which have subscribed the notification of this data, including the driver. When a significant deviation in the arrival of the truck is detected by the IoT cloud platform, it communicates the new estimated time of arrival to the destination.
Users:	Road Haulier company: It makes the transport planning and assigns the work order to a truck (even if it is a subcontracted one). It can check and receive information about the transport execution. Truck owner: It can access to all the data capture from the sensors and establish the rules to provide access to the truck data to other companies that contract its services. Destination company (i.e. the container terminal): It can receive information regarding the estimated time of arrival of a truck and have access to a subset of the truck and transport work order data. It can provide data to the truck regarding the delivery service (i.e. estimated time to be attended, arrival details).
Context:	Road transport
Interacting system:	ValenciaportPCS, movildata fleet management system, road haulier IoT cloud platform, truck's owner IoT platform, destination company IoT platform, truck's devices, driver's smart phone.
Users' goals:	Haulier company wants to easily communicate work orders to the trucks. Truck owner wants to monitor all the data regarding the truck, the driver and the work orders it executes. The destination company wants to receive the estimated time of arrival and optimise its operations. The driver wants to receive the work orders, to be able to monitor its voyages, to be assisted in the execution of transport and to avoid delays.
Interaction:	Haulier companies, truck owners and destination companies can interact in this scenario through the user interfaces provided by their IoT platforms interfaces or from their own software using application programming interfaces. Drivers can interact in this scenario through an APP installed on its mobile/on-board unit.
Initial status:	The transport planner adds a work order to a virtual truck in its IoT cloud platform.
Data:	Produced: truck position, truck sensor data, tachograph data, travel and final destination data. Consumed: transport work order data.
Motivation:	The scenario is focused on providing connected truck services to plan and execute transport services through interoperability of IoT platforms and devices.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the INTER-LogP demonstration within this project.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • A platform for monitoring trucks of in haulier company • A platform of the destination company Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: An IoT platform can notify changes in the properties of an object to other systems under a subscription basis.

	Middleware: A virtual truck registered in the truck's owner IoT cloud platform can be discovered, linked and used by a different IoT cloud platform managed by the road haulier. An event registered in a linked virtual truck is transferred to other IoT platforms where the virtual truck is registered or linked. Networking: - Device: A device is able to be introduced in a truck to provide information to the IoT platform for handling trucks.
Market and usage data available:	Availability of low power and low cost printers (i.e. CANON PIXMA MG2950S, ~40€) with wireless and IoT capabilities. Availability of GPS units, CAN-BUS and tachograph readers Possibility to use smart phones as GPS units when they are on board the truck as well as communication gateways. Potential Data: printable transport order, gps location, gps speed, origin, destination, total vehicle distance, engine total hours of operation, engine speed, kick down, brake switch, cruise control active, fuel level, engine turbocharger boost pressure, combined weight of tractor and trailer, service distance, instant consumption, driver identification, driving and idle timing, engine total fuel used, wheel based speed, etc.
Business model:	Use of existing devices for cost effective solutions with plug & play capabilities. Market enlargement for devices. Acquisition and use of IoT platforms for truck device management and monitoring connected and open to a wide variety of applications. Market enlargement for IoT platforms. Creation of gateways, virtualisation and interoperable solutions to break IoT silos among companies and products.
Missing technical know-how:	More information is needed from providers and users. Collaboration with project partners is required to define the contributions to achieve this scenario.
Partner specific interests:	VPF is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. VPF is interested in improving transport and port logistics with this scenario.
Business use case:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	15/Mar/16

[INTERIOT-601] IoT Weighbridges Created: 27/Apr/16 Updated: 19/Oct/16 Resolved: 03/May/16	
Identifier:	3
Name:	IoT Weighbridges
Description:	Vicente is operating a weighbridge near the port of Valencia and he provides container weigh services to shippers and freight forwarders to comply with new SOLAS convention. This convention, mandatory since 1st july 2016, requires shippers whose names appear on the bill of lading to verify the gross mass of all containers before being loaded onto the vessel. Truck drivers are happy to use the weigh services of Vicente because he is providing an IoT Weighbridge. Shippers are also happy to use the IoT Weighbridge because it provides competitive services.

	When José, a truck driver working in Transportes Ballester, arrives at the weighbridge station, the IoT truck platform notifies the arrival to the IoT Weighbridge, thanks to the geo-fence it was configured when Transportes Ballester subscribed its IoT platform to use the services of the IoT Weighbridge. Truck data required for the weigh operation is available to the IoT Weighbridge and the truck is positioned in a virtual queue waiting to be served. When the previous truck in the queue enters in the weighbridge, Vicente is warned he is going afterwards in its mobile phone. When the truck enters the weighbridge an iBeacon, a barcode reader or a NFC card allows to identify that the truck is on the weighbridge. The position of the truck is checked in the truck IoT platform and the identification of the truck to be weighed is informed to the IoT weighbridge platform. The weighbridge has all the information required to carry out the weighing and notifies the driver that the operation has been completed so he can continue its journey to the port. As the operation has been carried out automatically, the customer will get a discount for the service, while trucks using manual procedures do not have such discount, as they require manual handling of paperwork, which takes more time and consumes more resources, consequently being more costly. The time spent in the weighbridge by the truck is publicly available so a congestion indicator can be produced to help other truck drivers to plan their visits.
Users:	Road Haulier company: It subscribes its IoT platform for the IoT services and the IoT weighbridge provides the configuration for generating notifications. The road haulier configures the data associated with the trucks in its IoT platform and it can access to the data captured and registered in each virtual truck entity, including the data associated to the weigh process. Driver: It spends less time waiting for the truck being weighed. It receives information regarding the entrance in the weighbridge station, the time it has to position in the weighbridge and when the operation has been finalized. All the required data from the truck is automatically accessed by the IoT weighbridge so the driver only needs follow the instructions inside the cabin and drive. Weighbridge operator: The company is able to weigh much more trucks per day and reduce significantly the administrative costs associated to the weigh operation, so its profits increase.
Context:	Road transport
Interacting system:	IoT Weighbridge, Road haulier IoT platform, Mobile phones/Tablets, iBeacons
Users' goals:	Haulier company wants to easily communicate work orders to the trucks. Truck owner wants to monitor all the data regarding the truck, the driver and the work orders it executes. The destination company wants to receive the estimated time of arrival and optimise its operations. The driver wants to receive the work orders, to be able to monitor its voyages, to be assisted in the execution of transport and to avoid delays.
Interaction:	The IoT Weighbridge provides configuration parameters (i.e. weighbridge virtual entity data, weighbridge station geo-fence and data exchange sequence) so the truck IoT platform is able to automatically register this data to interoperate with the IoT Weighbridge. Truck IoT platform communicates the arrival of the truck at the weighbridge station, truck data, detection of weighbridge iBeacon and departure from the station to IoT Weighbridge.

	IoT Weighbridge provides information on service availability (i.e. open or closed), queue position, notification to go to the weighbridge, of the beginning and of the finalisation of the weighing process to the Truck IoT platform. Application for providing the container verified gross mass to the stakeholders concerned will subscribe to the IoT Weighbridge and they will exchange information regarding the weighing operations.
Initial status:	The carrier arrives at the weighbridge station with a container which need to be weighed.
Data:	Produced: Arrival to the station, Position in queue, Notification of positioning, Start and end of weighing, Departure from the station. Consumed: Weighbridge station geofence, weighbridge data, and truck data.
Motivation:	The scenario is focused on providing connected truck services to plan and execute transport services through interoperability of IoT platforms and devices. And attend a high quantity of truck weighs per day with the less delays for the transport.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the INTER-LogP demonstration within this project.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • A platform for monitoring trucks of in haulier company • A platform of the Weighbridge Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: The road haulier IoT platform subscribes to the services of the location IoT platform. The infrastructure IoT platform defines a geo-fence and the mechanisms to share information with the road haulier IoT platform. Middleware: The truck virtual entities are linked to the IoT platform of the infrastructure. Networking: - Device: Automatic identification of the truck through passive sensors. The IoT platform of the infrastructure can request and subscribe to data as well as to use some devices of the virtual entity (i.e. a screen, a printer).
Market and usage data available:	Use of IoT identification and location based solutions (i.e. iBeacons). Use of the IoT transport planning and execution scenario. Some commonalities with the IoT access control, traffic and operational assistance scenario.
Business model:	Use of existing devices for cost effective solutions with plug & play capabilities. Market enlargement for devices. Acquisition and use of IoT platforms for weighbridges and truck device management and monitoring, connected and open to a wide variety of applications. Market enlargement for IoT platforms. Connection of IoT platforms with weighbridges. Creation of gateways, virtualisation and interoperable solutions to break IoT silos among companies and products.
Missing technical know-how:	It will be required more information on how to integrate the IoT platform with weighbridges systems and with the application to provide container verified gross mass information to concerned stakeholders. Collaboration with project partners is required to define the contributions to achieve this scenario.

Partner specific interests:	VPF is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. VPF is interested in improving transport and port logistics with this scenario.
Business use case:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	25/Apr/16

[INTERIOT-520] Monitoring reefer container Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	4
Name:	Monitoring reefer container
Description:	Maerks is a shipping company specialized in the transport of overseas cargo carrier, and it has reefer containers for refrigerated goods transport. Recently is has published in their website its project on smart containers for reefers (http://www.maersk.com/en/the-maersk-group/about-us/publications/group-annual-magazine/2015/smart-containers-listen-and-talk). Maersk is outfitting its fleet of reefer containers with “smart” technology. From his desk in Maersk Line’s Conpenhagen headquarters, Musaddique can monitor on his screen the precise location and operational details of 270,000 refrigerated “reefer” containers, carrying anything from bananas to pharmaceuticals. The system enabling this is RCM (Remote Container Management). Reefer containers are equipped with Wi-Fi, GSM and GPS deployed on a global scale on more than 270,000 Maersk Line reefer containers. The devices allows global tracking and communication and collection of reefer’s atmospheric conditions and power status. A satellite transmitter mounted of 400 of Maersk Line’s vessels picks up the data streaming from the Wi-Fi and sends it real-time to a satellite that beam it back to the RCM teams located around the globe. The natural extension of this scenario is that RCM, which is in fact the IoT platform of Maersk is able to interoperate with the container terminal IoT platform once the container is unload from the vessel and connected and monitored also by the terminal operator. The interoperability of RCM with the road haulier’s IoT platform is also important to connect the reefer with the truck while it is being transported. The same happens in the empty container depot while this container is stored waiting to be pick-up. With this approach, all the involved people can take care of the proper functioning of the reefer container and take immediate action in front of any issue. Now Eduardo from NOATUM is able to know and take care of the temperature of the reefer containers from his desk instead of going each hour to the container yard to check the proper functioning of the reefer, of the power supply and registering the temperatures using its human eyes and hands. The remote inspection and monitoring of reefers also reduces the danger associated with people walking among container stacks and handling electricity. And José, from Transportes Ballester, is sure that the reefer is well connected to its truck power supply to feed the container with electricity and that the temperature parameters are correct while it is transporting it to the destination. Additionally, these companies provide the necessary network and data connectivity to Maersk Line receive the data from their reefer containers.

	Thanks to the interoperability of heterogeneous IoT platforms, RCM is dynamically linked with the IoT platforms of the providers of the storage and transportation services of its containers.
Users:	Carrier company: It is the owner of the container who has installed the sensors, gateways and other devices in the container and manages the container IoT platform. Container terminal: It is responsible for the loading and discharge of the containers, monitoring the temperatures in the terminal and manages the container terminal IoT platform. Haulier company: It is responsible of transporting the reefer container to/from the container terminal in a truck. Empty container depot: It is responsible to store the empty reefer container until it will be used.
Context:	The transportation of a reefer container from its origin to its destination.
Interacting system:	Carrier IoT platform (RCM), container terminal IoT platform (SEAMS), road haulier IoT platform, reefer container sensors, Terminal Operation Systems (TOS).
Users' goals:	Carrier company wants to monitor and ensure the proper functioning of its reefer containers. Container Terminal wants to monitor automatically the proper functioning of all the reefer container stored in its yard and to be warned immediately if there is any issue. Road haulier wants to ensure that the reefer container has not any issue while it is being transported by its responsibility. Insurance companies of this organisations wants to know when a problem occurred which damage the products carried by a reefer container.
Interaction:	There is already an interaction between the reefer container and RCM platform. Other interactions required would be between RCM and the terminal IoT platform, between the terminal IoT platform and the road haulier IoT platform and between RCM and the road haulier IoT platform. INTER-IoT is required to achieve this scenario.
Initial status:	The reefer container is picked up to transport refrigerated goods.
Data:	Produced: reefer container temperature, reefer container position, power supply and electrical consumption. Consumed: Operational data coming from TOS (Terminal Operation Systems) and transport orders.
Motivation:	The scenario is focused on monitoring the temperature of the container through different operators along its route, and to get a fast action in front of any issue with the temperature of the container. A basic supply chain stretches across the world and it involves trucks, terminals, depots and ocean carriers. There is no end-to-end visibility and very little control, which for refrigerated cargo is very risky.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the Inter-LogP demonstration within this project.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Carrier IoT platform who is owner of the container • Container terminal IoT platform • Road haulier cloud IoT platform Interoperability requirements:

	Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: Whenever container data is obtained by the haulier, the terminal operator or the carrier, it can be share with the trader. Middleware: The container is monitored when is in the ship, in the terminal and in the truck, so the container virtual entity is share among the three IoT platforms. Networking: - Device: All the sensor in the container send the data to the container virtual entity.
Market and usage data available:	RCM is already an existing IoT platform of Maersk. Maersk Line reefer containers already are equipped with sensors and communication gateways Use of the SEAMS IoT and IoT transport planning and execution scenarios. Some commonalities with the IoT access control, traffic and operational assistance scenario.
Business model:	Collaborative model of different IoT platforms that reduce transportation risks, issues and costs. Acquisition and use of IoT platforms for containers, terminals and trucks, connected and open to a wide variety of applications. Market enlargement for IoT platforms. Connection of IoT platforms with reefer containers. Market for devices. Creation of gateways, virtualisation and interoperable solutions to break IoT silos among companies and products.
Missing technical know-how:	It will be necessary to work on how the connection of RCM and the IoT platforms in the port and in transport can be established.
Partner specific interests:	VPF is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. VPF is interested in improving transport and port logistics with this scenario.
Business use case:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	16/Mar/16

[INTERIOT-521] Monitoring of containers carrying sensitive goods Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	5
Name:	Monitoring of containers carrying sensitive goods
Description:	Philippe is a trader who moves sensitive goods in containers that need to be monitored and tracked (e.g. IMO containers, high value goods, goods in transit, etc.). Philippe is able to obtain accurate traceability for these special movements using SGS OMNIS real time tracking solution. OMNIS is a platform that ensures the integrity of goods when they are travelling through different territories, across countries and between customs controlled areas, such as port terminals, bonded warehouses and free zones.

	OMNIS solution is using the Savi Mobile Tracking System™ (http://www.savi.com/solutions/applications/savi-tracking). This system is a specific IoT platform for global cargo and asset tracking solutions. To track freight movements the solution uses GPS, GPRS and satellite technology to provide full in-transit visibility and real time event management that includes a wide range of alerts on risky and dangerous behaviour. It also works with Savi Now, which is a mobile app that uses the advanced sensor-based features of iOS and Android-based Smartphones to track and monitor the status and location of high consequence of goods. The solution tracks the precise location of the freight at all times. With the use of geo-corridors, alerts are sent to Philippe if freight suddenly changes route, direction, or is delayed. Philippe is very satisfied with this solution but it knows that when something happens with their sensitive goods it needs a quick reaction from the place and the people responsible of transporting or storing the container. This is the reason why he is interested in an interoperability and communication of Savi Mobile Tracking System™ with the IoT platforms of transport and storage facilities so his goods could be considered as an integral part of their ecosystem, jointly with their own assets, to take immediate actions in front of alarms.
Users:	Carrier company: It is responsible for managing the transport of goods. It decides to use the global container tracking platform. Container terminal: It is responsible for storing and monitoring the sensitive containers in the terminal. Haulier company: It is responsible for transporting and monitoring the sensitive containers during road transport.
Context:	The whole route of the container
Interacting system:	OMNIS, Smartphones/Tablets, terminal IoT platform, haulier IoT cloud platform, container sensors.
Users' goals:	Carrier company wants to know the status of its goods at any time. Terminal wants to assess security and avoid goods' damages in the terminal. Road haulier company wants to assess security and avoid goods' damages or thefts during the transport.
Interaction:	The road haulier and the terminal operator exchange information of containers with the trader. The trader can access the sensitive container data at any time.
Initial status:	The trader needs to transport sensitive goods in a container.
Data:	Produced: container data, container position, alerts, deviation, estimated time of arrivals, end-of-journey reports. Consumed: geofences, transport planning data
Motivation:	The scenario is focused on tracking and monitoring the security status of the container through different operators during all its route and get a faster response in case of an exception-based alert including arrival, departure, dwell time, speeding and other events.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the Inter-LogP demonstration within this project.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Carrier IoT platform who is owner of the container • Container terminal IoT platform • Road haulier cloud IoT platform

	Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: Whenever container data is obtained by the haulier, the terminal operator or the carrier, it can be share with the trader. Middleware: The container is monitored when is in the ship, in the terminal and in the truck, so the container virtual entity is share among the three IoT platforms. Networking: - Device: All the sensor in the container send the data to the container virtual entity.
Market and usage data available:	OMNIS is an existing product that is already being used in several places. Savi produces a wide variety of tags, readers and other devices which can be used under this scenario. It is also available Savi Now that is its product to convert a Smartphone into and active IoT device using his sensors to convert them in a low-cost, fast to implement solution for track and trace of any high-value asset.
Business model:	Track and monitor sensitive goods along its journey.
Missing technical know-how:	More information regarding these solutions is required to involve them in the interoperability framework.
Partner specific interests:	VPF is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. VPF is interested in improving transport and port logistics with this scenario.
Business use case:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	16/Apr/15

[INTERIOT-522] Dynamic lighting in the port Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	6
Name:	Dynamic lighting in the port
Description:	Due to legal normative the roads of the port must be illuminated. The illumination level design depends on traffic density. After 22:00 to 07:00 the traffic is very low or no traffic so the roads could dim the light level to low traffic legal level even lower. During low traffic hours a vehicle get in to the road the light bright at nominal power, when get out the influential area the light dims again. Dynamic Lighting system is running in Noatum Terminal with SEAMS and Noatum's machinery. When José drives his truck in the port overnight, its company's IoT platform, which is monitoring his position continuously, detects that it is inside the geo-fences of the port and the container terminal and it starts relaying the position of the José's truck to the respective IoT platforms. While the truck is moving, the dynamic lighting system increases the road lighting when he passes. Transportes Torres, the road haulier José works with, has automatically obtained the configuration of the port and terminal geo-fences beforehand by subscribing to the IoT services provided by these platforms.

Users:	Haulier: The driver gets high level illumination during its trip inside the port. Drivers: Other vehicles affected during the nigh could have high level illumination (safer). Port Authority: is the responsible of light system in the port roads. Noatum: Is the responsible of light system in the terminal.
Context:	Port area and terminal roads.
Interacting system:	Dynamic Lighting system, haulier IoT cloud platform, port IoT platform.
Users' goals:	Haulier: wants to drive more safely into the port. Port Authority and Container Terminal: wants to save energy while maintaining the security levels.
Interaction:	The port and container terminal IoT platform needs the position of vehicles every 1-5 seconds from the truck's IoT platform. The Dynamic Lighting system accesses the position of the trucks when they are inside and area. The Dynamic Lighting system can be complemented with motion detectors and WiFi tracking to identify also elements that are not communicating their position in the area.
Initial status:	A haulier access to the port overnight.
Data:	Produced: energy savings, GPS position, vehicle speeds. Consumed: Device presence, geo-fences, WiFi
Motivation:	The scenario is focused on using the necessary light when there are trucks and save energy.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the Inter-LogP demonstration within this project.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Terminal IoT platform • A platform for monitoring trucks of in haulier company • Dynamic Lighting system Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: The Dynamic Lighting system accesses to the information of position of the trucks. Middleware: The position of the haulier company's truck is shared with the port IoT platform and terminal IoT platform. Networking: - Device: -
Market and usage data available:	NOATUM has already installed a dynamic lighting system but it is only able to detect the position of its machinery.
Business model:	Dynamic lighting, WiFi and motion detection vendors Energy savings in the illumination of large areas. Interoperability of heterogeneous IoT platform
Missing technical know-how:	The solution needs to consider also the presence of people and vehicles that do not provide information regarding their position (i.e. using WiFi tracking).
Partner specific interests:	Noatum is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. Noatum could run the dynamic lighting system all night, now is running when the external vehicles go out.

Business use case:	INTER-LogP
Identified by:	Noatum Ports Valenciana S.A.U. (NOATUM)
Registration Date:	16/Apr/16

[INTERIOT-523] SCADA port sensor system integration with IoT platforms Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	7
Name:	SCADA port sensor system integration with IoT platforms
Description:	Alfredo works in the Port Authority of Valencia. He is using a SCADA system for monitoring, gathering, and processing data generated by different devices including meteorological and pollution sensors, marine buoys, navigational aids, detectors of presence, CCTV, power grid network, etc. This is a closed system with access restricted to authorised operators, who can supervise this equipment including the modification of the configuration parameters of different elements, alerts, warnings and historical data and transmitted orders. As several data captured and registered in the SCADA system is relevant to be aggregated with other data in other applications, devices and sensors which are not connected to the SCADA system. It is also relevant to introduce new mechanisms for predictive and detection data analytics. In this sense, Javier is interested on expanding the traditional SCADA functions towards an IoT expanded vision. The possibility of introducing an intelligent connectivity of physical devices towards an IoT infrastructure without disrupting or interfering the functioning of the SCADA system is seen as the way forward to provide a secure evolution towards an IoT interoperable environment. This new environment will simplify the capabilities for introducing new IoT enabled devices in the port industrial network and provide new data aggregation, processing and transformation capabilities. It will also give greater data storage and access capacities and possibilities to interoperate with other heterogeneous IoT platforms operating at the port (i.e. linking data with terminal, truck and vessel IoT platforms, enlarging the IoT devices to other areas) to enable new business models, new applications and to provide more value to the port.
Users:	Port authority: It is the owner of the SCADA sensors network and who is accessing the data.
Context:	The SCADA port sensor network
Interacting system:	SCADA port sensor system, external IoT platforms, PMIS (Port Management and Information System), interoperable port IoT platform, PCS (Port Community System).
Users' goals:	Port authority is interested in connecting the SCADA sensor network with other IoT systems in the port in a standard way.
Interaction:	SCADA system transfers some data captured from the port sensors to an interoperable IoT platform managed by the port. This interoperable IoT platform is able to interact with port applications managed by the port authority and with other IoT platforms operating around the port.
Initial status:	The SCADA port sensor system is already managing a significant quantity of data coming from the different devices of the port.

Data:	Produced: Data captured from the devices of the port authority and handled by the SCADA system. Consumed: Data coming from other IoT platforms and systems.
Motivation:	The scenario is focused to open access to relevant data that is managed by the SCADA system to enable new business models, new applications and to provide more value to the port.
Time:	The security and safety relevance of the SCADA system network (i.e. a failure in the navigation signalling, like a lighthouse, can produce accidents or put in risk lives pushes high requirements in cybersecurity and reliability that need to be preserved and ensured. The introduction of this scenario will be conditioned to the specific requirements, authorisation, approval and consent of the managers of this system in the Port Authority.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • SCADA port sensor system • External IoT platforms Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: - Middleware: Relevant data managed in the SCADA system is available in an Industrial IoT platform to interoperate with other IoT platforms. Networking: - Device: - An Industrial IoT platform enables (i) an heterogeneous computing platform environment (e.g. Android, iOS, RTOS, Linux, Windows, machine controllers, sensors, gateways, cloud services, virtualization); (ii) enterprise wide data-connectivity for control analytics, monitoring, mobility, etc. wherever required to add business value; (iii) IDEs (for rapid new application development), edge device management, API management, edge (small data) and cloud-based (big data) analytics, etc. for generic applications and services; (iv) multiple and sophisticated end-to-end Qualities-of-Service (e.g. determinism, content-based priorization, data security, bandwidth efficiency, massive scalability, real-time peer-to-peer capability, etc.); (v) integrating legacy systems via standards-based protocol gateways to free the data from proprietary constraints.
Market and usage data available:	SCADA system is already used by the Port Authority of Valencia.
Business model:	The port receives fees for accessing some port sensors data. An Industrial IoT platform can provide new business models, new applications and more value to the port.
Missing technical know-how:	It will be required more information about the SCADA system.
Partner specific interests:	VPF is partner of the project and it will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario.
Business use case:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)

Registration Date:	16/Mar/16

[INTERIOT-524] SEAMS integration with IoT Platforms Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	8
Name:	SEAMS integration with IoT Platforms
Description:	Francisco is currently able to monitor and analyse from its desk the operations carried out by NOATUM's equipment and machines (more than 200 machines) working at the terminal. To do this, it is using the SEAMS platform. The Smart Energy Efficient Adaptive Management System (SEAMS) platform is a state-of-the art monitoring tool that is able to observe the different operations being carried by the equipment and machinery used at Noatum Container Terminal Valencia (NCTV) e.g. Ship to Shore cranes, Terminal Tractors, Rubber Tyred Gantry Cranes or Reach Stackers. This monitoring system works capturing signals coming from the Programmable Logic Controllers (PLCs) installed onto the equipment and machinery, and sending them each second to a database, using the container yard Wi-Fi network, in order to process the signals. The type of signals that are registered by the PLC are coming from a variety of sensors such as fuel consumption, location (GPS Installed), twist locks status or as simple as if whether the machine is working or not. This platform is able to detect bottlenecks in the operation of the machines at the Port Container Terminal by means of several algorithms as well as providing different KPI's regarding the terminals' operations. Francisco is facing some difficulties in improving the quality of communications between the IoT gateways in the machines and the SEAMS platform. The main reason for this is that terminal machines are working between the stacks of containers, which constitute big and dynamic steel screen walls for data communications, so IoT gateways need to decide the best network access point to transmit the data and connect to it very fast. Francisco is also pursuing to monitor and manage data coming from containers, trucks trains and other vehicles entering into the terminal. To achieve this goal, the terminal needs to interoperate with other heterogeneous Internet of Things platforms used by other companies and organisations. The need for monitoring these entities starts when the truck is initiating the voyage to go to the terminal (even before it enters) up to the moment they leave. When the entities are outside the terminal the data needed is lower than when the units are inside the terminal. For example, outside the container terminal the main information required is some basic information regarding the identity of the entities (i.e. truck, train, wagon, container, etc.), the operation to carry out (pick up or delivery of the container) and the estimated time of the arrival. Inside the terminal, data requirements are higher (i.e. position, identification and properties of the entities, security or safety issues and operation to carry out). The container terminal IoT platform will also carry out a dialog with other IoT platforms in order to interact with these entities to carry out operations properly. Francisco is also pursuing to communicate the terminal IoT platform with new big data tools as well as with other applications, especially the TOS, to further analysing and processing the data captured and to provide new services that will bring higher quality and value to the customers, higher efficiency in the

	terminal and lower operational costs. The terminal IoT platform comprises the SEAMS platform and new IoT interoperability framework and associated tools.
Users:	Port Container Terminal: It manages the terminal IoT platform. Truck owner company: It manages the road haulier IoT platform. Sea/Ocean carrier: It manages the shipping line IoT platform.
Context:	Port Container Terminal
Interacting system:	SEAMS platform, Terminal IoT platform, TOS, tucks' owner IoT platform, sea/ocean carrier IoT platform, internal terminal equipment & machines, INTER-IoT interoperability framework and associated tools.
Users' goals:	Achieve an interoperable framework that is able to merge the data captured by the terminal machinery with the data coming from different entities entering and exiting the terminal (containers, trucks, trains, vessels, etc.) and with the data managed by the TOS. Provide data and interact with the entities entering and exiting the terminal through their respective IoT platforms.
Interaction:	Noatum gets information from the SEAMS platform, TOS system and PCS. Exchange information with the road haulier company and shipping line company IoT platforms.
Initial status:	SEAMS is receiving from different sensors and GPS units placed in the machinery.
Data:	Produced: Registry Time, Entity Type, Identifier, Linked Entities, GPS position, speed, direction, twistlock sensors, spreader sensors, crane boom sensors, fuel consumption, etc. Consumed: TOS data, PCS data.
Motivation:	The scenario is focused to improve and evolve SEAMS to become an interoperable IoT platform.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the INTER-LogP demonstration within this project.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Terminal IoT platform • Haulier cloud IoT platform • SEAMS Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: SEAMS accesses to the information of position of the trucks. Middleware: The Terminal IoT platforms needs to access to relevant data managed by external IoT platform such as the truck position. Networking: - Device: The SEAMS should communicate with external devices to get data from sensors and tags located in different physical entities and to provide certain interactions with actuators (i.e. print a document, show a message, show a map, and produce a sound or a voice message).
Business model:	Acquisition and use of IoT platforms for containers, terminals and trucks, connected and open to a wide variety of applications. Market enlargement for IoT platforms. Connection of IoT platforms with machinery. Market for devices.

	Creation of gateways, virtualisation and interoperable solutions to break IoT silos among companies and products.
Partner specific interests:	Noatum is interested in reducing its costs by applying the interoperability of the SEAMS platforms and fleet management systems in order to reduce idling times and operative costs. Noatum is interested in improving transport and port logistics with this scenario.
Business use case:	INTER-LogP
Identified by:	Noatum Ports Valenciana S.A.U. (NOATUM)
Registration Date:	13/Apr/16

[INTERIOT-526] IoT interoperability for Vessel Arrivals Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	13
Name:	IoT interoperability for Vessel Arrivals
Description:	Gerardo is a pilot coordinator that works at the port of Valencia. He is in charge of orchestrating all the operations carried out by the pilots during the arrival and departure of vessels in the port. Thanks to the interoperability of heterogeneous IoT platforms he can now monitor the vessel arrival forecasts and the exact position of the vessels which are announced to arrive at the port of Valencia. It can also merge this information with the data coming from the tugboats, the mooring service cars and personal devices, the position and status of the ship-to-shore cranes at the container terminal and the position of their own pilot boats. All this captured information is handled by a new innovative application named PortCDM (Port Collaborative Decision Making) that is used to manage and coordinate all the operations needed by different companies and authorities in the arrival and departure processes of vessels. Savings in dwelling times for vessels and container terminals waiting for the berth are providing significant benefits to the port so Gerardo is very proud to provide a better quality of service to its customers. The position of the vessels arriving at the port uses vessel AIS data that is being compiled from different sources. At the first place, the vessels announced by shipping agencies to the Port Authority through ValenciaportPCS system are registered in the port IoT platform dedicated to manage and monitor different things handled by the port. AIS data from the vessels announced is captured periodically from existing “IoT cloud platforms” specialised in the location of vessels around the world (i.e. aishub.net or marinetraffic.com) through INTER-IoT interoperability tools. When the vessel is around 15-20 miles from the port the AIS receivers of the port authority also provide information of the different vessels navigating within the coverage area, which helps Gerardo to know the vessel traffic around the port. Pilot boats, tugboats, mooring vehicles and handheld units, and ship to shore cranes are also reporting the position and status of the operations to their private IoT platforms which, in turn, are linked and provide information to PortCDM in order to Gerardo manage and coordinate all the operations. With the support of PortCDM solution, Gerardo can also send messages and instructions for the completion of the operation, which are immediately shown on the specific screen devices used by the people concerned.

	ValenciaportPCS and the PMIS (Port management information system) are also subscribed to these IoT platforms in order to receive updates regarding different relevant properties of the vessel in the moment they are registered. Some of the relevant vessel properties are estimated time of arrival, current position of the vessel, actual time of arrival, actual time of berth, start time of terminal operations, end time of terminal operations, actual time of un-berth and actual time of departure.
Users:	Shipping Agency: It receives information regarding vessel ETA directly from the vessel and it is not required to update this information into the port system. The agency is also informed accurately of the operations taking place with the vessel they are operating with. The vessel is served with less waiting times. Container terminal: They connect their IoT platform to provide information regarding the position and status of their Ship to Shore cranes. With this information the pilot coordinate better the arrival of the vessel optimising the start of operations in the terminal, avoiding waiting times. Port authority: It receives accurate information on the dates and position of the vessels, so it can register this data for its internal processes. Pilots: They are able to receive information regarding different entities that participate in the berthing of the vessel so they can plan better the operations optimising the pilot resources and providing a higher quality of service. Towage and mooring services: Provide information on the position and status of their tugboats, the vehicles used and handheld units used for the mooring and receive instructions and information to carry out its operations.
Context:	Sea voyage, port operations and terminal berth
Interacting system:	ValenciaportPCS, PortCDM, Port IoT platforms used by different companies.
Users' goals:	Shipping companies want to avoid unnecessary waiting times for cargo operations and delays in leaving the port after cargo operations in the terminal are completed. The terminal wants to speed up the movement of containers. Great challenge to predict when a vessel might depart from a berth. Overcome low ability to predict state changes leading to poor coordination of port activities (arrival, activities at berth and departure).
Interaction:	Each company providing nautical and port services will be managing their own devices and units through their private IoT platforms. External vessel tracking systems (that behave like IoT platforms) will also interact in the solution. The IoT platform used by pilots will provide information to the PortCDM solution (application level).
Initial status:	A vessel visit is announced in the port.
Data:	Produced: Position, time and status of pilot boats, tugboats, mooring vehicles, mooring handheld units, cranes position and status. Consumed: vessel announcements, vessel name and identification, vessel position and timestamp, estimated time of arrival, course over ground, speed over ground, heading, position accuracy, rate of turn, navigational status, positioning device, vessel dimensions, draught, vessel's destination, estimated time of arrival, information and warning messages.
Motivation:	The scenario is focused on providing the IoT infrastructure and interoperability capabilities to enhance the coordination and decision making in vessel port arrivals.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the INTER-LogP demonstration within this project.

Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Port IoT platform • Private IoT platforms in the port environment Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: An IoT platform can notify changes in the properties of an object to other systems under a subscription basis. An IoT platform is able to interface with PortCDM in the same way as a software interfaces directly with a device. Middleware: Different devices are installed by different port and nautical service providers. These companies are interested in the first hand to use these devices to optimise their internal operations and they are open to share part of the data they have generated to better coordinate the operations and reduce manual reporting obligations. Private IoT platforms can also share data with existing applications, like PortCDM, PCS and PMIS. Networking: - Device: AIS data is automatically inserted in the port IoT platform
Market and usage data available:	Possibility to use smart phones and tablets as GPS units when they are on board the vessel as well as communication gateways. Possibility to interoperate with other existing platforms that are managing AIS data (which can be considered IoT platforms).
Business model:	Use of existing devices for cost effective solutions with plug & play capabilities. Market enlargement for devices. Acquisition and use of IoT platforms for vessel operations management and monitoring, connected and open to a wide variety of applications. Market enlargement for IoT platforms. Connection of IoT platforms with AIS systems. Creation of gateways, virtualisation and interoperable solutions to break IoT silos among companies and products.
Missing technical know-how:	More information is needed from PortCDM and stakeholders working in the port of Valencia. Collaboration with project partners is required to define the contributions to achieve this scenario.
Partner specific interests:	VPF is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. VPF is interested in improving transport and port logistics with this scenario.
Business use case:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	22/Mar/16

[INTERIOT-517] Containership is entering the harbor region Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	18

Name:	Containership is entering the harbour region
Description:	A container ship is entering the harbour environment, all containers with a monitoring system start to enter into range of the land-based communication systems (GSM, WiFi, LoRa, etc.) All the monitoring devices start to connect and try to transmit their collected data. With the maximum size of an ULCV (currently) of about 20.000 TEU this could mean that in a relative short period 10.000 devices (40 foot containers) could try to connect to the land-based networks. All these devices will, once connected, start transmitting their collected data.
Users:	The users will be autonomous devices which log and crunch sensor data during the trip. Since connectivity is not always supported during the trip, logging devices may store the collected sensor data until they are in reach again with a communication line.
Context:	The described scenario will be in the harbour region. The ship speed will be very low.
Interacting system:	The environment will be very open, no buildings or flora will be blocking lines of sight. However there will be an enormous amount of devices that are sometimes communicating their data. The amount of devices close to each other may be up to 25000 (supposed each container has a tracking device) Platforms will be any type of medium to long range communication platform. Probably mainly GSM, WiFi, LoRa, SigFox.
Users' goals:	Real time monitoring of container environments.
Interaction:	The human users interact through an online portal where all information about each container is collected and stored. Each device will update its status on regular intervals when connected to a network. In case limits are exceeded this should be marked in the portal.
Initial status:	Creation and setting of the devices and platform
Data:	Produced: setting of user data and parameters, frequency of measures, sensor data. Consumed: user data, frequency of measures.
Motivation:	Container monitoring is becoming more important, especially for products with an expiration date. This expiration date depends on the products surroundings, like temperature, humidity, shock/vibration levels, light, etc. To predict the expiration more accurate monitoring is required. Container monitoring can also improve port logistics efficiency because of tracking vehicle and container movement in- and outside the port.
Time:	For the project INTER-IoT, the lifespan of a container is about 7 years. Ideally the system can work without interruption for these 7 years.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Port platform • Containers with a monitoring system Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: - Middleware: - Networking: - Device: The interoperability platform must be able to sustain these enormous amount of devices that are communicating together as well as supporting the

	different network topologies. All the devices data should be collected in one or more repositories.
Business model:	The business model will be preliminary warning when limits are approached so corrective actions can be taken before goods get spoiled.
Missing technical know-how:	More information is needed from port-, ship- & truck-Logistics, trading company, importer, insurance and other users. Collaboration with project partners would greatly benefit the feasibility assessment of this scenario.
Partner specific interests:	As INTER-IoT partner Neways is responsible for Integration and Pilot Deployment. Neways is interested in the potential of developing new business opportunities, creating the technology to enable and support IoT, while improving the availability of LogP.
Business use case:	INTER-LogP
Identified by:	NEWAYS Technologies (NEWAYS)
Registration Date:	01/Apr/16

[INTERIOT-518] Transport on truck breaks down or is hijacked Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	19
Name:	Transport on truck breaks down or is hijacked
Description:	The truck leaves the harbour with a checked reefer container. The truck makes a long trip landinward. During the trip the reefer container monitoring system notices a temperature increase inside the container without an ambient chance. The monitoring system notices that something must be wrong with the temperature control system and sent out a warning with expected time before the container cargo will go to waste. GPS and/or geolocation will be sent with the warning together with the previous location, so in case the vehicle is still moving, speed, direction and location on a map can be determined in the cloud-system that interfaces with the transport company, in this case the user can be the cloud system or the transport company employee. The cloud system will also check (the monitoring unit has to send its location on a regular basis) if the truck is still moving. The user (employee or the could-system) will try to contact the truck-driver or truck operating system (when the truck is autonomous). In case the truck (or driver) does not respond the user must be able to get location and direction on demand, so the monitoring unit can give a location update more often. Local law-enforcement can go to the vehicle and resolve the situation before the cargo goes to waste. Vehicle theft or injuries/illness of the driver can also be detected early.
Users:	The users will be logistic companies and operators at the office or an automated cloud system. The operators will have limited technical knowledge, but can receive trainings how to operate the system. The system must therefore be intuitive and simple to use. The cloud system must be robust and able to contact truck (driver) and law enforcement.
Context:	The environment in which this scenario can take place is anywhere inland. In case of theft the criminals will maybe try to disable communication systems, in case of illness of the truck driver maybe no response is possible.

Interacting system:	Because this scenario can take place anywhere inland possibly with hostile intentions there may be communication errors, the system must be robust and able to handle this. The communication may be over long-range communication with a small bandwidth. The monitoring device must be able to minimize the amount of data to be sent and received. In order to achieve better coverage more communication platforms are needed, since a single platform may not have coverage everywhere.
Users' goals:	Real time tracking of container/vehicle movement, monitoring of internal container climate.
Interaction:	The users interact through an online cloud-based system. They contact the monitoring devices through various communication platforms depending on location and availability. Interaction will be between monitoring device and could-based system and vice versa, between the cloud based system and human operators, between cloud-based system and truck (driver), and between cloud-based system and law-enforcement.
Initial status:	Most of current in place communication systems will be used, the monitoring devices and cloud-based system have to be created. Communication lines to truck-driver and law-enforcement are (partly) in place.
Data:	Produced: sensor data, location, warning signals. Consumed: user data, warnings signals, location and location tracking.
Motivation:	Container monitoring is becoming more important, especially for products with an expiration date. This expiration date depends on the products surroundings, like temperature, humidity, shock/vibration levels, light, etc. To predict the expiration more accurate monitoring is required. Container monitoring can also improve logistics efficiency and avoid theft or problems with the driver.
Time:	For the project INTER-IoT, the lifespan of a standalone container monitoring system is about 7 years. Reefer containers have their own backup batteries and are connected to power supply during storage or on ships. The reefer batteries can maintain the climate control for about 24 hours. The monitoring system could also use this power supply to replenish its batteries.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • A platform for monitoring trucks of in haulier company Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: - Middleware: The interoperability platform must be able to sustain these different platforms and communication methods. Networking: - Device: All the data devices should be collected in one or more repositories.
Market and usage data available:	A device that does a more simplified monitoring is the Globe Tracker Communications Unit GT Comm. Unit, which is enclosed in the market research.
Business model:	The business model will be preliminary warning when limits are approached so corrective actions can be taken before goods get spoiled.
Missing technical know-how:	More information is needed from port-, ship- & truck-Logistics, trading company, importer, insurance and other users.

	Collaboration with project partners would greatly benefit the feasibility assessment of this scenario.
Partner specific interests:	As INTER-IoT partner Neways is responsible for Integration and Pilot Deployment. Neways is interested in the potential of developing new business opportunities, creating the technology to enable and support IoT, while improving the availability of LogP.
Business use case:	INTER-LogP
Identified by:	NEWAYS Technologies (NEWAYS)
Registration Date:	15/Apr/16

[INTERIOT-519] Damage or problems to the container during shipment Created: 15/Apr/16 Updated: 19/Oct/16 Resolved: 15/Apr/16	
Identifier:	20
Name:	Damage or problems to the container during shipment
Description:	Still many containers get lost or (heavily) damaged during transport due to all kinds of mistakes or external influences (nature). If a tracking system allows the containers to be recovered again, this could safe and protect the environment as well as reducing claims for lost cargo.
Users:	The users will be logistic companies or postal companies. They suffer losses because shipments get lost, or damaged.
Context:	Containers or packages can get lost everywhere on the planet, in the most harsh environments. Land based communication systems may not be accessible.
Interacting system:	The system may need to find an active connection, or even connect through satellite.
Users' goals:	To track lost containers and get instant information about damage.
Interaction:	The users interact through an online cloud-based system. Two way interaction may not be possible because lack of proper communication. Interaction will be between monitoring device and could-based system.
Initial status:	Most of current in place communication systems will be used, the monitoring devices and cloud-based system have to be created.
Data:	Produced: location, sensor data. Consumed: location and location tracking.
Motivation:	Container monitoring is becoming more important, especially for products with an expiration date. Loosing shipments can occur, and could be in some cases costly. This will allow to recover the lost goods.
Time:	For the project INTER-IoT, the lifespan of a standalone container monitoring system is about 7 years. However in case of a calamity the time-span will be less, up to one month when the container is lost on sea.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Logistic company platform Interoperability requirements:

	Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: It must be able to select and find a communication line everywhere on the planet. Middleware: The interoperability platform must be able to sustain different platforms and communication methods. Networking: - Device: -
Market and usage data available:	Containers are still getting lost during transport and usually end up either on the bottom of the ocean or they are washed up ashore, usually ending up in nature because they are not recovered.
Business model:	The business model will be to recover lost containers. About 10.000 containers get lost at sea each year, resulting in high insurance policies.
Missing technical know-how:	More information is needed from port-, ship- & truck-Logistics, trading company, importer, insurance and other users. Collaboration with project partners would greatly benefit the feasibility assessment of this scenario.
Partner specific interests:	As INTER-IoT partner Neways is responsible for Integration and Pilot Deployment. Neways is interested in the potential of developing new business opportunities, creating the technology to enable and support IoT, while improving the availability of LogP.
Business use case:	INTER-LogP
Identified by:	NEWAYS Technologies (NEWAYS)
Registration Date:	15/Apr/16

[INTERIOT-599] Reliable control of robotic cranes and trucks in port terminals Created: 22/Apr/16 Updated: 19/Oct/16 Resolved: 22/Apr/16	
Identifier:	29
Name:	Reliable control of robotic cranes and trucks in port terminals
Description:	Mike is a truck driver authorized to enter the port terminal and pick a container. In violation of regulations, he gets off his truck to talk to another driver in person. However, he is crossing an area where the robotic truck or crane is using. The presence of human is picked by camera monitoring systems and the movement of robots in that area has to be suspended. Besides the robot that is directly putting Mike's health in danger, other robots need to pause to avoid congestion to other terminal areas and potential other dangers. The various robots are contacted via an IoT network of low-power battery operated devices. The terminal wants to reduce the service costs of the network by keeping the devices operational on same battery for at least 5 years. It is the same network that is used for data logging from smart containers.
Users:	terminal operators, port authorities, terminal robots manufacturers, logistics companies, insurance companies
Context:	Terminals of ports
Interacting system:	Robotic (off)loading systems of ships at ports.

Users' goals:	Reduction of injuries and fatalities at port terminals.
Interaction:	Port terminal employees and users with robots in the terminal.
Initial status:	Human operated monitoring of robotic-designated areas.
Data:	Produced: robot trajectories Consumed: human presence
Motivation:	Users improve their employment attractiveness and their container throughput.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the INTER-LogP demonstration within this project.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Terminal platform • Port authority platform Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: Middleware: Interoperability between external systems e.g. CCTV and Industrial IoT. Networking: - Device: Interoperability between nodes of different manufacturers (HW & SW).
Business model:	B2B services offered to logistics and insurance companies.
Partner specific interests:	IoT connectivity dependability
Business use case:	INTER-LogP
Identified by:	Technische Universiteit Eindhoven (Tu/e)
Registration Date:	22/Apr/16

[INTERIOT-600] IoT access control, traffic and operational assistance Created: 25/Apr/16 Updated: 19/Oct/16 Resolved: 25/Apr/16	
Identifier:	30
Name:	IoT access control, traffic and operational assistance
Description:	José is a truck driver that works in Transportes Ballester, a road haulier company in Spain. Everyday José goes twice a day to the port of Valencia to pick up and drop off containers. Recently, the port authority has increased the security requirements to access the port following national security recommendations. Now, he will need to identify himself, identify the truck and provide other transport details when he enters into the port area. A similar identification is required when he enters into the container terminal to carry out the pick-up and drop off operations. A new IoT access control, traffic and operational assistance solution is now available at the port to simplify José's life thanks to heterogeneous interoperable IoT platforms. To improve the reliability of the identification of the truck at different places, the truck has been equipped with a passive RFID tag located over its windscreen; it has also a GPS unit and a gateway to communicate with the company's

	private IoT platform. Inside the cabin, there is an iBeacon using Bluetooth LE that is used to activate the presence in the cabin of José's smart phone. From the moment José enters into the cabin, José's phone is temporarily linked with the truck until it will get out from the truck. The phone's app remembers José all the activities he has to carry out to initiate the voyage, including the tasks for registering its card into the tachograph and to check all the documentation. Some tasks are recognised by the truck's sensors and when the task is completed, the sensor updates the status of the task so it can start its journey. The truck cabin also detects the semi-trailer it has attached using also an iBeacon located in the semi-trailer that it is recognised by the trucks gateway. When José arrives at the port gate system, an automatic access check control is made by the devices located at the gate and the fence is opened. During this process and in order to gain access to the port, the gate system has identified the truck through an LPR (license plate reader) and an RFID antenna (as a redundant system) to identify the truck. This information is immediately registered and managed by the port authority's IoT platform. It is also immediately communicated to the road haulier IoT platform. The road haulier IoT platform checks if the truck is effectively in the port area and confirms the operation. This notification produces also a temporal link between the truck virtual entity between the truck's owner and the port authority IoT platforms. This link gives the port authority access to several transport data elements managed that will be managed in both platforms. The link will enable the possibility to request the details of the driver, the semi-trailer identification, the work order, the position of the truck while it is inside the port as well as to subscribe to different events, like the moment when the truck is leaving the port area or when the driver is leaving the cabin. The container terminal IoT platform has also subscribed to the port authority IoT platform to receive events of truck's arriving the port that will go to its premises. The link of the virtual truck in all these platforms give the possibility to provide messages to the cabin. During the stay of the truck inside the port, it is monitored by the port authority's IoT platform for security and safety purposes. It can know the position of the truck, the presence of the driver in the cabin and provide to the cabin warning and information messages (i.e. traffic information, accidents, congestion, waiting times, emergencies). When the truck arrives at the container terminal, a similar access control process is made at the terminal gate and José will be able to enter to the terminal. From this moment, the truck and the driver are also monitored by the container terminal IoT platform. The container terminal has access and can use the truck cabin's printer to print the Interchange documents. These documents contain a barcode to identify the interchange details in the case this information will be required by customs. In the case José leaves the cabin while he is inside the terminal in an unsafe area, the container terminal sends a safety-warning message to his mobile phone. When leaving the terminal premises and the port area the gate control systems performs equivalent checks. If the operation is authorised the fence is open but if there is any problem the incident is communicated to the terminal and road hauliers IoT platforms. When the truck leaves these areas, the link between the locations and the truck virtual entities is removed. The road hauliers' IoT platform also monitors the departure of these areas through geo-fences and notifies the departure to the linked IoT platforms in the case these events were not recognised by the gates.

	With this solution, José does not need to stop at the gates, all the information required is communicated automatically and he receives relevant information to complete its job. Now José can go three times per day at the port instead of two giving more revenues to his company.
Users:	Road Haulier company: It establishes the data exchange rules with the port and the terminal and manages its own IoT platform handling all the data and communications coming from the devices of their trucks and drivers. Driver: It can be informed about all the events and messages relevant for its work. Port Authority and Container Terminal: They gain access to relevant data of the truck and the driver during the stay in their premises.
Context:	Port and terminal access
Interacting system:	Road haulier IoT cloud platform, Port Gate System, Port Authority IoT platform, Container Terminal Gate System, Container Terminal IoT platform, SEAMS, truck's devices, driver's smart phone.
Users' goals:	Haulier company wants to increase the efficiency, security and safety of the truck operations and the port as well as to increase its incomes. Port Authority and container terminals want to provide reliable and efficient mechanisms for gate access controls, security, safety and mobility of trucks and other vehicles inside the port/terminal area. The driver wants to avoid waiting times to carry out their work orders, to be warned about dangers and to avoid problems while it is inside the port.
Interaction:	Haulier companies, port authority and container terminals can interact in this scenario through the user interfaces provided by their IoT platforms interfaces connected to the existing gate systems. Drivers can interact in this scenario through an APP installed on its mobile and on-board unit.
Initial status:	The driver enters in the cabin and prepares its daily voyages.
Data:	Produced: truck position, truck sensor data, driver identification, authorisations and monitoring of trucks in restricted areas. Consumed: Work orders, Interchange documents.
Motivation:	The scenario is focused on providing new mechanisms for access controls and trucks monitoring in restricted areas through interoperability of IoT platforms and devices.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the INTER-LogP demonstration within this project.
Interoperability Role:	General description: INTER-LogP integrated resulting service by use of: • Road haulier IoT cloud platform • Port Gate System • Port Authority IoT platform • Container Terminal Gate System • Container Terminal IoT platform Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: The IoT platform of the location visited by the virtual entities can request and subscribe to data as well as to use some devices of the virtual entity (i.e. a screen, a printer). Middleware: Virtual truck and driver entities are registered in the truck's owner IoT cloud platform. A semi-trailer and driver virtual entity can temporarily be

	linked to a truck to carry out work orders. When a truck accesses to the port, the virtual entities are linked to the location IoT platform. The virtual entities' owners can disconnect the links of other external virtual entities at any time. Networking: - Device: Identification of the truck at a gates.
Market and usage data available:	Availability of Bluetooth LE iBeacons (i.e. Accent Systems, ~30€). Availability of GPS units, CAN-BUS and tachograph readers Possibility to use smart phones as GPS units and to interface with the driver. Possibility to use tablets as GPS units and as truck communication gateways and to interface with the driver. Potential Data: printable interchange document, gps location, gps speed, origin, destination, location geo-fence, authorisation, incident, warning and information messages, driver identification and detection, etc.
Business model:	Use of existing devices for cost effective solutions with plug & play capabilities. Market enlargement for devices. Acquisition and use of IoT platforms for truck device management and monitoring, connected and open to a wide variety of applications. -Market enlargement for IoT platforms. -Connection of IoT platforms with gate control access systems. -Creation of gateways, virtualisation and interoperable solutions to break IoT silos among companies and products. -Connection of IoT platforms with automatic gate control systems. -Creation of gateways, virtualisation and interoperable solutions to break IoT silos among companies and products.
Missing technical know-how:	More information is needed from providers and users. Collaboration with project partners is required to define the contributions to achieve this scenario.
Partner specific interests:	VPF is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. VPF is interested in improving transport and port logistics with this scenario.
Business use case:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	25/Apr/16

INTER-Health scenarios

[INTERIOT-468] Chronic disease prevention Created: 07/Apr/16 Updated: 16/Nov/16 Resolved: 07/Apr/16	
Identifier:	1
Name:	Chronic disease prevention
Description:	1. John is 40 years old, works in the office, he is slightly overweight. For some time he feels a little tired and therefore went to the family doctor for a check-up. The doctor visits him and prescribes some control tests. The test results are normal but the doctor suggests that he contacts the service of Hygiene Nutrition Unit (ASL TO5) in order to change his lifestyle and to prevent diseases such as hypertension, diabetes and so on. 2. The doctor of the ASL TO 5 in addition to provide a set of behavioural and dietary recommendations, proposes to John to undergo a period of monitoring to help changing lifestyle and prevent diseases caused by obesity. 3. Using INTER-Health the ASL TO5 operator • registers the John personal data • provides devices (weight scale, blood pressure monitor, activity monitoring sensor) for use at home to make periodic measurements and tells it how to use them • collects the John measures • sets the frequency of measurements • sets the schedule for the completion of the questionnaire 4. John starts the program compiling the online questionnaire on eating habits and physical activity using INTER HEALTH 5. Each day John wears the monitoring activity sensor and aims to reach the number of steps suggested checking on INTER HEALTH 6. Periodically (following the frequency of measurements suggested by ASL TO5) he measures the pressure and weight and sends the data using INTER Health 7. The ASL TO 5operator periodically checks if John is following the protocol and checks the measures and the activities on INTER health. In case of any detected problem (e.g. absence of measures for an interval of time, outside threshold values) he can contact John.
Users:	Citizen /Patients (older than 18 years old - any level culture and technical skill - healthy or diseased – producers of Measures, questionnaires - consumer of schedules and agendas) Doctor and Sanitary Operator ASL TO 5 (producer of setting of patients data and parameters – consumer of measures and questionnaire reports)
Context:	ASL TO 5 ambulatory – home of citizens /patients
Interacting system:	Medical and wearable devices, tablets, smartphone, personal computer BodyCloud, eCare, INTERHealth
Users' goals:	ASL TO 5 doctors: want to monitor habits and measures of patients that they are following Patients/Citizens: they want to feel good and improve their well-being
Interaction:	Using app on smartphone / tablet and web interfaces to collect, send measures and see reports, trend and setting information
Initial status:	Creation and setting of the user on the platform

Data:	Produced: setting of user data and parameters, frequency of measures, questionnaires setting, measures (weight, height, waist circumference, imc, blood pressure), questionnaires Consumed: measures and questionnaire reports, user data, frequency of measures.
Motivation:	Home monitoring is introduced in a comparative study to assess the efficacy in terms of response to the program by the citizen / patient, comfort (the patient does not have to go to the nutrition ambulatory), the savings and efficiencies in ASL TO5.
Time:	For the project INTERIOT, around one year for each patient /citizen that adheres to the program
Interoperability Role:	General description: The resulting service will be obtained by the integration of: • A platform for monitoring subjective information (questionnaires) and medical measures (such as eCare platform) • A platform for activity monitoring (such as BodyCloud) Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel. number; correlation between the same kind of measures; mapping between unit of measures Kg/g/lb) Application Services: There should be primitives for access to service data or already synthetized information (e.g. trend of measures, health status dashboard, fall events,..) of the integrated platforms Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices or user data into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated
Business model:	B2B2C The customer of the INTER HEALTH system that enable the Chronic disease Prevention service could be an Health operator that uses it for patients
Partner specific interests:	TI is partner of the project and will contribute to the pilot on m-health. TI is interested in clinical results in term of ability of the INTER-HEALTH platform to respond to the needs of users (patients and ASL TO5) and in term of efficiency and cost reduction evaluation.
Business use case:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	10/Mar/16

[INTERIOT-469] Primary prevention of cognitive decline Created: 07/Apr/16 Updated: 16/Nov/16 Resolved: 07/Apr/16	
Identifier:	11
Name:	Primary prevention of cognitive decline
Description:	1. Robert is an elderly person, 65 years old. Recently he accuses some memory lapses and is anxious for his health so that he decides to go to his doctor. The physician who follows him detects the risk of a potential cognitive decline in the

	future as it detects a low level of education, a clear overweight, low socio-economic conditions and a mild hypercholesterolemia and hyperglycaemia. 2. Therefore the physician suggests the patient to enter the ASL "primary prevention program of cognitive decline" monitoring some medical parameters, from a quantitative and qualitative point of view, for the next 12 months. 3. Using INTER-Health the ASL operator • Registers the Robert personal data • provides devices (weight scale, blood pressure monitor, glucometer, oximeter, activity monitoring) for use at home to make periodic measurements and tells it how to use them • collects the Robert measures • sets the frequency of measurements • sets the schedule for the completion of the food diary and physical activity through a questionnaire 4. Robert starts the program compiling the online questionnaire on eating habits and physical activity using INTER HEALTH 5. Each day Robert wears the monitoring activity sensor and aims to reach the number of steps suggested checking on INTER HEALTH 6. Periodically (following the frequency of measurements suggested by ASL) he measures the pressure, the heart frequency, the weight, the glucose level and the OS2 saturation and sends the data using INTER Health 7. The ASL operator periodically checks if Robert is following the protocol and checks the measures and the activities on INTER health. In case of any detected problem (e.g. absence of measures for an interval of time, outside threshold values) can contact Robert.
Users:	Citizen /Patients (elderly persons - any level culture and technical skill - diseased person– producers of Measures, questionnaires - consumer of schedules and agendas) Doctor and Sanitary ASL Operator (producer of setting of patients data and parameters – consumer of measures and questionnaire reports)
Context:	ASL ambulatory – home of citizens /patients
Interacting system:	Medical and wearable devices, tablets, smartphone, Personal computer BodyCloud, eCare, INTERHealth
Users' goals:	ASL doctors: they want to monitor habits and measures of patients that they are following Patients/Citizens: they want to feel good and improve their well-being
Interaction:	Using app on smartphone / tablet and web interfaces to collect, send measures and see reports, trend and setting information
Initial status:	Creation and setting of the user on the platform
Data:	Produced: setting of user data and parameters, frequency of measures, questionnaires setting, measures (weight, height, waist circumference, imc, blood pressure, glucose level, OS2 saturation, steps), questionnaires Consumed: measures and questionnaire reports, user data, frequency of measures.
Motivation:	Home monitoring is introduced to improve the efficacy in terms of response to the program by the citizen / patient, comfort (the patient does not have to go to the surgery), the savings and efficiencies in ASL.
Time:	12 months or more depending by patients responses

Interoperability Role:	General description: INTER-Health Integrated resulting service by use of: • A platform for monitoring subjective information (questionnaires) and medical measures (such as eCare platform) • A platform for activity monitoring (such as BodyCloud) Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel number; correlation between the same kind of measures; mapping between unit of measures Kg/g/lb) Application Services: There should be primitives for access to service data or already synthetized information (e.g. trend of measures, health status dashboard, fall events,..) of the integrated platforms Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated.
Business model:	B2B2C The customer of the INTER HEALTH system that enable the PRIMARY PREVENTION OF COGNITIVE DECLINE service could be an Health operator that uses it for patients.
Partner specific interests:	TI as service provider.
Business use case:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	16/Mar/16

[INTERIOT-470] Heart failure disease and mild alzheimer desease Created: 07/Apr/16 Updated: 16/Nov/16 Resolved: 07/Apr/16	
Identifier:	12
Name:	Heart failure disease and mild Alzheimer disease
Description:	1. Marc and Lucy are two elderly persons, 65 and 60 years old respectively. Marc is in good health while Lucy had a heart failure, she is hyperglycaemic patient and suffers from an initial, mild Alzheimer's disease. Marc goes to the cardiologist in the hospital because it is worried about the health of his wife and also for the temporary loss of memory. 2. The cardiologist consult a geriatrician and together they decide to insert his wife in a medical surveillance project. This project allows to monitor the cardiac pathologies and the early symptoms of Alzheimer disease integrating a remote monitoring system with a geolocalization system. Therefore the physician suggests the patient to enter the Hospital “monitoring program” for the next 12 months. 3. Using INTER-Health the Hospital operator • registers the Lucy personal data

	• provides medical devices (weight scale, blood pressure monitor, thermometer, glucometer, oximeter, ECG and an activity monitoring) for use at home to make periodic measurements and tells it how to use them • provide geolocalization device (bracelet or mobile phone) to the patient communicating with the application and the platform. The patient device operates in a "silent mode", without interfering with the normal activity of the patient himself. • sets the safe area, that is to say, a portion of the space within the patient moves with "security"; when the patient leaves the safe area, the system generates an alarm • collects the Lucy measures • sets the frequency of measurements 4. Each day Lucy wears the monitoring activity sensor and aims to reach the number of steps suggested checking on INTER HEALTH 5. Each day Lucy wears the geolocalization device (bracelet or mobile phone) to be easily located by the parents 6. Periodically (following the frequency of measurements suggested by the hospital operator) she measures the pressure, the heart frequency, the weight, the glucose level, the temperature, the OS2 saturation and the ECG and sends the data using INTER Health 7. The patients' relatives check continuously, through their mobile phone, the displacements of Lucy to be in alert and call her if she goes away from a safe pre-defined area. They could enable / disable tracking, define and enable / disable the safe area, check the patient and receives any alarms, can request the location of the patient, make sure the phone is running and charged. 8. The Hospital operator periodically checks if Lucy is following the protocol and checks the measures and the activities on INTER health. In case of any detected problem (e.g. absence of measures for an interval of time, outside threshold values) he can contact Lucy.
Users:	Citizen /Patients (elderly persons - any level culture and technical skill - diseased person– producers of Measures, - consumer of schedules and agendas) Patients relatives to control position of the person Doctor and Sanitary Operator of the Hospital (producer of setting of patients data and parameters – consumer of measures and reports)
Context:	Hospital ambulatory – home of citizens /patients
Interacting system:	Medical and wearable devices, geolocalization device, tablets, smartphone, Personal computer BodyCloud, eCare, INTERHealth, platform that offers geolocalization services and geolocalization devices
Users' goals:	Hospital doctors: want to care their patients monitoring them at home Patients: who want to be cared for and they want to staying at home Patients relatives: want to control their loved ones in case of needs
Interaction:	Using app on smartphone / tablet and web interfaces to collect, send measures and see reports, trend and setting information
Initial status:	Creation and setting of the user on the platform (medical devices and geolocalization devices)
Data:	Produced: setting of user data and parameters, frequency of measures, measures (weight, height, waist circumference, imc, blood pressure, OS2 saturation, ECG, steps), displacements Consumed: measures, user data, frequency of measures, position.

Motivation:	Home monitoring is introduced to improve the efficacy in terms of response to the program by the patient, comfort and autonomy of the patient (the patient does not have to go to the ambulatory), the savings and efficiencies in the Hospital.
Time:	12 months or more depending by patients' needs.
Interoperability Role:	General description: INTER-Health integrated resulting service by use of: • A platform for monitoring medical measures (such as eCare platform) • A platform for activity monitoring (such as BodyCloud) • Platform /service for geolocalization and related devices Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel. number; correlation between the same kind of measures; mapping between unit of measures Kg/g/lb) Application Services: There should be primitives for access to service data or already synthetized information (e.g. trend of measures, health status dashboard, fall events, localization data..) of the integrated platforms Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking:- Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated
Business model:	B2B2C The customer of the INTER-Health system that enable the "heart failure disease and mild Alzheimer disease" service could be an Health operator that uses it for patients
Partner specific interests:	TI as service provider.
Business use case:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	16/Mar/16

[INTERIOT-501] Surveillance systems for prevention programs Created: 14/Apr/16 Updated: 17/Nov/16 Resolved: 14/Apr/16	
Identifier:	15
Name:	Surveillance systems for prevention programs
Description:	1. In the Piedmont Regional plan of prevention 2014-2018 the school environment is identified as a strategic framework to promote health in childhood and adolescence. 2. Students weight control in schools through the use of health kiosks connected to a data collection platform (eCare) allows to return to the Region useful information (through the analysis of data) in order to plan training courses to promote the adoption of lifestyles beneficial for health. 3. Using the eCare platform and the health Kiosk placed in schools boys are controlled periodically and in particular are collected the following measurements: height, weight, fat mass, body mass index. On demand may also be collected the blood pressure measurement.

	4. Using the online questionnaires available on the eCare platform students periodically provide information about their lifestyle. 5. Every guy (or in the case of minors their families) can access the data measured via the web browser on the internet. 6. Using a platform for anonymization and data analysis all data collected from eCare platform are provided to the Region through dashboards and useful trend analysis. 7. On the basis of the indicators and trend analysed results the territorial health facilities (ASL) in connection with the schools will promote ad hoc training campaigns for prevention
Users:	Students (child or adolescent age – producers of Measures, questionnaires) Parents (consumer of measures and questionnaire reports) Region/ASL/Schools (consumer of data analysis aggregated and reports)
Context:	Schools: schools identification, questionnaires and measures collecting. ASL: for setting and data monitoring Home: for data monitoring by student's parents ASL: for setting and data monitoring. Home: for data monitoring by student's parents
Interacting system:	Health Kiosk, tablets, smartphone, personal computer, eCare, platform for data analysis (to be identified)
Users' goals:	Region, ASL: want to analyse health status of children and adolescents in order to promote the adoption of lifestyles beneficial for health Children and adolescents or their parents: they want to improve their well-being or the wellbeing of their sons
Interaction:	Using app on smartphone / tablets and web interfaces to collect, send and control measures.
Initial status:	Creation and setting of the school users on the eCare platform
Data:	Produced: user data settings and parameters, questionnaires setting, measures (weight, height, fat mass, imc, blood pressure), questionnaires Consumed: measures and questionnaire reports, user data, reports and data analysis
Motivation:	Promotion health in childhood and adolescence in order to prevent overweight and obesity and derived diseases
Time:	For the project INTER-IoT, around one year for each patient /citizen that adheres to the program
Interoperability Role:	General description: Integrated INTER-Health resulting service by use of: • A platform for monitoring subjective information (questionnaires) and medical measures through the use of health Kiosk (such as eCare platform) • platform (to be identified) that offers data aggregation and anonymization, reporting e data analysis Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping between the same user; correlation between the same kind of information: sex, age, physical parameters/ measures; unit of measures Kg/g/lb) Application Services: There should be primitives for access to service data or already synthetized information of the integrated platforms Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: -

Business model:	B2B2C The customer of the INTER-Health system that enable the Surveillance systems for prevention programs service could be a Region that want to implement a prevention campaign
Missing technical know-how:	- platform (to be identified) that offers data aggregation and anonymization, reporting e data analysis
Partner specific interests:	TI as a provider of the eCare service or of the integrated solution
Business use case:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	11/Apr/16

[INTERIOT-504] Elderly monitoring Created: 14/Apr/16 Updated: 17/Nov/16 Resolved: 14/Apr/16	
Identifier:	16
Name:	Elderly monitoring
Description:	1. Paul is an elderly person 80 years old, with a slight chronic obstructive bronchitis and diabetes. He lives alone helped daily by a maid for cleaning the house and preparing meals. 2. A year ago due to an influence he had a worsening of general condition and was hospitalized in the geriatric ward of his city. At the end of the hospitalization the doctor asked him to get into the home monitoring program in order to avoid the occurrence of further deterioration of COPD and returns to hospital. 3. Paul has accepted to enter in the program and it was provided with a set of devices to be used to measure the oximetry, the blood glucose, the pressure and weight. As Paul does not have great familiarity with smartphones, he was provided with a device with mobile connectivity that can collect the measures carried out by Paul but with minimal interaction on his part. 4. Using INTER-Health the Hospital operator • Registers Paul's personal data • provides devices and equipment (weight scale, blood pressure monitor, glucometer, oximeter, gateway hub) for use at home to make periodic measurements and tells it how to use them • gives him the schedule of the measures 5. Periodically (following the frequency of measurements suggested by the doctor) he measures the pressure, the heart frequency, the weight, the glucose level and the OS2 saturation. The measures are collected in automatic way through the gateway hub and sent to the INTER-Health platform. 6. The Hospital operator periodically checks if Paul is following the protocol and checks the measures on INTER-health. In case of any detected problem (e.g. absence of measures for an interval of time, outside threshold values) can contact Paul.
Users:	Patients (diseased elderly people with little familiarity with the technologies – producers of Measures) Doctor and Sanitary Operator of the Hospital (producer of setting of patients data and parameters – consumer of measures and reports)
Context:	Hospital ambulatory – home of patients
Interacting system:	Medical devices, gateway hub, Personal computer

	eCare, INTER-Health, gateway hub (to be identified e.g. coXnico) that offers medical devices integration and easy use
Users' goals:	Hospital doctors: want to care their patients monitoring them at home Patients: who want to be cared for and they want to staying at home
Interaction:	Using gateway hub / tablet and web interfaces to collect, send measures and see reports, trend and setting information
Initial status:	Creation and setting of the user on the platform (medical devices and gateway hub)
Data:	Produced: setting of user data and parameters, measures (weight, height, blood glucose, blood pressure, OS2 saturation). Consumed: measures, user data.
Motivation:	Home monitoring is introduced to improve the efficacy in terms of response to the program by the patient, comfort and autonomy of the patient (the patient does not have to go to the ambulatory), the savings and efficiencies in the Hospital.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the INTER-Health demonstration within this project.
Interoperability Role:	General description: INTER-Health integrated resulting service by use of: • A platform for medical measures monitoring (such as eCare) • Platform /service (to be identified e.g. coXnico) for gateway hub and related devices Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping between the user identities; correlation between the same kind of measures; mapping between unit of measures Kg/g/lb) Application Services: - Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated.
Business model:	B2B2C The customer of the INTER-Health system that enable the Elderly monitoring service could be a Health operator (e.g. Hospital) that uses it for patients.
Missing technical know-how:	- Platform /service (to be identified) for gateway hub and related devices
Partner specific interests:	TI as service provider.
Business use case:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	12/Apr/16

[INTERIOT-573] **Low risk of developing chronic diseases.**

Created: 19/Apr/16 Updated: 17/Nov/16 Resolved: 19/Apr/16

Identifier:	21
Name:	Low risk level of developing chronic diseases
Description:	Julia is a 36 years old girl who teaches mathematics at a public institution. She is in a situation of normal weight but in the last two years, has had depression problems because of the high rates imposed by the job. He consulted several specialists and began a drug therapy. Following the treatment, although she continues to have a BMI of normal weight and waist circumference values are normal, she noticed an increase in weight, she has been advised by her family doctor to consult the nutritional outpatient of ASL TO5 Hygiene Nutrition Unit, to verify and / or correct his lifestyle and his eating habits. Giulia takes part to traditional nutritional counselling, in which health staff gathered her objective measures (weight, height, BMI, waist circumference) and subjective measures such as eating habits and physical activity practice and will be checked every three months to evaluate the progress of his health. ASL TO5 Health staff has proposed to take part an experimental nutritional counselling that using IoT technology allows a decentralized monitoring in real time using the INTER-Health experimental platform. In particular Giulia will be provided of a balance with Bluetooth connection to detect periodically at home her weight (once a week) and a device for monitoring physical activity daily to detect the number of steps performed, the duration of practiced activities physical and kcal consumed. Will also be asked to fill out online questionnaires on eating habits and physical activity. The objective and subjective measures will be collected on the experimental platform. Giulia in this way will be monitored remotely by health staff that will periodically check its measures, ensuring an adequate level of care. Performing experimental advice, Giulia will be more motivated to control her health state, maintaining a healthy lifestyle, thanks to the recommendations provided by the health staff of the ASL TO5 about proper nutrition and physical activity.
Users:	All the healthy population of any social origin belonging not only to the territory of the ASL TO5, with more than 18 years old. Particular attention should be paid to persons who have borderline values of risk for developing chronic diseases. Involved health staff: key team (doctor, dietician, nutritionist biologist, food technologist, health assistant) These two classes of users in respect of the platform are to be producers of indicators and measures and at the same time consumers of collected data and devices.
Context:	Nutritional outpatient of Simple Structure of Nutrition Hygiene of the Department of Prevention ASL TO5. Homes of all those who agree to participate in experimental counselling Outpatient of the family doctor
Interacting system:	Medical devices (scales); wearable mobile devices; smartphones; tablet; PC. Questionnaires for the survey of eating habits and physical activity. Computerized nutritional folder. Platforms e-Care, Body Cloud, INTER-Health
Users' goals:	The population of ASL TO5 can become the main players in their own health state. Health staff can carry out continuous monitoring of the lifestyles of remote users / citizens in their homes and in real time.
Interaction:	Users can register independently their objective and subjective measures using the kit provided by the ASL TO5 during the trial and can control their data by accessing the web interface.

	Health staff can access the web interface used by the subject involved in the experimentation, controlling the testing at its various stages: recognition of objective and subjective measurements made by the recruited subjects; data collection and processing; evaluation of the results
Initial status:	Traditional nutritional counselling: monitoring of lifestyles takes place only at the nutrition outpatients by the health staff. Experimental nutritional counselling: training and information of individuals who will be recruited and health staff.
Data:	Products: sensitive health data: personal, anthropometric (weight, height, BMI, waist circumference), blood pressure, eating habits, physical activity (number of steps, duration of physical activity practiced and consumed kcal). Consumed: Identification of reference standards and evaluation of expected results.
Motivation:	The monitoring decentralized and in mobility lifestyles allows to act on health product in terms of efficacy of treatment for health staff and the person involved. Using mobile devices, you can convert measures that during the traditional counselling are defined such as subjective (physical activity) in objective measurements recorded in real time and continuously.
Time:	The experimental nutritional counselling will last about a year. At the beginning of the trial will be reported at the nutritional outpatient of the ASL TO5 Nutrition Hygiene structure the objective and subjective measures by the health staff and will be carried out checks at the same outpatient every 6 months. During the course of the year on decentralized monitoring it will be detected by the subjects themselves in their houses: once a week the weight by Bluetooth scales; twice a month eating habits and physical activity through online questionnaires; daily duration of physical activity, the number of executed steps and kcal consumed by the wearable mobile devices.
Interoperability Role:	General description: The resulting scenarios will include interoperability between: a platform for telemonitoring of data recorded by the medical devices (scales) and online questionnaires for the eating habits and the practice of physical activity (such as e-Care Platform) , and a platform for activity monitoring that contains the data recorded by mobile wearable devices (bracelets for the detection of physical activity) such as BodyCloud platform Moreover all the data collected should be made available to the sanitary structure into the nutritional folder that will collect also measures performed periodically during visits by health operators. Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms and nutritional folder (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel. number; correlation between the same kind of measures; mapping between units of measures Kg/g/lb). The resulting INTER-Health service can demonstrate the efficacy of a complete health status monitoring. At this level objective and subjective measures collected at Nutritional outpatient and at home through heterogeneous device on heterogeneous platform, allow to overcome the traditional methods about the relationship with subject who come to Nutritional Outpatient. Application Services: There should be primitives for access to service data or already synthetized information (e.g. trend of measures, health status dashboard, fall events, etc.) of the integrated platforms. Health operator

	periodically checks if the subject is following the given nutritional counselling and checks measures and activities on the INTER-Health platform. Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated. Health operators and subjects using smartphone / tablet and web interfaces on personal computer can collect and send measures, see reports and trends and setting information.
Market and usage data available:	-
Business model:	The introduction of ICT in the healthcare environment allows the creation of a connection network between health staff and the afferent public, which in the preventive field and in terms of health is reflected in the health care cost savings.
Missing technical know-how:	TI: Provides e-Care and medical devices (scales) and online questionnaires (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity. Unical: provides BodyCloud and wearable mobile devices (bracelets for the detection of physical activity).
Partner specific interests:	ASL TO5 is partner of the project and help from the health point of view to the development of the health use case. In particular TO5 ASL through health indicators established will evaluate the effectiveness of the IoT testing in health, analysing the positive and negative effects for all users (population and health staff), and for all the stakeholders involved.
Business use case:	INTER-Health
Identified by:	Azienda Sanitaria Locale TO5 (ASLTO5)
Registration Date:	17/Mar/16

[INTERIOT-574] **Increased risk of developing chronic diseases** Created: 19/Apr/16 Updated: 17/Nov/16 Resolved: 19/Apr/16	
Identifier:	22
Name:	Increased risk level of developing chronic diseases
Description:	Claudia is a young housewife 40 years old, she is overweight with a BMI of 26 and a 89 cm waist circumference, is located in a very particular family situation that recently lost her husband and two daughters who are finishing their studies. After pregnancy has begun to have blood glucose levels higher, and is hypertension. She is in a situation of increased risk of developing chronic diseases and must pay particular attention to blood sugar levels and blood pressure. The family doctor has prescribed several check-ups, including a nutritional counselling. It is therefore in contact with the nutritional outpatients of the ASL TO5 Nutrition Hygiene structure in which health staff gathered her objective measures (weight, height, BMI, waist circumference) and subjective measures such as eating habits and practice of ' physical activity and will be checked every three months to assess the progress of his health.

	ASL TO5 health staff has proposed to take part an experimental nutritional counselling that using IoT technology allows a decentralized monitoring in real time using the INTER-Health experimental platform. In particular Claudia will be provided of a balance with Bluetooth connection to detect periodically home his weight (once a week), a sphygmomanometer with Bluetooth connection for everyday detection of blood pressure at home and a device for the monitoring of ' daily physical activity for detecting the number of steps taken, the duration of physical activity practiced and kcal consumed. You will also be asked to fill out online questionnaires on eating habits and physical activity. The objective and subjective measures will be collected on the experimental platform. Claudia in this way will be monitored remotely by health staff that will periodically check its measures, ensuring an adequate level of care. Thanks to the decentralized monitoring, with the reduction of the waiting time at the outpatients, Claudia will follow his daughters and can control the state of his health, the recommendations provided by healthcare professionals ASL TO5 about proper nutrition and the practice of 'physical activity.
Users:	All the healthy population of any social origin belonging not only to the territory of the ASL TO5, with more than 18 years old. Particular attention should be paid to persons who have borderline values of risk for developing chronic diseases. Involved health staff: key team (doctor, dietician, nutritionist biologist, food technologist, health assistant) These two classes of users in respect of the platform are to be producers of indicators and measures and at the same time consumers of collected data and devices.
Context:	Nutritional outpatient of Simple Structure of Nutrition Hygiene of the Department of Prevention ASL TO5. Homes of all those who agree to participate in experimental counselling Outpatient of the family doctor
Interacting system:	Medical devices (scales, sphygmomanometer); wearable mobile devices; smartphones; tablet; PC. Questionnaires for the survey of eating habits and physical activity. Computerized nutritional folder. Platforms e-Care, Body Cloud, INTER-Health
Users' goals:	The population of ASL TO5 can become the main players in their own health state. Health staff can carry out continuous monitoring of the lifestyles of remote users / citizens in their homes and in real time.
Interaction:	Users can register independently their objective and subjective measures using the kit provided by the ASL TO5 during the trial and can control their data by accessing the web interface. Health staff can access the web interface used by the subject involved in the experimentation, controlling the testing at its various stages: recognition of objective and subjective measurements made by the recruited subjects; data collection and processing; evaluation of the results.
Initial status:	Traditional nutritional counselling: monitoring of lifestyles takes place only at the nutrition outpatients by the health staff. Experimental nutritional counselling: training and information of individuals who will be recruited and health staff.
Data:	Products: sensitive health data: personal, anthropometric (weight, height, BMI, waist circumference), blood pressure, eating habits, physical activity (number of steps, duration of physical activity practiced and consumed kcal). Consumed: Identification of reference standards and evaluation of expected results.

Motivation:	The monitoring decentralized and in mobility lifestyles allows to act on health product in terms of efficacy of treatment for health staff and the person involved. Using mobile devices, you can convert measures that during the traditional counselling are defined such as subjective (physical activity) in objective measurements recorded in real time and continuously.
Time:	The experimental nutritional counselling will last about a year. At the beginning of the trial will be reported at the nutritional outpatient of the ASL TO5 Nutrition Hygiene structure the objective and subjective measures by the health staff and will be carried out checks at the same outpatient every 6 months. During the course of the year on decentralized monitoring it will be detected by the subjects themselves in their houses: once a week the weight by Bluetooth scales; everyday the blood pressure by Bluetooth sphygmomanometer; twice a month eating habits and physical activity through online questionnaires; daily duration of physical activity, the number of executed steps and kcal consumed by the wearable mobile devices.
Interoperability Role:	General description: The resulting scenarios will include interoperability between: a platform for telemonitoring of data recorded by the medical devices (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity (such as e-Care Platform) and a platform for activity monitoring that contains the data recorded by mobile wearable devices (bracelets for the detection of physical activity) such as BodyCloud platform. Moreover all the data collected should be made available to the sanitary structure into the nutritional folder that will collect also measures performed periodically during visits by health operators. Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms and nutritional folder (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel. number; correlation between the same kind of measures; mapping between units of measures Kg/g/lb). The resulting INTER-Health service can demonstrate the efficacy of a complete health status monitoring. At this level objective and subjective measures collected at Nutritional outpatient and at home through heterogeneous device on heterogeneous platform, allow to overcome the traditional methods about the relationship with subject who come to Nutritional Outpatient. Application Services: There should be primitives for access to service data or already synthetized information (e.g. trend of measures, health status dashboard, fall events, etc.) of the integrated platforms. Health operator periodically checks if the subject is following the given nutritional counselling and checks measures and activities on the INTER-Health platform. Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated. Health operators and subjects using smartphone / tablet and web interfaces on personal computer can collect and send measures, see reports and trends and setting information.
Market and usage data available:	-

Business model:	The introduction of ICT in the healthcare environment allows the creation of a connection network between health staff and the afferent public, which in the preventive field and in terms of health is reflected in the health care cost savings.
Missing technical know-how:	TI: Provides e-Care and medical devices (scales, sphygmomanometer) and online questionnaires (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity. Unical: provides BodyCloud and wearable mobile devices (bracelets for the detection of physical activity).
Partner specific interests:	ASL TO5 is partner of the project and help from the health point of view to the development of the health use case. In particular TO5 ASL through health indicators established will evaluate the effectiveness of the IoT testing in health, analysing the positive and negative effects for all users (population and health staff), and for all the stakeholders involved.
Business use case:	INTER-Health
Identified by:	Azienda Sanitaria Locale TO5 (ASLTO5)
Registration Date:	18/Mar/16

[INTERIOT-575] High risk of developing chronic diseases Created: 19/Apr/16 Updated: 17/Nov/16 Resolved: 19/Apr/16	
Identifier:	23
Name:	High risk level of developing chronic diseases
Description:	George is an electrician of 38 years old, currently unemployed. He is an obese and has a waist circumference of 117 cm, is therefore in a high-risk condition for the development of cardiovascular diseases and chronic diseases. His family doctor has also shown that is in a particular condition of risk since it has high levels of blood pressure. He addressed the nutritional outpatients of the ASL TO5 Nutrition Hygiene structure to make a nutritional counselling. During the first visit to the dietitian Giorgio expressed the need to be followed frequently, the job loss make it psychologically weak so do not fail to follow any dietary advice. Among the nutritional outpatients of the ASL TO5structure of the Nutrition Hygiene, health staff gathered his objective personal data (weight, height, BMI, waist circumference) and subjective measures such as eating habits and physical activity, and every three months will be checked to assess the state of his health. One aspect in which the dietitian has paid attention was the fact that during the George nutritional counselling reported to have an active lifestyle, since in contrast to his BMI and waist circumference. The dietitian has therefore suggested to George to perform an experimental nutritional counselling, during which, using IoT technologies would have a decentralized real-time monitoring through the Inter-Health experimental platform. In particular Giorgio will be provided of a balance with Bluetooth connection to detect periodically home his weight (once a week), a sphygmomanometer with Bluetooth connection for everyday detection of blood pressure at home and a

	device for the monitoring of ' daily physical activity for detecting the number of steps taken, the duration of physical activity practiced and kcal consumed. The will also be asked to fill out online questionnaires on eating habits and physical activity. The objective and subjective measures will be collected on the experimental platform. Giorgio in this way will be monitored remotely by health staff that will periodically check its measures, ensuring an adequate level of care.
Users:	All the healthy population of any social origin belonging not only to the territory of the ASL TO5, with more than 18 years old. Particular attention should be paid to persons who have borderline values of risk for developing chronic diseases. Involved health staff: key team (doctor, dietician, nutritionist biologist, food technologist, health assistant) These two classes of users in respect of the platform are to be producers of indicators and measures and at the same time consumers of collected data and devices.
Context:	Nutritional outpatient of Simple Structure of Nutrition Hygiene of the Department of Prevention ASL TO5. Homes of all those who agree to participate in experimental counselling. Outpatient of the family doctor.
Interacting system:	Medical devices (scales, sphygmomanometer); wearable mobile devices; smartphones; tablet; PC. Questionnaires for the survey of eating habits and physical activity. Computerized nutritional folder. Platforms e-Care, Body Cloud, INTER-Health.
Users' goals:	The population of ASL TO5 can become the main players in their own health state. Health staff can carry out continuous monitoring of the lifestyles of remote users / citizens in their homes and in real time.
Interaction:	Users can register independently their objective and subjective measures using the kit provided by the ASL TO5 during the trial and can control their data by accessing the web interface. Health staff can access the web interface used by the subject involved in the experimentation, controlling the testing at its various stages: recognition of objective and subjective measurements made by the recruited subjects; data collection and processing; evaluation of the results.
Initial status:	Traditional nutritional counselling: monitoring of lifestyles takes place only at the nutrition outpatients by the health staff. Experimental nutritional counselling: training and information of individuals who will be recruited and health staff.
Data:	Produced: sensitive health data: personal, anthropometric (weight, height, BMI, waist circumference), blood pressure, eating habits, physical activity (number of steps, duration of physical activity practiced and consumed kcal). Consumed: Identification of reference standards and evaluation of expected results.
Motivation:	The monitoring decentralized and in mobility lifestyles allows to act on health product in terms of efficacy of treatment for health staff and the person involved. Using mobile devices, you can convert measures that during the traditional counselling are defined such as subjective (physical activity) in objective measurements recorded in real time and continuously.
Time:	The experimental nutritional counselling will last about a year. At the beginning of the trial will be reported at the nutritional outpatient of the ASL TO5 Nutrition Hygiene structure the objective and subjective measures by

	the health staff and will be carried out checks at the same outpatient every 6 months. During the course of the year on decentralized monitoring it will be detected by the subjects themselves in their houses: once a week the weight by Bluetooth scales; everyday the blood pressure by Bluetooth sphygmomanometer; twice a month eating habits and physical activity through online questionnaires; daily duration of physical activity, the number of executed steps and kcal consumed by the wearable mobile devices.
Interoperability Role:	General description: The resulting scenarios will include interoperability between: a platform for telemonitoring of data recorded by the medical devices (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity (such as e-Care Platform) and a platform for activity monitoring that contains the data recorded by mobile wearable devices (bracelets for the detection of physical activity) such as BodyCloud platform. Moreover all the data collected should be made available to the sanitary structure into the nutritional folder that will collect also measures performed periodically during visits by health operators. Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms and nutritional folder (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel. number; correlation between the same kind of measures; mapping between units of measures Kg/g/lb). The resulting INTER-Health service can demonstrate the efficacy of a complete health status monitoring. At this level objective and subjective measures collected at Nutritional outpatient and at home through heterogeneous device on heterogeneous platform, allow to overcome the traditional methods about the relationship with subject who come to Nutritional Outpatient. Application Services: There should be primitives for access to service data or already synthetized information (e.g. trend of measures, health status dashboard, fall events, etc.) of the integrated platforms. Health operator periodically checks if the subject is following the given nutritional counselling and checks measures and activities on the INTER-Health platform. Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated. Health operators and subjects using smartphone / tablet and web interfaces on personal computer can collect and send measures, see reports and trends and setting information.
Market and usage data available:	-
Business model:	The introduction of ICT in the healthcare environment allows the creation of a connection network between health staff and the afferent public, which in the preventive field and in terms of health is reflected in the health care cost savings.

Missing technical know-how:	TI: Provides e-Care and medical devices (scales, sphygmomanometer) and online questionnaires (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity. Unical: provides BodyCloud and wearable mobile devices (bracelets for the detection of physical activity).
Partner specific interests:	ASL TO5 is partner of the project and help from the health point of view to the development of the health use case. In particular TO5 ASL through health indicators established will evaluate the effectiveness of the IoT testing in health, analysing the positive and negative effects for all users (population and health staff), and for all the stakeholders involved.
Business use case:	INTER-Health
Identified by:	Azienda Sanitaria Locale TO5 (ASLTO5)
Registration Date:	21/Mar/16

[INTERIOT-576] Very high risk of developing chronic diseases Created: 19/Apr/16 Updated: 17/Nov/16 Resolved: 19/Apr/16	
Identifier:	24
Name:	Very high risk level of developing chronic diseases
Description:	Rosa is an employee of 65 years old, is in a situation of second level obesity and has a waist circumference of 93 cm. She performed a routine metabolic control, and found to have high levels of cholesterol. His family history is serious because it is familiar observed for cardiovascular disease with his mother and sister. Rosa should take extra care to his power, his family doctor has advised to refer to the nutritional outpatients of the ASL TO5 structure of the Nutrition Hygiene. Performed the traditional nutritional counselling, in which health staff gathered his objective personal data (weight, height, BMI, waist circumference) and subjective measures such as eating habits and physical activity practice and every three months will be checked to assess the 'performance of his health. Health personnel ASL TO5 has proposed to take part an experimental nutritional counselling that using IoT technology allows a decentralized monitoring in real time using the INTER-Health experimental platform. In particular will be provided a balance with Bluetooth connection to detect periodically at home his weight (once a week) and a device for monitoring physical activity daily for detecting the number of steps made, the duration of physical activity practiced and kcal consumed. You will also be asked to fill out online questionnaires on eating habits and physical activity. The objective and subjective measures will be collected on the experimental platform. In this way, Rose will be monitored remotely by health staff that will periodically check its measures, ensuring an adequate level of care. The compilation of online food questionnaires on eating habits in a situation where the level of risk is very high, will allow the medical staff to check real-time compliance with the frequency of consumption and the choice of food in a day, keeping one correct lifestyle thanks to the recommendations provided by the medical staff of the ASL TO5 about proper nutrition and physical activity.

Users:	All the healthy population of any social origin belonging not only to the territory of the ASL TO5, with more than 18 years old. Particular attention should be paid to persons who have borderline values of risk for developing chronic diseases. Involved health staff: key team (doctor, dietician, nutritionist biologist, food technologist, health assistant) These two classes of users in respect of the platform are to be producers of indicators and measures and at the same time consumers of collected data and devices.
Context:	Nutritional outpatient of Simple Structure of Nutrition Hygiene of the Department of Prevention ASL TO5. Homes of all those who agree to participate in experimental counselling. Outpatient of the family doctor.
Interacting system:	Medical devices (scales); wearable mobile devices; smartphones; tablet; PC. Questionnaires for the survey of eating habits and physical activity. Computerized nutritional folder. Platforms e-Care, Body Cloud, INTER-Health.
Users' goals:	The population of ASL TO5 can become the main players in their own health state. Health staff can carry out continuous monitoring of the lifestyles of remote users / citizens in their homes and in real time.
Interaction:	Users can register independently their objective and subjective measures using the kit provided by the ASL TO5 during the trial and can control their data by accessing the web interface. Health staff can access the web interface used by the subject involved in the experimentation, controlling the testing at its various stages: recognition of objective and subjective measurements made by the recruited subjects; data collection and processing; evaluation of the results.
Initial status:	Traditional nutritional counselling: monitoring of lifestyles takes place only at the nutrition outpatients by the health staff. Experimental nutritional counselling: training and information of individuals who will be recruited and health staff.
Data:	Produced: sensitive health data: personal, anthropometric (weight, height, BMI, waist circumference), blood pressure, eating habits, physical activity (number of steps, duration of physical activity practiced and consumed kcal). Consumed: Identification of reference standards and evaluation of expected results.
Motivation:	The monitoring decentralized and in mobility lifestyles allows to act on health product in terms of efficacy of treatment for health staff and the person involved. Using mobile devices, you can convert measures that during the traditional counselling are defined such as subjective (physical activity) in objective measurements recorded in real time and continuously.
Time:	The experimental nutritional counselling will last about a year. At the beginning of the trial will be reported at the nutritional outpatient of the ASL TO5 Nutrition Hygiene structure the objective and subjective measures by the health staff and will be carried out checks at the same outpatient every 6 months. During the course of the year on decentralized monitoring it will be detected by the subjects themselves in their houses: once a week the weight by Bluetooth scales; twice a month eating habits and physical activity through online questionnaires; daily duration of physical activity, the number of executed steps and kcal consumed by the wearable mobile devices.
Interoperability Role:	General description:

	The resulting scenarios will include interoperability between: a platform for telemonitoring of data recorded by the medical devices (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity (such as e-Care Platform) and a platform for activity monitoring that contains the data recorded by mobile wearable devices (bracelets for the detection of physical activity) such as BodyCloud platform. Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms and nutritional folder (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel. number; correlation between the same kind of measures; mapping between units of measures Kg/g/lb). The resulting INTER-Health service can demonstrate the efficacy of a complete health status monitoring. At this level objective and subjective measures collected at Nutritional outpatient and at home through heterogeneous device on heterogeneous platform, allow to overcome the traditional methods about the relationship with subject who come to Nutritional Outpatient. Application Services: There should be primitives for access to service data or already synthetized information (e.g. trend of measures, health status dashboard, fall events, etc.) of the integrated platforms. Health operator periodically checks if the subject is following the given nutritional counselling and checks measures and activities on the INTER-Health platform. Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated. Health operators and subjects using smartphone / tablet and web interfaces on personal computer can collect and send measures, see reports and trends and setting information.
Market and usage data available:	-
Business model:	The introduction of ICT in the healthcare environment allows the creation of a connection network between health staff and the afferent public, which in the preventive field and in terms of health is reflected in the health care cost savings.
Missing technical know-how:	TI: Provides e-Care and medical devices (scales) and online questionnaires for the eating habits and the practice of physical activity. Unical: provides BodyCloud and wearable mobile devices (bracelets for the detection of physical activity).
Partner specific interests:	ASL TO5 is partner of the project and help from the health point of view to the development of the health use case. In particular TO5 ASL through health indicators established will evaluate the effectiveness of the IoT testing in health, analysing the positive and negative effects for all users (population and health staff), and for all the stakeholders involved.
Business use case:	INTER-Health
Identified by:	Azienda Sanitaria Locale TO5 (ASLTO5)
Registration Date:	23/Mar/16

[INTERIOT-577] Extremely high risk of developing chronic diseases Created: 19/Apr/16 Updated: 17/Nov/16 Resolved: 19/Apr/16	
Identifier:	25
Name:	Extremely high risk level of developing chronic diseases
Description:	Umberto is a 50 year old nurse who is in a serious situation of obesity, is a hypertensive subject. For heart problems he has stopped smoking and poor nutrition plays, continuing to have weight gain. For the type of risk to which he is subjected and the type of work he does must take urgent and adequate food path; the family doctor advised him to turn to the nutritional outpatients of ASL TO5 Nutrition Hygiene structure and following the interview with the dietitian seems very motivated. Umberto is subjected to the traditional nutritional counselling, in which health staff gathered his objective personal data (weight, height, BMI, waist circumference) and subjective measures such as eating habits and physical activity, and will be checked every three months to evaluate the progress of his health. ASL TO5 health staff offered him to take part an experimental nutritional counselling that using IoT technology allows a decentralized monitoring in real time using the INTER-Health experimental platform. In particular Umberto will be provided of a balance with Bluetooth connection to detect periodically at home his weight (once a week), a sphygmomanometer with Bluetooth connection for everyday detection of blood pressure at home and a device for the monitoring of ' daily physical activity for detecting the number of steps taken, the duration of physical activity practiced and kcal consumed. The will also be asked to fill out online questionnaires on eating habits and physical activity. The objective and subjective measures will be collected on the experimental platform. Umberto in this way will be monitored remotely by health personnel that will periodically check its measures, ensuring an adequate level of care. Umberto is a nurse, so he knows the healthcare environment; real-time monitoring makes it independent and involved in first person of the state of his health.
Users:	All the healthy population of any social origin belonging not only to the territory of the ASL TO5, with more than 18 years old. Particular attention should be paid to persons who have borderline values of risk for developing chronic diseases. Involved health staff: key team (doctor, dietician, nutritionist biologist, food technologist, health assistant) These two classes of users in respect of the platform are to be producers of indicators and measures and at the same time consumers of collected data and devices.
Context:	Nutritional outpatient of Simple Structure of Nutrition Hygiene of the Department of Prevention ASL TO5. Homes of all those who agree to participate in experimental counseling. Outpatient of the family doctor.
Interacting system:	Medical devices (scales, sphygmomanometer); wearable mobile devices; smartphones; tablet; PC. Questionnaires for the survey of eating habits and physical activity. Computerized nutritional folder. Platforms e-Care, Body Cloud, INTER-Health.
Users' goals:	The population of ASL TO5 can become the main players in their own health state.

	Health staff can carry out continuous monitoring of the lifestyles of remote users / citizens in their homes and in real time.
Interaction:	Users can register independently their objective and subjective measures using the kit provided by the ASL TO5 during the trial and can control their data by accessing the web interface. Health staff can access the web interface used by the subject involved in the experimentation, controlling the testing at its various stages: recognition of objective and subjective measurements made by the recruited subjects; data collection and processing; evaluation of the results.
Initial status:	Traditional nutritional counselling: monitoring of lifestyles takes place only at the nutrition outpatients by the health staff. Experimental nutritional counselling: training and information of individuals who will be recruited and health staff.
Data:	Produced: sensitive health data: personal, anthropometric (weight, height, BMI, waist circumference), blood pressure, eating habits, physical activity (number of steps, duration of physical activity practiced and consumed kcal). Consumed: Identification of reference standards and evaluation of expected results.
Motivation:	The monitoring decentralized and in mobility lifestyles allows to act on health product in terms of efficacy of treatment for health staff and the person involved. Using mobile devices, you can convert measures that during the traditional counselling are defined such as subjective (physical activity) in objective measurements recorded in real time and continuously.
Time:	The experimental nutritional counselling will last about a year. At the beginning of the trial will be reported at the nutritional outpatient of the ASL TO5 Nutrition Hygiene structure the objective and subjective measures by the health staff and will be carried out checks at the same outpatient every 6 months. During the course of the year on decentralized monitoring it will be detected by the subjects themselves in their houses: once a week the weight by Bluetooth scales; everyday the blood pressure by Bluetooth sphygmomanometer; twice a month eating habits and physical activity through online questionnaires; daily duration of physical activity, the number of executed steps and kcal consumed by the wearable mobile devices.
Interoperability Role:	General description: The resulting scenarios will include interoperability between: a platform for telemonitoring of data recorded by the medical devices (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity (such as e-Care Platform) and a platform for activity monitoring that contains the data recorded by mobile wearable devices (bracelets for the detection of physical activity) such as BodyCloud platform. Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms and nutritional folder (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel. number; correlation between the same kind of measures; mapping between units of measures Kg/g/lb). The resulting INTER-Health service can demonstrate the efficacy of a complete health status monitoring. At this level objective and subjective measures collected at Nutritional outpatient and at home through heterogeneous device on heterogeneous platform, allow to overcome the traditional methods about the relationship with subject who come to Nutritional Outpatient.

	Application Services: There should be primitives for access to service data or already synthetized information (e.g. trend of measures, health status dashboard, fall events, etc.) of the integrated platforms. Health operator periodically checks if the subject is following the given nutritional counselling and checks measures and activities on the INTER health platform. Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated. Health operators and subjects using smartphone / tablet and web interfaces on personal computer can collect and send measures, see reports and trends and setting information.
Market and usage data available:	-
Business model:	The introduction of ICT in the healthcare environment allows the creation of a connection network between health staff and the afferent public, which in the preventive field and in terms of health is reflected in the health care cost savings.
Missing technical know-how:	TI: Provides e-Care and medical devices (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity. Unical: provides BodyCloud and wearable mobile devices (bracelets for the detection of physical activity).
Partner specific interests:	ASL TO5 is partner of the project and help from the health point of view to the development of the health use case. In particular TO5 ASL through health indicators established will evaluate the effectiveness of the IoT testing in health, analysing the positive and negative effects for all users (population and health staff), and for all the stakeholders involved.
Business use case:	INTER-Health
Identified by:	Azienda Sanitaria Locale TO5 (ASLTO5)
Registration Date:	04/Apr/16

[INTERIOT-597] **Vitamins and minerals intake analyser** Created: 20/Apr/16 Updated: 17/Nov/16 Resolved: 21/Apr/16	
Identifier:	27
Name:	Vitamins and minerals intake analyser
Description:	Alice is 4-year-old girl, which has very low vitamin blood analysis. In long term this can have bad consequences for her health. Her mother is very concerned about her health. As well her family history shows low in iron. Therefore, she get vitabear, which is a cuddly bear that, besides behaving like a normal toy, is able to analyse if the child has symptoms of vitamin deficiency. The bear asks Alice to do usual things for children, like asking for hugs or standing on one leg, and with visual analysis as well is able to detect specific deficiencies of vitamins, and in case, it sends an alert to Alice's mother smartphone.
Users:	All children as a prevention of low vitamin insufficiency.

Context:	Testing at home for children under their parents' supervision or for adults alone.
Interacting system:	Additional device for Smart phone, tablet application.
Users' goals:	Prevention leading to better health conditions. Making sure that vitamins are not only sufficient but also accepted and well processed by the body.
Interaction:	Bear asks to perform simple tasks playing with a child, and interacting with him/her. App on smart phone device that warns the mother if a specific behaviour is detected.
Initial status:	Low vitamins or health prevention.
Data:	The immediate levels of vitamin and minerals in body of tested person.
Motivation:	Health prevention.
Time:	During INTER-IoT project.
Interoperability Role:	General description: The resulting scenarios will include interoperability between: an app on a smartphone (to be identified) and a device (e.g. cuddly bear to be identified) and possibly a platform for telemonitoring of data recorded by the device (to be identified). Interoperability requirements: Data & Semantics: There should be primitives for data interpretation between device, app on the smartphone and platform receiving data (e.g. mapping between the user identities; correlation between the same kind of measures or level of alert). Application Services: There should be primitives for access to service data (e.g. deficiency of vitamins, level of alert) of the integrated platform. Middleware: There should be primitives at the platform level for direct access to the collected data of the devices into the platform integrated. Networking: there should be a radio communication between the device and the app n the smartphone (e.g. BT). Device: There should be primitives at the gateway level on the smartphone for direct access to the collected data of the device.
Business model:	B2B sales to hospitals, doctors' offices and B2C direct sale to end users.
Missing technical know-how:	The device to detect the vitamin deficiency should be identified or produced. A new service could be developed using an existing monitoring service integrating the new device.
Partner specific interests:	Market analysis.
Business use case:	INTER-Health
Identified by:	Alessandro Bassi Consulting (ABC)
Registration Date:	10/Apr/16

INTERIOT-598] **Calories/ nutrition mixer / cookware counter** Created: 20/Apr/16 Updated: 17/Nov/16 Resolved: 21/Apr/16	
Identifier:	28
Name:	Calories/ nutrition mixer / cookware counter

Description:	Alice is 30 years old business analyst leading very active life despite her job in the office. She is very health conscious. Alice exercises every day in a gym or goes for run. She is shopping in bio markets and cooking at home. Every meal she cooks is cooked in a cookware which has a calories and nutrition analyser. She puts her ingredients in according to the receipt and after the food is cooked the mixer/cookware produces a list of calories and nutrition in the meal. She likes to control and monitor how much of each she had consumed each day.
Users:	Pregnant women, New mothers, people with special diets, Patients with insufficient nutrition. Weight conscious people, health conscious people, athletes and sport people.
Context:	At home kitchen use, hospital kitchen
Interacting system:	Mixer and cookware with embedded systems for vitamin and nutrition analysis. Inter-Health analysis cookware
Users' goals:	Health improvement, health prevention
Interaction:	Person and cookware
Initial status:	Buying the product or getting a doctor's prescription.
Data:	Data produced are levels of vitamins and nutrition in each cooked meal.
Motivation:	People can better monitor their diets and for health prevention.
Time:	Pending Inter IoT
Interoperability Role:	General description: The resulting new service could include interoperability between: an app on a smartphone (to be identified) and a device (e.g. cookware to be identified) and possibly a platform for monitoring of data recorded by the device (to be identified). Interoperability requirements: Data & Semantics: There should be primitives for data interpretation between device, app on the smartphone and platform receiving data (e.g. mapping between the user identities; correlation between the same kind of measures). Application Services: There should be primitives for access to service data (e.g. list of calories by day, trend) of the integrated platform. Middleware: There should be primitives at the platform level for direct access to the collected data of the devices integrated into the platform. Networking: there should be a radio communication between the device and the app n the smartphone (e.g. BT). Device: There should be primitives at the gateway level on the smartphone for direct access to the collected data of the device.
Business model:	Potential business models are in B2B, hospitals, maternity, work canteens and home use, as a health prevention support of the insurance companies.
Missing technical know-how:	The device to analyse list of calories should be identified or produced. A new service could be developed using an existing monitoring service integrating the new device.
Partner specific interests:	Market analysis.
Business use case:	INTER-Health
Identified by:	Alessandro Bassi Consulting (ABC)

Registration Date:	10/Apr/16

[INTERIOT-809] Chronic disease prevention (aggregated) Created: 17/Nov/16 Updated: 17/Nov/16	
Identifier:	31
Name:	Chronic disease prevention (aggregated)
Description:	Healthy people with different level of risk of developing chronic diseases (e.g. hypertension, diabetes, cognitive decline, cardiovascular, obesity) are suggested by the family doctor to make a nutritional counselling in order to change their lifestyle and to prevent diseases. The nutritional outpatients of Nutrition Hygiene structure visit the patients and on the basis of the problems and health status identify the risk of developing chronic disease, proposes a prevention program, provides a set of behavioural and dietary recommendations, proposes a period of monitoring to help changing lifestyle. These the main steps: 1. Doctors: Perform visit to identify risk of chronic diseases and to define the prevention program 2. Doctors: Register into prevention program 3. Doctors: Set protocol parameters: kind of measures to be monitored and frequency, questionnaires to be filled in 4. Healthy people and/or Doctors: Doctors perform measures during visits, healthy people perform measures and fill questionnaires by home 5. Doctors: Monitor patients measures The measures of interest to be monitored in the prevention protocol, depending on the level of risk are: Weight, blood pressure, physical activity. This scenario is an aggregation of the following scenarios: 01 - Chronic disease prevention. 11 - Primary prevention of cognitive decline. 21 - Low risk of developing chronic diseases. 22 - Increased risk of developing chronic diseases. 23 - High risk of developing chronic diseases. 24 - Very high risk of developing chronic diseases. 25 - Extremely high risk of developing chronic diseases.
Users:	Citizen /Patients (older than 18 years old - any level culture and technical skill - healthy or diseased – producers of Measures, questionnaires - consumer of schedules and agendas). Doctor and Sanitary Operator (producer of setting of patients' data and parameters – consumer of measures and questionnaire reports).
Context:	Medical ambulatory – home of citizens /patients
Interacting system:	eCare platform to collect and monitor weight a pressure measures and questionnaires. BodyCloud platform to collect and monitor physical activity. Nutritional Folder to collect all data patients of interest for Nutrition Hygiene structure to manage the prevention protocols (clinical history, measures, etc.).
Users' goals:	Healthy people can become the main players in their own health state. Health staff can carry out continuous monitoring of the lifestyles of remote users / citizens in their homes and in real time.

Interaction:	Mobile App Web application Medical Devices Wearable devices Using app on smartphone / tablet and web interfaces to collect, send measures and see reports, trend and setting information. Using of medical devices and wearable to collect measures and physical activity
Initial status:	Creation and setting of the user on the platform for the experimental nutritional counselling program.
Data:	Produced: setting of user data and parameters, frequency of measures, questionnaires setting, measures (weight, height, waist circumference, imc, blood pressure, glucose level, OS2 saturation, and steps), questionnaires Consumed: measures and questionnaire reports, user data, frequency of measures.
Motivation:	The monitoring decentralized and in mobility lifestyles allows to act on health product in terms of efficacy of treatment for health staff and the person involved. Using mobile devices, you can convert measures that during the traditional counselling are defined such as subjective (physical activity) in objective measurements recorded in real time and continuously.
Time:	12 months or more depending by patients responses.
Interoperability Role:	General description: The resulting service will be obtained by the integration of: • A platform for monitoring of subjective information (questionnaires) and medical measures (such as eCare platform) • A platform for activity monitoring (such as Body Cloud) • Nutritional Folder to collect all patients data of interest for Nutrition Hygiene structure to manage the prevention protocols (clinical history, measures, etc.) Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping between the user identities; correlation between citizen personal data like sex, age, tel. number; correlation between the same kind of measures; mapping between unit of measures Kg/g/lb) Application Services: There should be primitives for access to service data (e.g. trend of measures, health status dashboard, fall events,..) of the integrated platforms Middleware: There should be primitives at the platform level for direct access to the collected data of the sensors /devices into the different platforms integrated Networking: - Device: There should be primitives at the gateway level for direct access to the collected data of the sensors /devices into the different platforms integrated
Business model:	The introduction of ICT in the healthcare environment allows the creation of a connection network between health staff and the afferent public, which in the preventive field and in terms of health is reflected in the health care cost savings. B2B2C The customer of the INTER-Health system that enable the Chronic disease Prevention service could be a Health operator that uses it for patients.
Partner specific interests:	TI, UNICAL and ASLTO5 are partners of the project and will contribute to the pilot on m-health. TI: Provides e-Care and medical devices (scales, sphygmomanometer) and online questionnaires for the eating habits and the practice of physical activity.

	Unical: provides BodyCloud and wearable mobile devices (bracelets for the detection of physical activity). ASLTO5 will conduct the clinical study of nutritional counselling on the recruited people using the INTER-HEALTH platform in which BodyCloud and eCare will be integrated. TI is interested in clinical results in term of ability of the INTER-Health platform to respond to the needs of users (patients and ASL TO5) and in term of efficiency and cost reduction evaluation. ASLTO5 through health indicators established will evaluate the effectiveness of the IoT testing in health, analysing the positive and negative effects for all users (population and health staff), and for all the stakeholders involved.
Business use case:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	11/Aug/16

INTER-LogP/Health scenarios

[INTERIOT-525] Accident at the port area Created: 15/Apr/16 Updated: 27/Oct/16 Resolved: 15/Apr/16	
Identifier:	9
Name:	Accident at the port area
Description:	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.) A haulier of Transportes Torres is inside the port to carry out a transport order. The haulier has a serious medical problem (e.g. heart attack). Immediately the medical device worn by the haulier detects the problem and reports the haulier IoT cloud platform. Furthermore the platform gets the truck position through the movildata fleet management system. Finally the platform sends the information to the Valencia port control system. The port control system sends an ambulance to the truck GPS position. And the ambulance takes the driver to hospital.
Users:	Port authority: It is responsible for safety within the port Haulier: It is carrying out a transport order
Context:	The port area
Interacting system:	Port emergency control system, personal health device, haulier IoT cloud platform, movildata fleet management system.
Users' goals:	Port authority wants to detect accidents and react in real time. Haulier company wants to improve the safety of their drivers.
Interaction:	The medical device detects a problem and automatically alerts the haulier IoT platform. The haulier and the port exchange safety events.
Initial status:	A haulier in the port area has a medical problem.
Data:	Produced: driver medical data, truck position. Consumed: safety event.
Motivation:	The scenario is focused on improving safety within the port. It wants to react in real time when an accident happens.
Time:	The interoperability of IoT platforms and devices presented in this scenario will be considered in the Inter-LogP demonstration within this project.
Interoperability Role:	General description: The haulier company monitors the health of their drivers at any times. The personal health device alerts the haulier IoT platform. The haulier IoT cloud platform and the port emergency control system share security and safety information. Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. medical data). Application Services: There should be primitives between the haulier IoT platform and the port IoT platform for sharing information about the driver. The haulier company monitors the health of their drivers at any times. The haulier IoT cloud platform and the port emergency control system share security and safety information. Middleware: The personal health device alerts the haulier IoT platform.

	Networking: There should be primitives to connect the truck container to the port platform. Device: -
Business model:	Ensure the safety of your workers anywhere.
Partner specific interests:	VPF is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. VPF is interested in improving transport and port logistics with this scenario.
Business use case:	Both
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	16/Mar/16

[INTERIOT-488] Health monitoring system with passengers aboard a mode of public transport (e.g. ferry)

Created: 13/Apr/16 Updated: 27/Oct/16 Resolved: 13/Apr/16

Identifier:	10
Name:	Health monitoring system with passengers aboard a mode of public transport (e.g. ferry)
Description:	When using public transport, there is a delay in a user's access to emergency services due to the time and distance from exit points (ports, stations, etc.) and the lack of emergency medical personnel on the various modes of transport. During a medical emergency, beginning the triage of a patient by informing medical personnel of the patient's status prior to their arrival on scene can improve the outcome for the patient. This early gathering of information is especially relevant for ferries and airplanes which travel long distances and that visit remote areas without regular access to local health care facilities. Steam Packet Ferries is one example. It provides freight, vehicle, and passenger transport between Heysham port and other ports around the Irish Sea. Currently medical care is limited to basic first aid kits and Automated External Defibrillators (AEDs) aboard the ferries. Patients taken ill on the journey must wait until reaching port to receive treatment from ambulance crews based near the port. With an IoT cloud aboard the ferry, medical information gathered by the health IoT platform connected to the patient monitors can be streamed wirelessly to paramedics on route to the emergency. Patient monitors include ECG, SPO2, blood pressure, and temperature. Further sensors could be added as the system is designed to be sensor agnostic. These sensors connect using Bluetooth and are sent on over 3G/4G or other telecommunication networks available on board. Data from the PRIME patient monitoring platform will be streamed continuously to the emergency medical response team to allow real time analysis of waveform data. Additionally, voice and video communication via the health IoT platform would allow direct consultation with medical professionals. Early analysis of this patient information will lead to early patient triage. This can inform decisions about ferry diversion, the need for a helicopter rescue or the insertion of a medical team onto the vessel. Diversions cost significant amounts of money and the utilization of an IoT system would remove the need for many of these diversions while insuring decisions are based on strong medical evidence.

	In addition to addressing passenger needs aboard the mode of transport, many remote locations visited by these modes of transport lack medical services. The addition of the health IoT cloud platform will improve emergency medical care in these location. Persons located in these remote locations could attend the terminal when the ferry is in port and have their health monitored.
Users:	Carrier (Steam Packet Ferries): They will be able to access patient monitoring data and communicate directly with health professionals. Ambulance Services: They will have early access to patient data to enabling patient triage which will inform the appropriate course of action.
Context:	Medical care aboard public transport
Interacting system:	On-board transportation IoT system, health IoT systems, emergency medical systems
Users' goals:	The transport company wants to assist medical staff in triage and preparing to treat an unwell person inaccessible to normal emergency care due to location. This will lead to greater customer satisfaction and avoid unnecessary costly diversions. Emergency medical teams want to start patient triage as early as possible to insure a positive patient outcome and to insure resources are used efficiently.
Interaction:	Health IoT will utilize local WiFi networks, 3G/4G, or other communication systems to transmit data to emergency services. Sensors use Bluetooth to connect to the Health IoT system.
Initial status:	The sensors will be charged and in storage on the mode of transport. Staff will be trained in utilizing the system.
Data:	Patient monitoring data will be collected from multiple sensors. It would be necessary to review feedback from paramedics on the usefulness of the data in triaging and preparing for the arrival of the patient. Understanding how employees on the mode of transport feel about applying the system to patients is necessary.
Motivation:	Having a health IoT systems in this environment enables emergency medical personnel early access to data pertinent in the treatment and triage of patients.
Time:	The health IoT network will be utilized as necessary when there is a medical emergency aboard the mode of transport. The system will continue to monitor the patient until emergency services advise that it is safe to discontinue monitoring or they take over the care of the patient.
Interoperability Role:	General description: A health IoT system will allow for the addition of new medical sensors. It will also make healthcare borderless and facilitate collaborative care in an environment that is not currently under covered by emergency services. Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: It will also make healthcare borderless and facilitate collaborative care. Middleware: A health IoT system will allow the addition of new medical sensors. Networking: - Device: -
Market and usage data available:	Availability of medical sensors thought important by paramedics in this environment.

	The systems have been initially tested in a transportation setting. Patient monitoring systems are currently not positioned on-board mass transit. Potential data: ECG wave form, Blood Pressure, temperature, and blood oxygen saturation, heart rate and pulse wave from SPO2 monitors.
Business model:	IoT platforms aboard transportation Licensing of health IoT systems utilizing a set sensor suite.
Missing technical know-how:	More information is needed from providers and users Collaboration with project partners would greatly benefit the feasibility assessment of this scenario.
Partner specific interests:	Rinicom is interested in testing the system in new environments. The potential of developing new business opportunities while improving the availability of health care.
Business use case:	Both
Identified by:	Rinicom Ltd. (RINI)
Registration Date:	05/Apr/16

[INTERIOT-508] Health monitoring system with passengers aboard a mode of public transport (e.g. Train) Created: 14/Apr/16 Updated: 27/Oct/16 Resolved: 14/Apr/16	
Identifier:	17
Name:	Health monitoring system with passengers aboard a mode of public transport (e.g. Train)
Description:	When using public transport, there is a delay in a user's access to emergency services due to the time and distance from exit points (ports, stations, etc.) and the lack of emergency medical personnel on the various modes of transport. During a medical emergency, beginning the triage of a patient by informing medical personnel of the patient's status prior to their arrival on scene can improve the outcome for the patient. This early gathering of information is especially relevant for ferries and airplanes which travel long distances and that visit remote areas without regular access to local health care facilities. Virgin trains (West Coast Trains Limited) is one example. It provides passenger transport throughout England, Wales and Scotland. Currently medical care is limited to basic first aid kits and Automated External Defibrillators (AEDs) aboard the trains. Patients taken ill on the journey must wait until reaching a stop to receive treatment from ambulance crews. With an IoT cloud aboard the train, medical information gathered by the health IoT platform connected to the patient monitors can be streamed wirelessly to paramedics on route to the emergency. Patient monitors include ECG, SPO2, blood pressure, and temperature. Further sensors could be added as the system is designed to be sensor agnostic. These sensors connect using Bluetooth and are sent on over 3G/4G or other telecommunication networks available on board. Data from the PRIME patient monitoring platform will be streamed continuously to the emergency medical response team to allow real time analysis of waveform data. Additionally, voice and video communication via the health IoT platform would allow direct consultation with medical professionals. Early analysis of this patient information will lead to early patient triage. This can inform decisions about train diversions. Adding stops to long haul train

	journeys costs money and time. The utilization of an IoT system would remove the need for many of these unnecessary stops while insuring decisions are based on strong medical evidence.
Users:	Virgin Trains: Staff aboard the trains will be able to gather patient monitoring data and communicate directly with health professionals. Ambulance Services: They will have early access to patient data to enabling patient triage which will inform the appropriate course of action.
Context:	Medical care aboard public transport
Interacting system:	On-board transportation IoT system, health IoT systems, emergency medical systems
Users' goals:	The transport company wants to assist medical staff in triage and preparing to treat an unwell person inaccessible to normal emergency care due to location. This will lead to greater customer satisfaction and avoid unnecessary costly diversions. Emergency medical teams want to start patient triage as early as possible to insure a positive patient outcome and to insure resources are used efficiently.
Interaction:	Health IoT will utilize local WiFi networks, 3G/4G, or other communication systems to transmit data to emergency services. Sensors use Bluetooth to connect to the Health IoT system.
Initial status:	The sensors will be charged and in storage on the mode of transport. Staff will be trained in utilizing the system.
Data:	Patient monitoring data will be collected from multiple sensors. It would be necessary to review feedback from paramedics on the usefulness of the data in triaging and preparing for the arrival of the patient. Understanding how employees on the mode of transport feel about applying the system to patients is necessary.
Motivation:	Having a health IoT systems in this environment enables emergency medical personnel early access to data pertinent in the treatment and triage of patients.
Time:	The health IoT network will be utilized as necessary when there is a medical emergency aboard the mode of transport. The system will continue to monitor the patient until emergency services advise that it is safe to discontinue monitoring or they take over the care of the patient.
Interoperability Role:	General description: A health IoT system will allow the addition of new medical sensors. It will also make healthcare borderless and facilitate collaborative care. Interoperability requirements: Data & Semantics: There should be primitives for data interpretation in the different platforms (e.g. mapping objects among platforms; correlation between the same kinds of measures; etc.). Application Services: It will also make healthcare borderless and facilitate collaborative care. Middleware: A health IoT system will allow the addition of new medical sensors. Networking: - Device: -
Market and usage data available:	Availability of medical sensors thought important by paramedics in this environment. The systems have been initially tested on Virgin Trains. Patient monitoring systems are currently not positioned on-board mass transit. Potential data: ECG wave form, Blood Pressure, temperature, and blood oxygen saturation, heart rate and pulse wave from SPO2 monitors.

Business model:	IoT platforms aboard transportation Licensing of health IoT systems utilizing a set sensor suite.
Missing technical know-how:	More information is needed from providers and users Collaboration with project partners would greatly benefit the feasibility assessment of this scenario.
Partner specific interests:	Rinicom is interested in testing the system in new environments. The potential of developing new business opportunities while improving the availability of health care.
Business use case:	Both
Identified by:	Rinicom Ltd. (RINI)
Registration Date:	14/Apr/16

[INTERIOT-596] Alcohol / Drug testing protection system from driving for truck / bus drivers Created: 20/Apr/16 Updated: 27/Oct/16 Resolved: 21/Apr/16	
Identifier:	26
Name:	Alcohol / Drug testing protection system from driving for truck / bus drivers
Description:	Bob is a 28-year old truck driver with 5 years of driving experience. He loves sports but also spending a good time with his friends where alcohol has a place, and sometimes recreational drugs. Bob is working 5 days a week driving a truck delivering goods to customers across the country. Bob's employer is aware of the issue with alcohol or drug use and wants to invest in a system, which protects from even starting a truck/bus when system detects drugs or alcohol in the blood. Bob come to work at 7am each morning. Changes into work cloths and after his morning coffee he is given an assigned truck to drive that particular day. After getting his truck keys he enters the car and breath into a little tube, which is connected with the trucks system. After a few seconds of breathing into it, the system detects if this driver is fit to drive and automatically starts the engine in case no drug or alcohol use is detected.
Users:	Truck and Bus drivers (18 years +) in terms of logistics For future potentially any driver.
Context:	In any commercial or personal vehicle.
Interacting system:	In vehicle built in smart device for testing alcohol and drugs
Users' goals:	Citizen protection from drivers under influence.
Interaction:	Car system analysis
Initial status:	The drivers going to start a delivery.
Data:	Produced data are the levels of drugs or alcohol in blood.
Motivation:	Decreasing fatal accidents.
Time:	Every time a driver is about to set off.
Interoperability Role:	General description: The ability to control the level of alcohol and drugs can reduce the number of road accidents. Interoperability requirements:

	Data & Semantics: Application Services: Middleware: Device: Integrate a device to measure the level of alcohol and drugs with the truck system.
Market and usage data available:	EU safety roads statistics. Statistics on drink and drive in EU.
Business model:	Standardization of systems for trucks and busses. Device installation at the time of building a vehicle. The sale of the device via B2B.
Missing technical know-how:	Use an alcohol/drug device that can be integrated in the truck.
Partner specific interests:	ABC is partner of the project and will contribute to demonstrate the feasibility and advantages of the interoperability of heterogeneous IoT platforms in this scenario. ABC is interested in improving transport and port logistics with this scenario.
Business use case:	Both
Identified by:	Alessandro Bassi Consulting (ABC)
Registration Date:	10/Apr/16

Annex B Use cases

Annex B contain the results of Task 2.4 investigations destined to describe the use cases identified for the INTER-IoT project. The identification of use cases has been intended as a key step to design of the five products identified in the project.

This annex is a full part of task 2.4 activities. However, in order to enhance clarity as well as to make the D2.4 more easily readable by avoiding over flooding it with too much data in the same document, it has been decided to include the use cases' templates in a separate document.

In line with the clarity objective, as well as to enhance the readability of the information, the use cases' templates have been listed below in Annex B following the INTER-IoT 5 product approach adopted for Task 2.4 (INTER-LAYER, INTER-FW, INTER-METH, INTER-LogP and INTER-Health).

The chosen methodology is described within the D2.4 report, but it is useful to highlight the fact that the use cases have been defined from the scenarios and the technical work done in WP3, WP4 and WP5.

The summative information contained in this document constitutes an annex to INTER-IoT D2.4 but furthermore, during the phase of development of the project, partners will be asked to provide additional information using the same identification templates, if ever and whenever new use cases are encountered in the lifetime of the project. Additional information will be uploaded on the JIRA repository.

Although all the information is available in the JIRA repository and the deliverable contains the summary and a detailed study of the information gathered, we have decided to include the filled use cases' templates as an annex with the raw information at the time of submitting this document, in order that readers with no access to JIRA can access to the same information.

INTER-LAYER use cases

[INTERIOT-780] User interacts with sensors or devices Created: 14/Nov/16 Updated: 07/Dec/16	
Identifier:	19
Name:	User interacts with sensors or devices
Description:	Users can interact with sensors or devices in different contexts, for example a driver can send/receive data to/from a specific cloud platform by interacting with his smartphone or a patient can send medical data to his doctor by interacting with wireless medical devices.
Reference Scenario:	[2] IoT support for transport planning and execution [15] Surveillance systems for prevention programs [16] Elderly monitoring
Layer Level:	Device
Objectives:	Provide an easy to use or even transparent interface for data communication between the generic user and sensors or devices.
Actors:	End user: the person that has to send/receive data to/from a remote centre Device or sensor: they can be considered as secondary users if they periodically perform a specific measurement and send the acquired data to a remote centre.
Pre-conditions:	The devices or sensors have to be located in physical proximity of the users or they must be placed within radio transmission range compliant with the used data transmission technology.
Trigger:	If the actor is a human being the trigger depends by the will of the end user; o the other side, if the actor is a sensor or a device, the trigger is mostly based on the firing of a periodic timer.
Expected results:	The interaction between users and sensors or devices should be as simple as possible, fast and reliable also requiring as little effort as possible by the user.
Design choices:	How to choose the most suitable communication technology for the user. How to ensure the ease of interaction and, at the same time, a good reliability.
Notes and issues:	The users need to be authenticated to interact with sensors and devices.
Main execution:	1. The generic user interacts with his device to require/receive information on the next mission to be accomplished. 2. The generic user reads the requested information and execute the specific task.
Alternative execution:	1. The devices or the generic sensors, periodically acquire the measurements. 2. The devices or the generic sensors, depending on their communication technologies, send the acquired data to a gateway or directly to an IoT cloud platform.
Requirements involved:	[19], [22], [65], [70]
Product Name:	INTER-Layer
Identified by:	Università della Calabria (UNICAL)
Registration Date:	07/Nov/16

[INTERIOT-806] Request query to MW2MW Created: 17/Nov/16 Updated: 09/Dec/16 Resolved: 17/Nov/16	
Identifier:	23
Name:	Request query to MW2MW
Description:	An MW2MW user will be able to request a list of values from [a set of]devices of the platforms it has access to with conditions regarding the geographical, temporal and other conditions as defined by the given set of filters.
Layer Level:	Middleware
Objectives:	To let the inquirer to obtain a list of values of interest from a subset of devices.
Actors:	Inquirer: the Application, service or person that triggers the action. MW2MW: the layer that forwards the requests to the underlying platforms, and merges the responses into a single answer for the Inquirer.
Pre-conditions:	A MW2MW properly configured deployment. A working IoT platform configured to work with the MW2MW. Required access from the Inquirer to the platform's discovery service.
Trigger:	Inquirer calls the API with a query requests (i.e. a given device reference and a timeframe, filtering conditions for the device, a geo-fence filter) and a call-back point.
Expected results:	A list of values, times, devices and other measurement properties, from all the relevant platforms.
Design choices:	Try to use as much of the underlying platforms' services for obtaining the necessary values, and return a merged set of results.
Notes and issues:	A non-responsive platform can delay the finalization of the requests, so a timeout is probably needed. It is unclear how to inform that no data from a particular platform was retrieved due to such fail. Some types of filters might not be possible to be implemented for all platforms, i.e. if a platform does not provide the capability of filtering by geographical location.
Main execution:	1. Inquirer sends query and call-back point to API. 2. MW2MW creates and sends a request to all relevant platforms. 3. The Platforms responds to the MW2MW. 4. The MW2MW merges all obtained results. 5. The MW2MW call-back the calling party.
Requirements involved:	[2], [6], [13], [72], [179], [234], [235], [236], [237], [255]
Product Name:	INTER-Layer
Identified by:	XLAB razvoj programske opreme in svetovanje d.o.o. (XLAB)
Registration Date:	28/Oct/16
Update Date:	08/Dec/16

[INTERIOT-775] Request query to AS2AS Created: 10/Nov/16 Updated: 24/Nov/16 Resolved: 11/Nov/16	
Identifier:	24
Name:	Request query to AS2AS

Description:	An AS2AS user (IoT platform, application, person, etc.) will be able to exchange information between IoT platform services/applications through the AS2AS system.
Reference Scenario:	[7] SCADA port sensor system integration with IoT platforms [8] SEAMS integration with IoT platforms
Layer Level:	Service
Objectives:	To let the inquirer exchange information of interest with services and applications allocated in another platform.
Actors:	Inquirer: The application, service or person that triggers the action AS2AS: the layer in charge of modelling the query and access through the API to run this query.
Pre-conditions:	An AS2AS deployment properly configured. A working IoT platform configured to work with the AS2AS User with guaranteed access to IoT platform services. A set of applications well-listed within the catalogue to be used by the modeller
Trigger:	A user calls the Orchestrator API to run a query flow previously designed within the modeller.
Expected results:	The correct execution of the query flow and the retrieval of the requested information.
Design choices:	We are working in the composition of IoT services with the concept of data flows (in a composition, the input of one component is typically produced by another component output). This is the procedure to perform the flow queries. The queries have to be designed with the modeller and stored in the flow repository. The orchestrator module from AS2AS has to access the available flow repository to execute the flow query.
Notes and issues:	It is implemented a set of pre-defined nodes to access the information from desired services of configured IoT platforms.
Main execution:	1. A user uses the Modeller GUI to create a query within available services. In this step the desired information exchange is defined. 2. The modeller performs a validation of the created design. 3. The validated design (query flow) is stored in the Flow Repository. 4. The API orchestrator runs the query flow. 5. The orchestrator module calls IoT platform services in the order indicated in the design to run the composite service. If everything has worked well there is an exchange of information between platform services. 6. The orchestrator informs the user of the correct execution of the flow. On the other hand, if there is any problem the user will be informed of any error in the execution of a service.
Alternative execution:	2.1 Design validation fails. 2.2 The modeller displays an error message. If it is possible the GUI indicates the reasons for the failure.
Exceptions:	If it is not possible to contact a requested service, then the execution will fail.
Requirements involved:	[236], [239], [240], [241]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	10/Nov/16

[INTERIOT-805] MW2MW resource discovery Created: 17/Nov/16 Updated: 09/Dec/16 Resolved: 17/Nov/16	
Identifier:	25
Name:	MW2MW resource discovery
Description:	An MW2MW user will be able to obtain the list of devices throughout the integrated platform it has access to, which comply with a search query or filter.
Layer Level:	Middleware
Objectives:	To let application and services to discover, whenever possible, what devices, and with which properties, are available to the system.
Actors:	Inquirer: the Application, service or person that triggers the action MW2MW: the layer that forwards the requests to the underlying platforms, and merges the responses into a single answer for the Inquirer.
Pre-conditions:	A MW2MW properly configured deployment. A working IoT platform configured to work with the MW2MW. Required access from the Inquirer to the platform's discovery service.
Trigger:	Inquirer calls the API with a resource discovery requests (i.e. filter, or string to match) and a call-back point.
Expected results:	A list of matching devices from all the relevant platforms.
Design choices:	Try to use as much of the underlying platforms' services for resource discovery, and return a merged set of results.
Notes and issues:	A non-responsive platform can delay the finalization of the requests, so a timeout is probably needed. It is unclear how to inform that no data from a particular platform was retrieved due to such fail.
Main execution:	1. Inquirer sends query and call-back point to API. 2. MW2MW forwards request to all relevant platforms. 3. Platforms responds to the MW2MW. 4. MW2MW merges all obtained results. 5. MW2MW call-back the calling party.
Requirements involved:	[2], [6], [13], [17], [43], [57], [72], [179], [234], [235], [236], [237], [238], [255]
Product Name:	INTER-Layer
Identified by:	XLAB razvoj programske opreme in svetovanje d.o.o. (XLAB)
Registration Date:	28/Oct/16
Update Date:	08/Dec/16

[INTERIOT-804] Subscribe to MW2MW event messages Created: 17/Nov/16 Updated: 09/Dec/16 Resolved: 17/Nov/16	
Identifier:	26
Name:	Subscribe to MW2MW event messages
Description:	Subscribers shall be able to subscribe to topics, in order to be informed of any new information (reading, device update, etc.) related to that defined topic.
Layer Level:	Middleware

Objectives:	A subscriber will be able to create a subscription through the system, which will allow it to receive as soon as possible news from the publisher about any event relevant to the desired topic.
Actors:	The subscriber: any actor using the MW2MW API to subscribe to a topic. Publisher: the platform providing defined topics and news of event taking place that are related to the topics. MW2MW: the middleware integration layer, managing the subscriptions and the flow of information between all parties.
Pre-conditions:	A MW2MW properly configured deployment. A working IoT platform configured to work with the MW2MW. Required access from the subscriber to the publisher's topic.
Trigger:	Subscriber calls the MW2MW API with a valid Subscribe action.
Expected results:	The MW2MW integration layer will report the all subscribers of events in activated topics.
Design choices:	The information of the arrival of new information can be obtained by either having the subscriber polling for new content (not advisable), or the MW2MW layer using a call-back URL provided by the subscriber.
Notes and issues:	Different message queues might make use of different models for communication (i.e. Pull or Push messages). It might not be possible to allow users to define their own topics. It might not be possible to have topics traversing different platforms.
Main execution:	The sequence of actions (steps) that describe the execution of "normal" use case 1. Subscriber issues a Subscribe call to the MW2MW API. 2. The MW2MW forwards the subscription to the underlying platform(s). 3. At least one platform reports a new related event. 4. The MW2MW informs the subscriber of the new information.
Exceptions:	If an underlying platform does not support event subscription.
Requirements involved:	[2], [6], [13], [72], [75], [179], [201], [234], [235], [236], [237], [255], [281], [282]
Product Name:	INTER-Layer
Identified by:	XLAB razvoj programske opreme in svetovanje d.o.o. (XLAB)
Registration Date:	28/Oct/16

[INTERIOT-776] AS2AS service cataloguing Created: 10/Nov/16 Updated: 15/Nov/16 Resolved: 11/Nov/16	
Identifier:	28
Name:	AS2AS service cataloguing
Description:	An AS2AS user will be able to register the applications with their description or detailed information to make them discoverable.
Layer Level:	Service
Objectives:	The following objectives are mainly pursued: - Register the applications to make them discoverable. - Offer a description or detailed information about the services/applications.
Actors:	User: any actor using the AS2AS Register Client to register a new service/application.

	AS2AS GUI: use the Register Client interface to communicate the user with the AS2AS service catalogue. AS2AS: manages the registered services into the service catalog and the flow of information between all the modules involved.
Pre-conditions:	An AS2AS properly configured deployment. A working IoT platform configured to work with the AS2AS. User with guaranteed access to IoT platform services.
Trigger:	A user makes a call to Register Client.
Expected results:	The service is registered with the corresponding semantic annotations. This service becomes available in the modeller. So it can be used by the orchestrator.
Design choices:	Semantic annotations through the use of linked-data descriptions of services.
Notes and issues:	Selected tools and standards to achieve this goals: - Use the same metadata annotations. Then we will be able to creating a point of interoperability. - Uniform data catalog with semantics.
Main execution:	1. A user uses the GUI to register a service through Register Client. 2. The user fills the information and description of the service. 3. The catalog confirms that the service has not been previously registered. 4. The catalog confirms that the service has been successfully registered. 5. The new service becomes available in the modeller. So it can be used by the orchestrator.
Alternative execution:	3.1 The catalog confirms that the service was previously registered. 3.2 The service is not twice registered.
Exceptions:	A service is not correctly registered. AS2AS asks the proper register information to the user through its GUI.
Requirements involved:	[180], [236], [238]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	10/Nov/16

[INTERIOT-777] **AS2AS service discovery** Created: 10/Nov/16 Updated: 24/Nov/16 Resolved: 11/Nov/16	
Identifier:	29
Name:	AS2AS service discovery
Description:	An AS2AS user will be able to obtain the list of services throughout the integrated platform it has access to, which comply with a search query or filter.
Layer Level:	Service
Objectives:	Main Objective: discover information about available IoT services from the IoT platforms, to provide the appropriate service to the user. Objective in the short term: a searching mechanism that provides recommended results for queries that do not provide a perfect match of service features.
Actors:	User: any actor using the AS2AS Modeller to discover a registered service/application which comply with a search query or filter.

	Modeller GUI: use the Modeller interface to communicate the user with the AS2AS service discovery module. AS2AS: the layer that forwards the requests to the service catalog via the discovery module, and provides a response with the recommended services.
Pre-conditions:	An AS2AS properly configured deployment. A working IoT platform configured to work with the AS2AS. User with guaranteed access to IoT platform services.
Trigger:	An AS2AS Modeller user searches for an available IoT platform service with desired properties or information.
Expected results:	A list of matching services and applications from the IoT platforms considered.
Design choices:	Use of semantic annotations through the use of linked-data descriptions of services.
Notes and issues:	The use of Linked Data, help to locate services and APIs.
Main execution:	1. A user uses the Modeller GUI to discover a registered service/application which comply with a search query or filter. 2. The service discovery module forwards request to service catalog. 3. The service catalog responds to service discovery. 4. The service discovery processes the result of the query and sends it back to the graphical environment 5. A list of matching services and applications from the IoT platforms considered is available for the user.
Alternative execution:	4.1 There is no result to the query. 4.2 The GUI does not offer any result to the user.
Exceptions:	If it is not possible to contact with the service catalog, then no results can be provided.
Requirements involved:	[180], [236], [238]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	10/Nov/16

[INTERIOT-778] AS2AS service composition Created: 10/Nov/16 Updated: 24/Nov/16 Resolved: 11/Nov/16	
Identifier:	30
Name:	AS2AS service composition
Description:	An AS2AS user will be able to create added-value services, called composite services, from existing services.
Layer Level:	Service
Objectives:	The main objective is wiring together APIs and Services from the IoT Platforms creating new composite services.

Actors:	User: any actor using the AS2AS Modeller to perform a modeled solution with available services. Modeller GUI: use the Modeller interface to communicate the user modelled solution with the AS2AS orchestrator module. AS2AS: The orchestration module would be responsible of making calls to IoT Platform services.
Pre-conditions:	An AS2AS properly configured deployment. A working IoT platform configured to work with the AS2AS User with guaranteed access to IoT platform services. Services requested must be available.
Trigger:	A user calls the Orchestrator API to run a flow (composite service) designed with the modeller.
Expected results:	The correct execution of the flow (service composition).
Design choices:	In the first steps of our solution we are working in the composition of IoT services with the concept of data flows (in a composition, the input of one component is typically produced by another component output). This action is done from a centralized perspective, expressing how the composition has to act in order to integrate components (orchestrator).
Notes and issues:	Use a visual programming approach that allows developers to connect predefined code blocks, known as 'nodes', together to perform a task. The connected nodes, usually a combination of input nodes, processing nodes and output nodes, when wired together, make up a 'flows'. Flow Based Programming (FBP). FBP describe a graph of nodes, which exchange messages containing data via the edges. The edges are defined outside the nodes, in others words nodes have no control on where the data comes from and where it goes to.
Main execution:	1. A user creates with the Modeller GUI a solution with the available services. 2. The modeller performs a validation of the created design. 3. The validated design (flow) is stored in the Flow Repository. 4. The API orchestrator runs the flow 5. The orchestrator module calls IoT platform services in the order indicated in the design to run the composite service. 6. The orchestrator informs the user of the correct execution of the flow. On the other hand, if there is any problem the user will be informed of any error in the execution of a service.
Alternative execution:	2.1 Design validation fails. 2.2 The modeller displays an error message. If it is possible the GUI indicates the reasons for the failure.
Exceptions:	If it is not possible to contact a requested service, then the execution will fail.
Requirements involved:	[236], [239], [240], [241]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	10/Nov/16

[INTERIOT-826] IPSM Translation Created: 21/Nov/16 Updated: 04/Dec/16 Resolved: 21/Nov/16	
Identifier:	38
Name:	IPSM Translation
Description:	Data is exchanged between artifacts that use different semantics. The message should be translated from the semantics of the source artifact to the semantics of the target artifact.
Reference Scenario:	This use case can be considered (if necessary) as connected with <<includes>> association stereotype to any other use case (identified in scenarios) that includes passing data between artifacts. Its presence is determined by use case execution environment.
Layer Level:	Semantics
Objectives:	To establish communication between artifacts that use different semantics.
Actors:	Source artifact that publishes the data (via dedicated components). Target artifact that subscribes to the translated data (via dedicated components). IPSM component performing the semantic translation.
Pre-conditions:	Alignments between source ontology and central ontology, central ontology and target ontology are present in the semantic repository. IPSM is configured (alignments and channel configuration).
Trigger:	Message is sent to preconfigured IPSM communication channel.
Expected results:	Message in target semantics will be published to a predefined IPSM communication channel.
Notes and issues:	Alignments to/from the central ontology should be stored and managed in alignments repository.
Main execution:	The sequence of action for IPSM translation: 1. Component(s) that supports interaction with IPSM prepare and send input data to the appropriate IPSM communication channel. 2. IPSM translation channel performs the semantic conversion based on alignments between source, central and target ontologies. 3. Component(s) that supports interaction with IPSM receive translated messages.
Requirements involved:	[179], [180], [183], [220]
Product Name:	INTER-Layer
Identified by:	Systems Research Institute Polish Academy of Sciences (SRIPAS)
Registration Date:	10/Nov/16
Update Date:	03/Dec/16

[INTERIOT-779] Software Defined Radio Created: 11/Nov/16 Updated: 17/Nov/16 Resolved: 14/Nov/16	
Identifier:	40
Name:	Software Defined Radio
Description:	A software defined radio component is being 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 utilising 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. The goal of this development will be to demonstrate a point to point communication link to supply data via the SDR to be utilized by other systems connected to Inter-IoT. This will involve transferring data over IP from a platform to an SDR external to the Inter-IoT system. This SDR will then communicate the information wirelessly to the SDR included in the access network controller section of the Inter-IoT gateway. The data will be output over IP to the protocol controller be made available to other platforms served by Inter-IoT. Exploratory work will be done to see how control of this module can be achieved and where in Inter-Layer these controls will be located.
Layer Level:	Network
Objectives:	To develop and incorporate a software defined radio module for use in the gateway in Inter Layer.
Actors:	The primary user would be a user of a frequency or protocol not supported by other gateway entry points.
Trigger:	The identification of a user active on a frequency not supported by the other gateway entry points.
Expected results:	The SDR could be tuned to accommodate this new user. The user can then connect into the Inter-Layer.
Design choices:	We are currently experimenting with 2 SDR development platforms. It is: PicoZed™ SDR SOM Z7035/AD9361. The kit includes the low-power, small footprint, rugged PicoZed SDR Z7035/AD9361 system-on-module (SOM) and a carrier card for prototyping with standard high bandwidth interfaces like USB, Gigabit Ethernet, SFP+, and an RF power module. The carrier also includes HDMI, audio, and a camera module interface to enable a host of new SDR applications requiring audio/video and embedded vision.
Main execution:	This is still unclear as the main use case is yet to be identified.
Requirements involved:	[17], [18], [170], [204]
Product Name:	INTER-Layer
Identified by:	Rinicom Ltd. (RINI)
Registration Date:	11/Nov/16

[INTERIOT-772] SDN communications: functions virtualization and central management Created: 10/Nov/16 Updated: 24/Nov/16 Resolved: 11/Nov/16	
Identifier:	41
Name:	SDN communications: functions virtualization and central management
Description:	The implementation and use of the SDN paradigm to speed up IoT connections and centralize the management.
Layer Level:	Network
Objectives:	The virtual network could be manage from a central point, using the API access to request topologies statistics historical, etc.

Actors:	The user/network administrator: that wants to access to the information about the network and modify the routing policies. The virtual switches: that route the information through the virtual network. The controller: that manages the logic of the network and provides the access to it.
Pre-conditions:	A virtual SDN network properly configured deployment. A configured controller with API access. A user/admin with credentials to access the controller. An operating platform/gateway to exchange the data flow information.
Trigger:	The user wants to access the information about the network or modify the traffic policies.
Expected results:	All the information is provided and to the user and this can configure the controller as desired.
Design choices:	The main technological approach is SDN paradigm implemented with OpenFlow through virtual switches with OpenVSwitch and a virtual controller at the top of the system (POX or RYU) and the different modules running within this controller.
Notes and issues:	Some characteristics cannot be implemented on the controller. It might not be possible to manage a big amount of flows.
Main execution:	1. The user communicates with the controller through the access API, requesting information (about topology, statistics, etc.) or wants to modify a routing policy. 2. The controller calls the involved module or the light database to provide the requested information. 3. Or the controller checks the viability to the policy to be applied and, store the rule within the routing module. 4. Finally, the data flow continues being carried with the new policy installed.
Exceptions:	• The user does not have the right access to the controller information. • No information is found in the controller. • The policy is incompatible or cannot be applied on the network
Requirements involved:	[17], [93], [226], [229], [231], [232], [233]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	10/Nov/16

[INTERIOT-774] Offloading workflow management Created: 10/Nov/16 Updated: 24/Nov/16 Resolved: 11/Nov/16	
Identifier:	43
Name:	Offloading workflow management
Description:	Discharging data traffic from more than one access network, simultaneously.
Layer Level:	Network
Objectives:	Improve the speed of uploading or discharging data traffic from the device using more than one access network technology.
Actors:	Device Connects to one or more access network to discharge the data to the gateway.

	Gateway: manage these connections and creates the flows of data to send it to the network. Virtual network: manages these all data flows from the same device and to the same destination with a given priority.
Pre-conditions:	A deployed and functional gateway and the configured virtual network.
Trigger:	The connection from the device to more than one access network.
Expected results:	All flows provided by a device are carried to its destination for aggregation in a secure and lossless manner.
Design choices:	Use of the virtual SDN network and protocols as MPTCP.
Notes and issues:	• A well-deployed virtual network. • Implementation of a module on the controller to handle more than one flow from the same device (e.g. MPTCP). • Aggregation service, if needed.
Main execution:	1. The device is connected to an access network (e.g. 4G), but he need more bandwidth to discharge data nimbler. 2. The device connects to another access network (e.g. WiFi). 3. The gateway registers these two connections and re-sends the information to the virtual network. 4. The network manages and drives properly the data flows until its destination.
Alternative execution:	4.1. If needed, an aggregation process can be done within the gateway or the network. Is some information is repeated, a dropped action can also take place. 4.2. Is some information is repeated, a dropped action can also take place.
Exceptions:	• If the device does no need more than one connection due is not sending a vast amount of data. • If a link has enough bandwidth. • If one of these links is lost or dropped.
Requirements involved:	[227], [229]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	10/Nov/16

[INTERIOT-808] Incident impact calculation Created: 17/Nov/16 Updated: 24/Nov/16 Resolved: 17/Nov/16	
Identifier:	44
Name:	Incident impact calculation
Description:	When an incident occurs, it can impact the offloading workflow. This impact should be calculated in order to adapt the workflow accordingly.
Reference Scenario:	[29] Reliable control of robotic cranes and trucks in port terminals
Layer Level:	Service
Objectives:	To calculate the incident impact and to inform the appropriate managing system.
Actors:	Primary actor is at the software level.
Trigger:	Incident has happened within the platform.

Expected results:	Computes the incident impact and transmits knowledge of the incident's impact on the network to the platform managing entity.
Specializes:	[43] Offloading workflow management
Main execution:	1. An incident occurs in the platform. 2. Information about the incident is gathered. 3. The impact of the incident on the platform is computed. 4. Higher layers of the incident's impact are informed.
Requirements involved:	[205], [232]
Product Name:	INTER-Layer
Identified by:	Technische Universiteit Eindhoven (Tu/e)
Registration Date:	11/Nov/16
Update Date:	11/Nov/16

[INTERIOT-807] Device failure detection Created: 17/Nov/16 Updated: 20/Nov/16 Resolved: 17/Nov/16	
Identifier:	46
Name:	Device failure detection
Description:	A device suddenly experiences a technical issue, and shuts down (e.g. crane not responding). This failure should be detected in order to be reported.
Reference Scenario:	[29] Reliable control of robotic cranes and trucks in port terminals
Layer Level:	Service
Objectives:	To detect a device failure.
Actors:	Device: The device is monitored to detect a failiture. IoT platform: Is monitoring the device, assesses it and detects the failiture.
Pre-conditions:	Incident should be detectable from the network point of view. Network should be functioning (single device failure).
Trigger:	Technical and unexpected failure of the device.
Expected results:	Detection of the failure (notification) and adaptation of the network to guarantee a reliable quality of service.
Design choices:	Network will get knowledge of non-working devices and adapts its topology.
Specializes:	[16] Detection of an incident
Notes and issues:	An alert should notify the upper layers. This should be done with use case [16]. This does not detects device malfunctions (e.g. crane not working as intended but still online from the network point of view).
Main execution:	1. Device unexpectedly does not respond anymore 2. Network detects this failure 3. Network adapts itself to guarantee quality of service
Requirements involved:	[84], [154], [168], [201], [205]
Product Name:	INTER-Layer
Identified by:	Technische Universiteit Eindhoven (Tu/e)
Registration Date:	11/Nov/16

Update Date:	11/Nov/16

[INTERIOT-823] Connection with virtual part and synchronization Created: 18/Nov/16 Updated: 07/Dec/16	
Identifier:	47
Name:	Connection with virtual part and synchronization
Description:	A connection must be setup during primary use for data storage and synchronization as well as user access (API).
Layer Level:	Device
Objectives:	Setup a communication with the virtual part of the gateway.
Actors:	Device: Is the physical object sending data. Physical System; the part of the gateway physically located next to the devices. Virtual system: It's where all the data and metadata of the device is storage in the cloud, together with other functions as the RE.
Pre-conditions:	Deployed working network and virtual environment.
Trigger:	A device sends data.
Expected results:	The data is stored in a measurement storage system located in the virtual part and available when is necessary.
Main execution:	Whenever there is an active internet connection the system can have a synchronization action. This will originate from the device. The device will be aware that its database is updated recently and checks the virtual database to have the data synchronized.
Exceptions:	A device may be active without (temporary) communication.
Requirements involved:	[1], [6], [9], [11], [13], [16], [30], [45], [48], [53], [68], [73], [77], [92], [125], [126]
Product Name:	INTER-Layer
Identified by:	NEWAYS Technologies (NEWAYS)
Registration Date:	18/Nov/16
Update Date:	07/Dec/16

[INTERIOT-773] SDN communications: traffic routing Created: 10/Nov/16 Updated: 15/Nov/16 Resolved: 11/Nov/16	
Identifier:	55
Name:	SDN communications: traffic routing
Description:	The implementation and use of the SDN paradigm to prioritize data flows using traffic engineering, having a general overview of the whole network at any time.
Layer Level:	Network
Objectives:	The data flows will travel through the software define network from the gateway to the IoT platform in a secure manner following the defined policies.
Actors:	The Gateway: which sends the data flows with the information from the devices.

	The virtual switches: that route the information through the virtual network. The controller: that manages the logic of the network creating the fastest and most secure path according to predefined conditions.
Pre-conditions:	A virtual SDN network properly configured deployment. A working gateway that receive the data from different devices and re-send them to the v-net. An operating platform/gateway to receive the data flow information.
Trigger:	The Gateway receives data from a device and re-sends them to through the network.
Expected results:	The SDN virtual network carries all the information from the gateway to its destination in a secure and efficient manner, keeping a preconfigured QoS level.
Design choices:	The main technological approach is SDN paradigm implemented with OpenFlow through virtual switches with OpenVSwitch and a virtual controller at the top of the system (POX or RYU) and the different modules running within this controller.
Notes and issues:	Some links can be cut or not enough for the communication. The network has to reroute the data flows. It might not be possible to manage a big amount of flows. Some unknown packets can be dropped.
Main execution:	1. The GW receive the information for one of his AN (out of this scope) and send the information over IP to a virtual GW switch in the v-net. 2. The data flow travels among the network following the rules implemented inside the virtual switches configured by the controller. 3. If a data flow does not match any of the fields of the routing table is sent to the controller that analyses and includes the adequate entry in the table to route the information. 4. Finally, the data flow is delivering to its destination, the IoT platform or another GW.
Alternative execution:	2.1 The GW receive the information for one of his AN (out of this scope) and send the information over IP to a virtual GW switch in the v-net. 2.2 The data flow travels among the network following the rules implemented inside the virtual switches configured by the controller. 2.3 If a data flow does not match any of the fields of the routing table is sent to the controller that could drop the information of the flow due to a security policy. 2.4 This data flow is dropped o moved to another module to be further analysed.
Exceptions:	• If there is no need of network routing. The gateway connects directly with the platform.
Requirements involved:	[11] ,[16], [18], [19], [20], [21], [55], [72], [89], [226], [229], [230], [233]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	10/Nov/16

[INTERIOT-834] **Device Registry**

Created: 28/Nov/16 Updated: 07/Dec/16 Resolved: 07/Dec/16	
Identifier:	60
Name:	Device Registry
Description:	A device is registered within the gateway by a descriptive method with basic parameters needed for its addressability and understanding of data.
Layer Level:	Device
Objectives:	To include the information about a device, sensor or actuator, in order to receive or send information from the device and to the gateway or to another system connected to the gateway.
Actors:	Primary; User, Gateway Secondary; Registry module, device Manager module, AN and protocol modules, AN and protocol controllers and GW configuration module.
Pre-conditions:	The gateway should be already configured and running. The format to introduce the device information should be pre-defined. The bundle involved on the connection should be started.
Trigger:	A User wants to register a Device into the gateway using the Registry module.
Expected results:	The device is correctly registered so it can send data (sensor) or receive data (actuator) in the correct format.
Design choices:	In the first iteration the inclusion of data for the registry will be from a configuration file in XML or JSON format. In further iterations, a GUI could be design to perform the registration of the device in a friendlier manner.
Main execution:	1. The file is created by the user, and then the registry module reads the file with all the information referring the device. 2. The registry module sends this information to the device manager to be parsed and stored in a cache or light storage. 3. The device calls the AN and Protocol controllers to check the correct set-up of the connection. 4. Those as well invoke the relevant AN and Protocol module to test the connection.
Exceptions:	If a file is not well-defined the registry will not be successful.
Requirements involved:	[15], [22], [39], [45], [57], [60], [93], [138], [242], [245]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	28/Nov/16

[INTERIOT-835] Platform Configuration on the Gateway Created: 29/Nov/16 Updated: 07/Dec/16 Resolved: 07/Dec/16	
Identifier:	61
Name:	Platform Configuration on the Gateway
Description:	The configuration of a platform that will be connected to our gateway and will receive/send all the information from/to the devices. So, at the beginning this configuration could be done by a configuration file to later on create a simple GUI to insert the information about the platform in order to create the connection.

Layer Level:	Device
Objectives:	To configure correctly the platform so this one can exchange information with the gateway and so with the devices.
Actors:	The user that configures the platform. The Gateway configuration module. The MW controller module. The MW specific platform module.
Pre-conditions:	The bundles needed should be running, The GW configuration bundle should be well-configured and running. The descriptor file should be well-structured and with the necessary information about the platform.
Trigger:	The actor calls the GW configuration module to read the file.
Expected results:	The platform is configured so can be reach and the exchange of data is possible.
Main execution:	1. The user calls the gw configuration bundle which reads the file with the reference information about the platform. 2. This information is sent to the MW controller which starts running the proper bundle and set this information in the module. 3.The pertinent module takes the information and configures the connection to the indicated platform.
Exceptions:	If the file is not well-written. The expected bundles are not running or not well-configured.
Requirements involved:	[15], [20], [39]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	29/Nov/16

[INTERIOT-838] Device (sensor) triggers information Created: 30/Nov/16 Updated: 07/Dec/16 Resolved: 07/Dec/16	
Identifier:	62
Name:	Device (sensor) triggers information
Description:	A device, typically a sensor, triggers an event sending determined information to the gateway in order to be stored on the platform. Cloud or server or in order to generate a response for an actuator (being handled by the rules engine).
Reference Scenario:	[3] IoT Weighbridges [4] Monitoring reefer container [5] Monitoring of containers carrying sensitive goods [6] Dynamic lighting in the port [7] SCADA port sensor system integration with IoT platforms [8] SEAMS integration with IoT platforms [9] Accident at the port area [10] Health monitoring system with passengers aboard a ferry [11] Primary prevention of cognitive decline [12] Health failure disease and mild Alzheimer disease [13] IoT interoperability for Vessel Arrivals [14] Train arriving to the port

	[15] Surveillance systems for prevention programs [16] Elderly monitoring [17] Health monitoring system with passengers aboard a train [18] Containership is entering the harbour region [19] Transport on truck breaks down or is hijacked [20] Damage or problems to the container during shipment [21] Giulia, young teacher with a low risk of developing chronic diseases. [22] Claudia, young housewife with increased risk of developing chronic diseases [23] Giorgio, unemployed electrician with high risk of developing chronic diseases [24] Rosa, employed with very high risk of developing chronic diseases [25] Umberto, nurses with extremely high risk of developing chronic diseases [26] Alcohol / Drug testing for truck/ bus drivers [27] Vitamins intake analyser [28] Calories / nutrition mixer / cookware counter [29] Reliable control of robotic cranes and trucks in port terminals
Layer Level:	Device
Objectives:	To send data from the device side through the gateway to rise its destination (Local platform, cloud or other device) in an efficient way.
Actors:	The AN module, the AN controller, the device manager, the protocol module, the protocol Controller, the Dispatcher, the MW module and the MW controller.
Pre-conditions:	The relevant bundles started and running.Correctly pre-configured gateway.Already registered device.
Trigger:	The sensor send a determined value.
Expected results:	The data is received by the gateway and carried out to the relevant destination.
Main execution:	1. The sensor, previously connected, sends a data message to the gateway through its specific access network. 2. The AN module is in charge of receive this message and send it to the controller. 3. The controller with the message and the information about the physical direction of the device and the AN will contact the device manager. 4. The device manager will provide the protocols supported by the device and will call the protocol controller. 5. The protocol controller will start the protocol module in charge of parse the message and send it to it. 6. The protocol module will interpret the message and parse into a common message format to be sent to the dispatcher. 7. The dispatcher will receive the common format message and redirection it to the MW controller. 8. The middleware controller will call the MW module in charge of parse again the message, if needed, and connects with the IoT platform.
Requirements involved:	[15], [21], [22], [23], [39], [45], [93], [138]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	29/Nov/16

[INTERIOT-839] Platform requests information from a device (sensor) Created: 30/Nov/16 Updated: 07/Dec/16 Resolved: 07/Dec/16	
Identifier:	63
Name:	Platform requests information from a device (sensor)
Description:	The gateway receives the request from the platform al re-direct it to the device, to obtain specific information. If is no change on the value has been performed in a short period, the response will be provided directly from the measurements storage.
Layer Level:	Device
Objectives:	To obtain a data requested by the platform from a concrete device.
Actors:	The platform module connected to the IoT platform. The platform controller. The dispatcher. The measurements storage. The Protocol module and controller. The AN controller and module.
Pre-conditions:	A well pre-configured gateway. A connected platform to the gateway. At least a sensor connected to the gateway to request the information.
Trigger:	The platform that request information to the gateway.
Expected results:	The data value is retrieved to the requester platform.
Main execution:	1. The platform sends a request to the gateway. 2. The platform connector module that communicates with the platform receives the message and parse the information, send them to the platform controller. 3. The controller connects with the dispatcher and re-sends the parsed message. 4. The dispatcher carries the request to the protocol controller. 5. This controller sends the messages to be again parsed to the specific protocol supported by the device on the protocol module. 6. Once parsed the module retrieve the message to the controller and this asks the device manager for the AN in which the device is connected. 7. The message is handled by the relevant AN module and sent to the device.
Requirements involved:	[15], [21], [22], [39], [45], [72], [93], [153], [283]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	30/Nov/16

[INTERIOT-840] Platform sends information to device (actuator) Created: 30/Nov/16 Updated: 07/Dec/16 Resolved: 07/Dec/16	
Identifier:	64
Name:	Platform sends information to device (actuator)
Description:	The platform sends information, normally a change of state, to the device, typically an actuator.
Layer Level:	Device

Objectives:	To change the state of an actuator connected to the gateway.
Actors:	The platform which sends the signal. The MW module connected to the platform. The MW controller. The Dispatcher. The Protocol controller. The relevant Protocol module. The Device Manager. The relevant AN module. The AN controller.
Pre-conditions:	A well pre-configured gateway. A connected platform to the gateway. At least an actuator connected to the gateway to receive the signal.
Trigger:	The platform that sends the change of state.
Expected results:	The actuator receive the message from the platform and changes its state.
Main execution:	1. The platform sends a message to the gateway. 2. The platform connector module that communicates with the platform receives the message and parse the information, send them to the platform controller. 3. The controller connects with the dispatcher and re-sends the parsed message. 4. The dispatcher carries the request to the protocol controller. 5. This controller sends the messages to be again parsed to the specific protocol supported by the device on the protocol module. 6. Once parsed the module retrieve the message to the controller and this asks the device manager for the AN in which the device is connected. 7. The message is handled by the relevant AN module and sent to the actuator to change its state.
Requirements involved:	[15], [21], [22], [25], [26], [39], [45], [56], [283]
Product Name:	INTER-Layer
Identified by:	Universitat Politécnica de Valencia (UPVLC)
Registration Date:	30/Nov/16

[INTERIOT-837] MW2MW sends information to a device (sensor or actuator) Created: 29/Nov/16 Updated: 09/Dec/16 Resolved: 30/Nov/16	
Identifier:	65
Name:	MW2MW sends information to a device (sensor or actuator)
Description:	The Middleware can access to a device (sensor or actuator) and send it orders or actions (e.g. change the configuration, activate/deactivate).
Reference Scenario:	[2] IoT support for transport planning and execution [9] Accident at the port area
Layer Level:	Middleware
Objectives:	In order to manage a device, it is necessary to send orders to it, besides receiving data.
Actors:	Device: Is a sensor or an actuator that receives an order. IoT Platform: Send an order to be executed in a device through the Middleware.
Trigger:	An application or a platforms sends an order to a device.

Expected results:	The order is received and executed in a device.
Specializes:	[23] Request query to MW2MW
Main execution:	1. A platform/application sends an order to the device through the MW2MW API. 2. The platform request manager to the corresponding platform's bridge. 3. The bridge translate to the proper format. 4. The order arrives to the device where it is located.
Requirements involved:	[2], [6], [13], [25], [89], [179], [234], [235], [236], [237], [255], [283]
Product Name:	INTER-Layer
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	29/Nov/16

[INTERIOT-846] IPSM Alignment Configuration

Created: 03/Dec/16 Updated: 08/Dec/16 Resolved: 08/Dec/16

Identifier:	66
Name:	IPSM Alignment Configuration
Description:	Alignment configuration enables operations, such as add, list and get, to be performed. Before utilizing IPSM translation services at least one alignment must be added to the Alignments Repository to become available to be used in the translation process.
Layer Level:	Semantics
Objectives:	IPSM needs configuration before being utilized
Actors:	Administrator - responsible for INTER-IoT configuration DS2DS layer component with dedicated API to that accepts request for IPSM configuration
Pre-conditions:	For add operation: a persisted alignment between platforms' ontologies is available to be uploaded to INTER-IoT. For get operation: alignment identifier is known.
Trigger:	IPSM is to be utilized for semantic translation.
Expected results:	Depending on request alignment is added to the repository, returned from the repository or alignments are listed.
Main execution:	The request is sent to the component that exposes a dedicated API. The request is forwarded to the alignment repository that returns result depending on operation executed.
Requirements involved:	[178], [179], [183], [184]
Product Name:	INTER-Layer
Identified by:	Systems Research Institute Polish Academy of Sciences (SRIPAS)
Registration Date:	03/Dec/16

[INTERIOT-847] IPSM Channel Configuration

Created: 03/Dec/16 Updated: 08/Dec/16 Resolved: 08/Dec/16

Identifier:	67
Name:	IPSM Channel Configuration
Description:	IPSM Channel configuration is required before establishing communication, between designated IoT artifacts, which involves semantic translation.
Layer Level:	Semantics
Objectives:	IPSM needs configuration before being utilized
Actors:	Administrator - responsible for INTER-IoT configuration DS2DS layer component with dedicated API to that accepts request for IPSM configuration
Trigger:	IPSM is to be utilized for semantic translation.
Expected results:	Upon successful completion of the process, an established communication channel is ready to send and receive messages.
Main execution:	A request is sent to the component that exposes a dedicated API. The request is forwarded to the component responsible for channel configuration (with respect to input, output and alignment to be used) that completes the request.
Requirements involved:	[178], [179], [183], [184]
Product Name:	INTER-Layer
Identified by:	Systems Research Institute Polish Academy of Sciences (SRIPAS)
Registration Date:	03/Dec/16

INTER-FW use cases

[INTERIOT-794] Temporal Access Created: 17/Nov/16 Updated: 24/Nov/16 Resolved: 17/Nov/16	
Identifier:	14
Name:	Temporal access to the virtual entity
Description:	Subscribers shall be able to access virtual entities of the different platforms only for a specified time range. Time range defining the temporal access to a virtual entity will be able to be set from outside the INTER-FW by the corresponding API taking into account the virtual entity, its location and specific consumers.
Reference Scenario:	[2] IoT support for transport planning and execution [3] IoT Weighbridges [4] Monitoring reefer container [6] Dynamic lighting in the port [9] Accident at the port area [19] Transport on truck breaks down or is hijacked [20] Damage or problems to the container during shipment [30] IoT access control, traffic and operational assistance
Layer Level:	Middleware
Objectives:	A platform owner will be able to specify a time range for the subscribers to be able to access measurements from the virtual entities. The possibilities will be the following ones: • Any virtual entities or for specific ones. • Daily allowed time range (for the 7 week days).

	• Geofencing: defining a polygon(s) so that only measurements with locations inside the polygon(s) will be made accessible from subscribers.
Actors:	Platform integrator: the platform integrator will define the temporal access restrictions for virtual entities its platform is providing measurements to subscribers through INTER-IoT. The subscriber: any actor using the MW2MW API to subscribe to a topic. Publisher: the platform providing defined topics and news of event taking place that are related to the topics. MW2MW: the middleware integration layer, managing the subscriptions and the flow of information between all parties. INTER-FW: The framework to be used for setting the temporal restrictions.
Pre-conditions:	A MW2MW properly configured deployment. A working IoT platform configured to work with the MW2MW. Required access from the subscriber to the publisher's topics. An IoT platform owner having the temporal restrictions well defined for a set of virtual entities.
Trigger:	The IoT platform owner sets time restrictions through the INTER-FW.
Expected results:	The INTER-FW will configure the MW2MW integration layer to report the subscribers only measurements of events in activated topics for the specified temporal access.
Design choices:	The time restriction can be made at 3 different levels, from most-desired and efficient to less desired: 1. In the MW2MW at the subscription each bridge performs to the related platform, transferring the time filtering to the IoT platform. 2. In the MW2MW at the bridge level, performing the filtering for each collected measurement. 3. In the INTER-FW, receiving thus all the measurements without time filters and performing the filtering before submitting the data to the end subscriber.
Notes and issues:	This capability means the ability to filter from different platforms that will have different subscription capabilities. Each bridge could expose different capabilities to the INTER-FW. Some filtering capabilities non-allowed by certain platforms could be made commonly in the cross-layer component, like geofencing, being used by the bridges that need it.
Main execution:	1. An integrator configures a subscription through INTER-FW to specific virtual entities. 2. The integrator specifies in INTER-FW a temporal filter (time periods or location based) for a set of entities. (Could be made at the same time than 1). 3. A subscriber requests to subscribe to some entities, some of them with temporal restrictions (this is unknown by the subscriber). 4. INTER-FW sends the subscriptions and the temporal restrictions to MW2MW for the specific platform and entities. 5. The MW2MW forwards the subscription to the underlying platform(s) with the subscription filters for entities and time/location restrictions. 6. At least one platform reports a new related event matching the temporal restriction. 7. The MW2MW informs the INTER-FW of the new measurement. 8. INTER-FW forwards the measurement to the subscriber.
Alternative execution:	Option 2) (The IoT platform doesn't allow the necessary temporal restrictions. 1. An integrator configures a subscription through INTER-FW to specific virtual entities.

	2. The integrator specifies in INTER-FW a temporal filter (time periods or location based) for a set of entities. (Could be made at the same time than 1). 3. A subscriber requests to subscribe to some entities, some of them with temporal restrictions (this is unknown by the subscriber). 4. INTER-FW sends the subscriptions and the temporal restrictions to MW2MW for the specific platform and entities. 5. The MW2MW forwards the subscription to the underlying platform(s) with the subscription filters for entities and the supported time/location restrictions. 6. At least one platform reports a new related event matching the temporal restriction. 7. The bridge performs the temporal restrictions not supported by the platform for the received measurement. 8. IF the measurements matches the temporal access restrictions, the MW2MW informs the INTER-FW of the new measurement. IF NOT, nothing is sent back. 9. INTER-FW forwards the measurement to the subscriber. Option 3) (The IoT platform doesn't allow the necessary temporal restrictions and temporal filtering is made at the INTER-FW level). 1. An integrator configures a subscription through INTER-FW to specific virtual entities. 2. The integrator specifies in INTER-FW a temporal filter (time periods or location based) for a set of entities. (Could be made at the same time than 1). 3. A subscriber requests to subscribe to some entities, some of them with temporal restrictions (this is unknown by the subscriber). 4. INTER-FW sends the subscriptions and the temporal restrictions to MW2MW for the specific platform and entities. 5. The MW2MW forwards the subscription to the underlying platform(s) with the subscription filters for entities and the supported time/location restrictions. 6. At least one platform reports a new related event matching the temporal restriction. 7. The bridge relays the measurements to the message broker and next the MW2MW informs the INTER-FW of the new measurement. 8. INTER-FW performs the temporal restrictions not supported by the platform for the received measurement of the platforms that didn't support the needed temporal restrictions. 9. INTER-FW forwards the measurement to the subscriber.
Exceptions:	If an underlying platform does not support temporal restrictions.
Requirements involved:	[2], [6], [14], [21], [28], [33], [37], [47], [50], [53], [61], [62], [64], [77], [94], [116], [121], [127], [195], [224], [266], [267], [270]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-795] Entity Status Created: 17/Nov/16 Updated: 07/Dec/16 Resolved: 07/Dec/16	
Identifier:	15
Name:	Entity Status
Description:	A virtual entity is used to represent a physical entity with its related measurement. This virtual entity can store and provide its status to INTER-IoT users.

Reference Scenario:	[9] Accident at the port area [10] Health monitoring system with passengers aboard a ferry [13] IoT interoperability for Vessel Arrivals [19] Transport on truck breaks down or is hijacked [30] IoT access control, traffic and operational assistance
Layer Level:	Device
Objectives:	The objective of this entity is to be a virtual representation of the physical object accessed through the gateway and virtualized in a cloud environment outside the scope of the physical sensor network. This virtual entity will be able to be updated with its current status and queried as well.
Actors:	Physical device: device with sensors collecting data and sending it to the gateway. Gateway: Physical/logical component accessing sensor data from the physical device and sending it upwards to the virtual entity. Virtual entity: Virtual representation of a physical device in the cloud. Consumer: external component accessing the virtual entity (through INTER-FW)
Pre-conditions:	A physical device is available and its measurements can be collected by a gateway.
Trigger:	A new measurement is available for a sensor in a device.
Expected results:	The virtual entity has stored the latest measurement and it's available for querying it.
Notes and issues:	The virtual entity is a part of the gateway that can be split to a cloud virtual representation or to be hosted at the own gateway hardware.
Main execution:	1. The gateway collects a new measurement from a sensor. 2. The measurement is processed locally at the gateway. 3. The measurement is submitted to the virtual representation, which is updated. 4. A consumer queries the latest measurement from the virtual entity.
Alternative execution:	The measurements are sent upwards to the virtual entity without a necessary query from a consumer.
Exceptions:	The communication channel is not available from the gateway to the cloud environment. Then the information is stored locally at a cache in the gateway (a stack) being sent to the virtual entity when the channel is available.
Requirements involved:	[23], [33], [39], [48], [50], [51], [55], [75], [127], [153], [194], [223], [238], [243], [244], [247], [267], [268], [270]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-796] Virtual Device Management Created: 17/Nov/16 Updated: 07/Dec/16 Resolved: 07/Dec/16	
Identifier:	18
Name:	Virtual Device Management
Description:	A virtual entity is used to represent a physical entity with its related measurement. This virtual entity can be managed, being created, updated or destroyed.

Reference Scenario:	[2] IoT support for transport planning and execution [4] Monitoring reefer container [9] Accident at the port area [13] IoT interoperability for Vessel Arrivals [19] Transport on truck breaks down or is hijacked [20] Damage or problems to the container during shipment
Layer Level:	Device
Objectives:	The objective of a virtual entity is to be a virtual representation of the physical object. It can be managed through the gateway by the device manager, for adding new entities into the system, querying, updating or destroying them.
Actors:	Physical device: device with sensors/actuator collecting data and sending it to the gateway. Gateway: Physical/logical component accessing sensor data from the physical device and sending it upwards to the virtual entity. Virtual entity: Virtual representation of a physical device in the cloud. External process: external component accessing the virtual entity (through INTER-FW) to manage virtual entities
Pre-conditions:	A physical device is available and its measurements can be collected by a gateway.
Trigger:	A new virtual entity is: • Created • Updated • Queried • Destroyed
Expected results:	The virtual entity has been modified in any way.
Design choices:	The virtual entities can be represented internally in the gateway hardware or (later on) being send to the virtual part of the gateway.
Main execution:	• Creation: 1. The external component wants to create a new virtual device for a physical thing accessible through a gateway, and sends a request to the gateway using the registry module. 2. The gateway creates a virtual entity and stores its latest measurement if available. 3. The virtual entity reference is sent back to the external component. • Access: 1. The external component sends a request to the virtual entity. 2. The virtual gateway accesses the virtual entity and sends the data back to the external component. • Destruction: 1. The external component wants the system to stop using a virtual entity for a physical thing, and sends a request to the gateway. 2. The gateway destroys the virtual entity and stops collecting data.
Exceptions:	The communication channel is not available from the gateway to the cloud environment. Then the information is stored locally at a cache in the gateway (a stack) being sent to the virtual entity when the channel is available.
Requirements involved:	[23], [33], [39], [48], [50], [51], [55], [75], [127], [153], [194], [223], [238], [243], [244], [247], [267], [268], [270]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-797] User reception Created: 17/Nov/16 Updated: 24/Nov/16 Resolved: 17/Nov/16	
Identifier:	20
Name:	User receives data or orders
Description:	A truck driver receives some data in the vehicle, containing instructions for a specific action to be done.
Reference Scenario:	[2] IoT support for transport planning and execution [3] IoT Weighbridges [4] Monitoring reefer container [20] Damage or problems to the container during shipment
Layer Level:	Service
Objectives:	To be able to send instructions to a truck driver so that he can perform an action.
Actors:	Truck driver: Person driving a truck involved in a scenario of INTER-LogP Road haulier: Truck company sending data to the driver.
Pre-conditions:	A truck is configured for being used in the corresponding scenario and the driver is in the truck with connectivity.
Trigger:	The road haulier sends some data.
Expected results:	The data is presented to the driver.
Main execution:	1. The road haulier sends some data. 2. The App at the truck gets the data. 3. The data is presented in the App to the driver, confirming the lecture. 4. A confirmation is sent back to the road haulier company.
Exceptions:	There's no connectivity between the truck and the company, the data is cached until connectivity appears again and data is sent to the truck. Idem with confirmation.
Requirements involved:	[70], [103], [260]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-798] System reception Created: 17/Nov/16 Updated: 24/Nov/16 Resolved: 17/Nov/16	
Identifier:	21
Name:	User receives data or orders
Description:	A port application or system receives some data containing instructions for a specific action to be done.
Reference Scenario:	[6] Dynamic lighting in the port [9] Accident at the port area [19] Transport on truck breaks down or is hijacked
Layer Level:	Service
Objectives:	To be able to send instructions to a port application or system so that it can perform an action.

Actors:	Application/system: Port computer system involved in a scenario of INTER-LogP. Port Authority IoT platform: Port component that generates an order towards a specific system.
Pre-conditions:	The Port Authority IoT platform is working properly and the target system is running as well.
Trigger:	The Port Authority IoT platform sends some order.
Expected results:	The target system receives the request and is able to start performing it.
Design choices:	• The target system is subscribed to a specific event from the Port Authority IoT platform. • An external component acts as a mediator, being subscribed to the specific events from the Port Authority IoT platform and is responsible for making the target system to be aware of the action to be done.
Main execution:	1. The Port Authority IoT platform sends some order as an event. 2. The target system receives the data App at the truck gets the data. 3. The data is presented in the App to the driver, confirming the lecture. 4. A confirmation is sent back to the road haulier company.
Exceptions:	There's no connectivity between the truck and the company, the data is cached until connectivity appears again and data is sent to the truck. Idem with confirmation.
Requirements involved:	[27], [28]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-799] FW CRUD Created: 17/Nov/16 Updated: 17/Nov/16 Resolved: 17/Nov/16	
Identifier:	31
Name:	FW CRUD
Description:	Basic operations provided by INTER-FW to maintain things in INTER-IoT, with the possibility of creating or adding a new thing (C), reading or getting measurements from a thing (R), updating/inserting things measurements (U) and destroying or deleting the thing (D).
Layer Level:	Middleware
Objectives:	To offer the basic handling operations for managing things.
Actors:	External system/integrator: The INTER-IoT user which needs to operate with things. IoT platform: The platform which is the final destination of the actions requested by the external system. Gateway: The component which is the final destination of the actions requested by the external system.
Pre-conditions:	A working IoT platform configured to work with INTER-IoT. A MW2MW properly configured deployment OR a gateway properly configured for accessing a sensor. A sensor is reachable from a gateway OR a sensor is correctly connected to an IoT platform which is accessible from the MW2MW layer.

Trigger:	An external component request to operate with a new thing by either: • Creating a new thing (and thus registering it) through INTER-IoT into a platform. • Reading thing data. • Updating or inserting new measurements about the thing. • Destroying or unregistering a thing from a platform.
Expected results:	The operation is properly done: the thing has been created, read, updated or deleted.
Notes and issues:	The operation is done in a connected IoT platform or in a gateway. This use case affects all layers.
Main execution:	Create: 1. The user requests to create a new thing into a specific IoT platform. 2. The FW checks for the right permissions of the user to access the platform. 3. The request is sent to the IoT platform. 4. A response with right/wrong result is returned from the IoT platform. 5. The response is forwarded to the user. Read: 1. The user requests to read data about a thing from a specific IoT platform. 2. The FW checks for the right permissions of the user to access the platform. 3. The request is sent to the IoT platform. 4. A response with right/wrong result is returned from the IoT platform. 5. The data is sent back to the user. Update: 1. The user requests to insert new data about a thing into a specific IoT platform. 2. The FW checks for the right permissions of the user to access the platform. 3. The measurement is sent to the IoT platform. 4. A response with right/wrong result is returned from the IoT platform. 5. The response is forwarded to the user. Delete: 1. The user requests to delete and unregister new thing into a specific IoT platform. 2. The FW checks for the right permissions of the user to access the platform. 3. The request is sent to the IoT platform. 4. A response with right/wrong result is returned from the IoT platform. 5. The response is forwarded to the user.
Exceptions:	There's no permissions to perform the action in the IoT platform. The thing doesn't exist in the platform.
Requirements involved:	[23], [26], [27], [28], [33], [48], [50], [51], [52], [64], [74], [256], [267], [271]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-800] FW Pub/Sub Created: 17/Nov/16 Updated: 17/Nov/16 Resolved: 17/Nov/16	
Identifier:	32
Name:	FW Publication/Subscription to middleware or gateway events
Description:	INTER-FW will provide the ability for an external user to subscribe to a middleware data stream from an IoT platform / gateway.

Layer Level:	Middleware
Objectives:	To be able to continuously receive all the measurements of a thing from an IoT platform or gateway.
Actors:	External system/integrator: The INTER-IoT user which needs to receive data from an IoT platform or gateway. IoT platform: The platform which is the source of data requested by the external system. Gateway: The component which is the source of data requested by the external system.
Pre-conditions:	A working IoT platform configured to work with INTER-IoT A MW2MW properly configured deployment OR a gateway properly configured for accessing a sensor. A sensor is reachable from a gateway OR a sensor is correctly connected to an IoT platform which is accessible from the MW2MW layer.
Trigger:	An external component requests to subscribe to the measurements from a thing.
Expected results:	The external component receives continuously all the available measurements about a thing in an IoT platform or gateway.
Design choices:	The subscription to a middleware needs to use a message broker in the Mw2MW, which can be different depending on the particular scenario of the connected IoT platforms (variable number of things, variable volume of real-time data, etc.).
Notes and issues:	The operation is done in a connected IoT platform or in a gateway.
Main execution:	IoT platform 1. The external component requests a subscription to data from a sensor. 2. The FW checks for appropriate permissions. 3. The MW2MW requests a subscription to the sensor from a platform. 4. The IoT platform begins sending data for each measurement. 5. Each measurement is sent to the FW and next to the external component. 6. Finally the external component request to stop the subscription. 7. The subscription finish is sent from the MW2MW to the IoT platform. Gateway 1. The external component requests a subscription to data from a sensor. 2. The FW checks for appropriate permissions. 3. The FW sends the requests for subscription to the gateway. 4. The gateway begins sending data for each measurement. 5. Each measurement is sent to the external component. 6. Finally the external component request to stop the subscription. 7. The subscription finish is sent from the FW to the gateway.
Alternative execution:	If a similar subscription is already made to the IoT platform/gateway, that subscription is reused for the two external consumers.
Exceptions:	No permissions are being held. The IoT platform doesn't allow subscriptions. The thing is not connected to the platform/gateway.
Requirements involved:	[27], [28], [33], [39], [47], [50], [52], [54], [64], [74], [115], [127], [242], [249], [256], [267], [270], [271]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-801] FW Service consumption Created: 17/Nov/16 Updated: 17/Nov/16 Resolved: 17/Nov/16	
Identifier:	33
Name:	FW Service consumption
Description:	INTER-FW will provide the ability for an external user to consume a service offered by AS2AS layer which in turn makes use of IoT platform services.
Layer Level:	Service
Objectives:	To consume existing services from the different IoT platforms connected through INTER-IoT.
Actors:	External system/integrator: The INTER-IoT user which needs to consume services from IoT platforms. AS2AS: Composed or simple service offered to external actors. IoT platform: The platform which provides some services.
Pre-conditions:	A working IoT platform configured to work with INTER-IoT with some services. A service is configured in AS2AS using one or more services from one or more IoT platforms.
Trigger:	An external system requests to consume a specific existing service.
Expected results:	The expected result for the service is delivered to the external system.
Notes and issues:	The different nature of IoT platform services lead to a very different response type. So it may condition the design of the way the response is conveyed to the external system.
Main execution:	1. The external system requests to consume a service. 2. The FW relays the request to AS2AS layer, which executes the requested service, making the necessary requests to specific IoT platform services. 3. The result of the service is sent back to the external request.
Exceptions:	The IoT platforms fail on executing some service.
Requirements involved:	[239], [240], [241], [248]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-802] FW API management Created: 17/Nov/16 Updated: 17/Nov/16 Resolved: 17/Nov/16	
Identifier:	34
Name:	FW API management
Description:	INTER-FW will offer an API for accessing all the capabilities of INTER-IoT. The API will be managed and protected through an API Manager.
Layer Level:	Service
Objectives:	The API Manager should be responsible for: • Controlling API versions and deployment. • Controlling user load. • Monitoring API usage. • Securing the API.

	• Using different communication protocols.
Actors:	External system/integrator: The INTER-IoT user which needs to access any feature INTER-IoT exposes through its API. INTER-FW: Framework of INTER-IoT which provides an API.
Pre-conditions:	An external user can access the API having the right permissions.
Trigger:	The external system makes any type of action by requesting something to the INTER-FW API.
Expected results:	The external system receives his response, being the request managed by the API properly.
Notes and issues:	Reuse existing open source projects.
Main execution:	1. The external system makes a request to the INTER-FW API. 2. The API Manager captures the request and handles it, with the specific security and load aspects. 3. If everything is OK, the request is relayed to the INTER-FW. 4. The response from INTER-FW is sent back to the external system.
Alternative execution:	1. The external system makes a request to the INTER-FW API. 2. The API Manager captures the request and handles it, with the specific security and load aspects, detecting some problem like security aspects, traffic limit overpassing, etc. 3. A denial response is sent back to the external system.
Requirements involved:	[2], [27], [28], [37], [47], [52], [58], [68], [86], [95], [115], [116], [117], [199], [237], [265], [266], [267], [268], [270], [271]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-803] LII Coordination Created: 17/Nov/16 Updated: 17/Nov/16 Resolved: 17/Nov/16	
Identifier:	35
Name:	Layer Interoperability Infrastructure (LII) coordination
Description:	The INTER-FW is responsible for handling the requests it receives from external users and direct the request to the appropriate layer, controlling the answer and sending it back to the requester.
Layer Level:	Service
Objectives:	To control the interaction between the external user and the different components of INTER-IoT.
Actors:	External system/integrator: The INTER-IoT user which needs to access any feature INTER-IoT exposes through its API. INTER-FW: Framework of INTER-IoT which provides an API.
Trigger:	The external system makes any type of action by requesting something to the INTER-FW API.
Expected results:	The external system receives his response, being the request managed by the API properly.
Notes and issues:	Generic for all layers.
Main execution:	1. The external system makes a request to the INTER-FW API.

	2. The INTER-FW captures the request and decides which layer is responsible for performing the requested action. 3. The INTER-FW sends the request to the specific layer through its API and receives the answer. 4. The response from INTER-FW is sent back to the external system.
Exceptions:	An exception from the related layer can be raised, being caught by the INTER-FW which will relay it to the external user.
Requirements involved:	[14], [47], [52], [193], [198], [199], [201], [237], [249], [250]
Product Name:	INTER-FW
Identified by:	Provedelop S. L. (PRO)
Registration Date:	17/Nov/16

[INTERIOT-781] FW Configuration tools Created: 14/Nov/16 Updated: 17/Nov/16 Resolved: 14/Nov/16	
Identifier:	36
Name:	FW Configuration tools
Description:	The configuration tools are designed to be standalone software components and are used to support the configuration of the INTER-FW in deployment time and even in runtime.
Reference Scenario:	-
Layer Level:	Middleware
Objectives:	Configuration tools support the use of the Inter-IoT interoperability stack in a harmonized, simple way.
Actors:	A system administrator is in charge for the management of each specific tool for the configuration and the deployment of the INTER-FW.
Pre-conditions:	-
Trigger:	The need of installing a new instance of the INTER-FW or the need to tune some properties/parameters of the running instance of INTER-FW are both triggering conditions.
Expected results:	Easy, adaptable and flexible off-line and at run time configuration of the INTER-FW product.
Design choices:	The configuration tools has to support a friendly visual interface rather than simple configuration text files in order to simply the work of the administrator.
Main execution:	1. Run the specific configuration tool. 2. Set the desired configuration parameters. 3. Save the configuration. 4. Deploy and run INTER-FW.
Alternative execution:	
Requirements involved:	[131], [140]
Product Name:	INTER-FW
Identified by:	Università della Calabria (UNICAL)

Registration Date:	04/Nov/16

[INTERIOT-782] FW Registration & discovery tools Created: 14/Nov/16 Updated: 17/Nov/16 Resolved: 14/Nov/16	
Identifier:	37
Name:	FW Registration & discovery tools
Description:	Considering different IoT platforms, the Inter-FW is able to connect, in a transparent way, the platforms in order to enable their interoperability. In this context, discovery of services and devices play a central role. For this reason, Inter-FW includes specifics mechanisms od registration and discovery.
Reference Scenario:	-
Layer Level:	Middleware
Objectives:	Services and devices belonging to different IoT platforms must be discovered and registered to be fully available to other platforms.
Actors:	IoT Platform: the system informs the Inter-FW about the existence of new services Inter-FW: it receives the information from the different IoT Platforms and it registers the specific characteristics of each device or service.
Pre-conditions:	The different IoT platforms have to be pre-registered to the Inter-FW to start the interoperability process.
Trigger:	The activation of a new device or a new service within each IoT platform trigger the FW registration & discovery tools.
Expected results:	An up to date device and service registry.
Design choices:	The main choice concerns the decision on which model has to be implemented for the discovery of a new device or service. In particular, the discovery process can be executed every time a new device is activated or periodically.
Main execution:	1. A new device or service is discovered by a certain IoT Platform. 2. The IoT platform notifies to Inter-FW the activation of a new device or service. 3. Inter-FW registers the presence of the new device or service in a specific registry.
Alternative execution:	1. Periodically, the Inter-FW sends a discovery message to the different IoT platforms. 2. The IoT platforms notify to Inter-FW the activation of a new device or service. 3. Inter-FW registers the presence of the new device or service in a specific registry.
Requirements involved:	[23], [43], [256], [275], [276]
Product Name:	INTER-FW
Identified by:	Università della Calabria (UNICAL)
Registration Date:	04/Nov/16

[INTERIOT-827] Semantic repository management Created: 21/Nov/16 Updated: 04/Dec/16 Resolved: 21/Nov/16	
Identifier:	39
Name:	Semantic repository management
Description:	Semantic repository is a component dedicated to storage and sharing of semantic data.
Layer Level:	Semantics
Objectives:	There exists a component that provides access to semantic data necessary to add a platform to the INTER-IoT deployment and to perform a translation of data exchanged between artifacts.
Actors:	• Users responsible for artifacts integration • Semantic repository component
Pre-conditions:	Artifacts that are added to INTER-IoT should have explicitly formulated semantics and data format for messages.
Trigger:	User responsible for integrating platforms wants to access central or target ontologies to generate alignments or upload his/her artifact's ontology. There is a request received via a dedicated API.
Expected results:	The action requested from the semantic repository component is executed without an error.
Notes and issues:	• Semantic repository should be accessible via a dedicated API. • It should be considered as part of the framework. • All entries in the repository should be identifiable by appropriate metadata e.g. related platform, version.
Main execution:	The following functionalities of semantic repository component can be considered: upload ontology, upload alignment, delete ontology, delete alignment. The user uses a dedicated API to send requests to the repository and receive results.
Requirements involved:	[23], [53], [223], [224], [225]
Product Name:	INTER-FW
Identified by:	Systems Research Institute Polish Academy of Sciences (SRIPAS)
Registration Date:	10/Nov/16
Update Date:	25/Nov/16

INTER-METH use cases

[INTERIOT-841] Requirements Analysis for IoT Platform Integration Created: 01/Dec/16 Updated: 02/Dec/16 Resolved: 01/Dec/16	
Identifier:	56
Name:	Requirements Analysis for IoT Platform Integration
Description:	Given two or more IoT platforms/systems to be integrated, the integration requirements need to be elicited. On the basis of the elicited requirements, the design of the IoT platforms integration could be then carried out.

Objectives:	To elicit the requirements for the integration of IoT platforms/systems.
Actors:	The developer of the integration (aka Integrator), who carries out the integration interconnection of heterogeneous IoT platforms; The platform Owner, who will obtain the integrated platform; The involved Platforms to be integrated.
Pre-conditions:	Two or more heterogeneous IoT platforms (available) to be interconnected/integrated.
Trigger:	The need to integrate/interconnect identified heterogeneous IoT platforms.
Expected results:	Set of (functional and non-functional) requirements for the integration of the identified IoT platforms/systems.
Notes and issues:	The involved IoT platforms should be well-documented (ore ven open-source) and/or the IoT platform developer/s should be available to provide technical support.
Main execution:	1. Each platform is analysed according to the functional and non-functional viewpoints of the five IoT platform layers (device, networking, middleware, application services, data&semantics) and of the cross-layering. 2. According to the Step 1, the requirements of integration among the layers of the platforms to be integrated, are defined according to an iterative process. The execution could be supported by the INTER-CASE tool.
Requirements involved:	[74][159-162][108-120]
Product Name:	INTER-Meth
Identified by:	Università della Calabria (UNICAL)
Registration Date:	21/Nov/16

[INTERIOT-842] IoT Platforms Integration Design Created: 01/Dec/16 Updated: 02/Dec/16 Resolved: 01/Dec/16	
Identifier:	57
Name:	IoT Platforms Integration Design
Description:	Given two or more IoT platforms/systems that have been analysed according to the use case IM1, design specifications have to be produced. On the basis of the design specifications, the implementation of the IoT platforms integration could then be carried out.
Objectives:	To define the design specifications for the integration of IoT platforms/systems.
Actors:	The developer of the integration (aka Integrator), who carries out the integration interconnection of heterogeneous IoT platforms. The platform Owner, who will obtain the integrated platform. The involved Platforms to be integrated.
Pre-conditions:	Two or more heterogeneous IoT platforms (available) to be interconnected/integrated, analysed through the use case [56].
Trigger:	Availability of the specific requirements for the integration of the involved IoT platforms/systems elicited through the use case IM1 (or even through another methodology/process).
Expected results:	Set of design specifications for the integration of the identified IoT platforms/systems.

Notes and issues:	The involved IoT platforms should be well-documented (or even open-source) and/or the IoT platform developer/s should be available to provide technical support.
Main execution:	1. For each layer (and cross-layer), on the basis of the elicited requirements in IM1, an initial design specification is produced. 2. Each design specification produced in Step 1 is iteratively refined. 3. A global integration design is defined on the basis of the outcome of Step 2. The execution could be supported by the INTER-CASE tool.
Requirements involved:	[74][159-162][108-120]
Product Name:	INTER-Meth
Identified by:	Università della Calabria (UNICAL)
Registration Date:	21/Nov/16

[INTERIOT-843] IoT Platforms Integration Implementation Created: 01/Dec/16 Updated: 02/Dec/16 Resolved: 01/Dec/16	
Identifier:	58
Name:	IoT Platforms Integration Implementation
Description:	Given two or more IoT platforms/systems, whose integration has been designed according to the use case IM2, the integration implementation (deployment and testing/validation) has to be performed. On the basis of the actual deployed and tested implementation, the maintenance of the integrated IoT platforms could then be realised.
Objectives:	To integrated/interconnect, deploy and test the IoT platforms/systems to be integrated/interconnected.
Actors:	The developer of the integration (aka Integrator), who carries out the integration interconnection of heterogeneous IoT platforms. The platform Owner, who will obtain the integrated platform. The involved Platforms to be integrated.
Pre-conditions:	Two or more heterogeneous IoT platforms (available) to be interconnected/integrated, whose integration design specification are analysed through use case [57].
Trigger:	Availability of the design integration specifications of the involved IoT platforms/systems defined through the use case IM2 (or even through another methodology/process).
Expected results:	The integrated, deployed and tested IoT platform/system.
Notes and issues:	The involved IoT platforms should be well-documented (or even open-source) and/or the IoT platform developer/s should be available to provide technical support.
Main execution:	1. For each layer (and cross-layer), the design specifications produced in IM2 are actually implemented. 2. On the basis of Step 1, a full-fledged integration (namely Integrated Platform) among the involved IoT platforms/system will be obtained. 3. The Integrated Platform is deployed. 4. The Integrated Platform is validated through testing. The execution could be supported by the INTER-CASE tool.

Requirements involved:	[74][159-162][108-120]
Product Name:	INTER-Meth
Identified by:	Università della Calabria (UNICAL)
Registration Date:	21/Nov/16

[INTERIOT-844] IoT Platforms Integration Maintenance Created: 01/Dec/16 Updated: 02/Dec/16 Resolved: 01/Dec/16	
Identifier:	59
Name:	IoT Platforms Integration Maintenance
Description:	Given an integrated platform obtained from the integration of two or more IoT platforms/systems, such platform needs to be maintained.
Objectives:	To maintain an integrated IoT platform.
Actors:	The developer of the integration (aka Integrator), who carries out the integration interconnection of heterogeneous IoT platforms. The platform Owner, who will obtain the integrated platform. The involved Platforms to be integrated; (d) the integrated Platform.
Pre-conditions:	An integrated platform implemented (and deployed and tested) through use case [58].
Trigger:	Availability of an integrated platform defined through the use case IM3 (or even through another methodology/process).
Expected results:	Maintenance of the integrated IoT platform.
Notes and issues:	The involved integrated IoT platform should be well-documented (or even open-source) and/or the IoT platform developer/s and integrator/s should be available to provide technical support.
Main execution:	1. Identification of a list of bugs and/or a list of evolution points. 2. Correction of bugs and/or implementation of new functionalities. The execution could be supported by the INTER-CASE tool.
Requirements involved:	[74][159-162][108-120]
Product Name:	INTER-Meth
Identified by:	Università della Calabria (UNICAL)
Registration Date:	21/Nov/16

INTER-LogP use cases

[INTERIOT-771] Vehicle arriving Created: 02/Nov/16 Updated: 02/Nov/16 Resolved: 02/Nov/16	
Identifier:	11
Name:	Vehicle arriving

Description:	A vehicle IoT platform (P-IoT - publisher) keeps track, among other attributes, of the position, destination, distance to destination and estimated time of arrival. This platform provides information to other IoT platforms and applications (S-IoT - subscriber) informing when the vehicle is arriving. The virtual entity will consider an ACL (Access Control List) to identify to whom publish data.
Reference Scenario:	[2] IoT support for transport planning and execution [3] IoT Weighbridges [6] Dynamic lighting in the port [30] IoT access control, traffic and operational assistance
Layer Level:	Service
Objectives:	A P-IoT publish certain attributes to authorised S-IoT previously registered and subscribed. Authorised subscribers establish the conditions for receiving notifications.
Actors:	P-IoT: The IoT platforms that manage attributes of the entity to publish to authorised subscribers. S-IoT: The IoT platforms which receive the data about attributes published from IoT entities.
Pre-conditions:	P-IoT and S-IoT have been previously registered together with their owners. S-IoT has subscribed to this service in each P-IoT.
Trigger:	The condition of the S-IoT indicated in the subscription is met and the owner of the S-IoT is on the ACL (access control list) of the virtual entity.
Expected results:	The S-IoT receives the attributes of the virtual entities published by P-IoT that met the subscription conditions.
Design choices:	How to identify virtual entities among different platforms (i.e. vehicles). How to identify IoT platforms and application owners. The notification of a VE registers this VE in the S-IoT.
Specializes:	[32] FW Publication/Subscription to middleware or gateway events
Notes and issues:	INTER-IoT needs to provide a directory of IoT platforms, applications and services that will interoperate. INTER-IoT needs to provide a common publication and subscription mechanism for different IoT platforms.
Main execution:	1. INTER-IoT provides mechanisms to register IoT platforms and applications associated with their owners. 2. S-IoT previously subscribes to this service and they provide trigger conditions to be notified as, for example, the distance to destination. 3. The P-IoT only provides the information to those S-IoT owned by the companies included in the ACL. 4. The S-IoT receives the information published that met the conditions of the subscription.
Requirements involved:	[19], [201], [224], [253], [256], [257]
Product Name:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	02/Nov/16

[INTERIOT-789] **Automatic identification**

Created: 16/Nov/16 Updated: 16/Nov/16 Resolved: 16/Nov/16

Identifier:	12
Name:	Automatic identification
Description:	A sensor identifies a physical object automatically through passive tags, video recognition, etc. and informs the owner about this event.
Reference Scenario:	[3] IoT Weighbridges [30] IoT access control, traffic and operational assistance
Layer Level:	Service
Objectives:	Publish the automatic identification of a physical entity to proper IoT platforms and applications.
Actors:	Physical entity: The vehicle that is accessing a place. Identification system: The sensors that allow the identification of the physical entity. Publish the event to other authorised subscribers. S-IoT: The IoT platforms which receive the data about the physical entities identified.
Pre-conditions:	P-IoT and S-IoT have been previously registered together with their owners. S-IoT has subscribed to this service in each P-IoT. The physical entity is registered in the P-IoT platform including its owner.
Trigger:	The identification system identifies the physical entity.
Expected results:	The identification is sent to the subscribed IoT platforms.
Design choices:	The automatic identification can be done through different technologies: iBeacon, RFID, video recognition, etc.
Extends:	[11] Vehicle Arriving
Specializes:	[32] FW Publication/Subscription to middleware or gateway events
Notes and issues:	- INTER-IoT needs to provide a common publication and subscription mechanism for different IoT platforms.
Main execution:	1. The identification system detects and identifies the entity. 2. The identification system platform publishes the event. 3. The S-IoT receives the information published.
Requirements involved:	[166], [197], [246], [201], [257]
Product Name:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	19/Oct/16

[INTERIOT-790] Access authorization Created: 16/Nov/16 Updated: 16/Nov/16 Resolved: 16/Nov/16	
Identifier:	13
Name:	Access authorization
Description:	The IoT platform that manages the identification system has to check whether the entity is authorized to access the facilities and report the result to and other related companies.
Reference Scenario:	[30] IoT access control, traffic and operational assistance
Layer Level:	Service

Objectives:	Check the authorization of a physical entity and publish the relevant data to authorised subscribed IoT platforms and applications.
Actors:	Physical entity: The vehicle that is accessing a place. Identification system: The sensors that allow the identification of the physical entity. Publish the event to other authorised subscribers. S-IoT: The IoT platforms which receive the data about the physical entities identified.
Pre-conditions:	P-IoT and S-IoT have been previously registered together. S-IoT has subscribed to this service in each P-IoT. The physical entity is registered in the P-IoT platform including its owner.
Trigger:	The IoT platform that manages the identification system receives the identification of an entity.
Expected results:	The access data is sent to the authorised subscribers IoT platforms and applications.
Design choices:	How to identify virtual entities among different platforms (i.e. vehicles) and using different technologies. How to identify IoT platforms and application owners.
Extends:	[12] Automatic identification
Specializes:	[32] FW Publication/Subscription to middleware or gateway events
Notes and issues:	- INTER-IoT needs to provide a directory of IoT platforms, applications and services that will interoperate. - INTER-IoT needs to provide a common publication and subscription mechanism for different IoT platforms.
Main execution:	1. INTER-IoT provides mechanisms to register IoT platforms and applications associated with their owners. 2. The P-IoT localizes the VE to determine it access authorization and the owner and authorised companies. 3. The P-IoT platform publishes the information about the vehicle, access status, gate and lane. 4. The S-IoT platform receives the information published. 5. The driver's mobile app receives the information published.
Requirements involved:	[201], [224], [256], [257]
Product Name:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	04/Oct/16

[INTERIOT-791] Detection of an incident Created: 16/Nov/16 Updated: 16/Nov/16 Resolved: 16/Nov/16	
Identifier:	16
Name:	Detection of an incident
Description:	An incident is detected by the sensors of a system or by a user and is notified to all the relevant actors.
Reference Scenario:	[9] Accident at the port area [10] Health monitoring system with passengers aboard a ferry [17] Health monitoring system with passengers aboard a train [19] Transport on truck breaks down or is hijacked

	[29] Reliable control of robotic cranes and trucks in port terminals [30] IoT access control, traffic and operational assistance
Layer Level:	Service
Objectives:	Detect, evaluate and publish an incident.
Actors:	P-IoT: The platforms that manage the facilities where the incident is detected and publish the event to other authorised subscribers. S-IoT: The IoT platforms which receive the data about incident. Human user: The user can detect the incident.
Pre-conditions:	P-IoT and S-IoT have been previously registered together. S-IoT has subscribed to this service in each P-IoT.
Trigger:	An incident is detected in the facilities of the P-IoT.
Expected results:	The incident is detected and notified to the appropriate companies.
Design choices:	How to identify IoT platforms and application owners. There are many possible incidents.
Specializes:	[32] FW Publication/Subscription to middleware or gateway events
Notes and issues:	- INTER-IoT needs to provide a directory of IoT platforms, applications and services that will interoperate. - INTER-IoT needs to provide a common publication and subscription mechanism for different IoT platforms.
Main execution:	1. An incident is detected by a sensor or process and the IoT platform is informed. 2. The P-IoT platform publishes the information about the incident. 3. The S-IoT platform receives the information published.
Alternative execution:	1. An incident is detected by a user and is notified to the IoT platform through a mobile app. 2. The P-IoT platform publishes the information about the incident. 3. The S-IoT platform receives the information published.
Requirements involved:	[84], [154], [168], [201], [205]
Product Name:	INTER-LogP
Identified by:	ValenciaPort Foundation (VPF)
Registration Date:	04/Oct/16

[INTERIOT-824] **Ship movement in harbour region** Created: 18/Nov/16 Updated: 24/Nov/16 Resolved: 22/Nov/16	
Identifier:	48
Name:	Ship movement in harbour region
Description:	A ship moves into the harbour region allowing all container monitoring systems, as well as the ship's own systems, to connect to the harbour IoT system.
Reference Scenario:	[13] IoT interoperability for Vessel Arrivals [18] Containership is entering the harbour region
Layer Level:	Network
Objectives:	All the containers and vessel systems can connect to the port IoT system and transmit the pending data.
Actors:	The devices trying to set up a connection.

	The IoT platform where all the data is sent.
Pre-conditions:	Devices must be properly configured to connect to the IoT system.
Trigger:	Land-based networks in reach of the devices.
Expected results:	No failure in connection. The harbour systems must be able to handle large amounts of devices trying to connect.
Design choices:	Devices may be required to get sequential access. Manage all incoming communication requests.
Notes and issues:	When systems have a connection supported by the ship, the severity will be much less.
Main execution:	1. When the vessel is close to the port, it establish a connection with the port systems. 2. The data is sent first come first serve.
Alternative execution:	The devices don't connect simultaneously, but sequentially.
Requirements involved:	[1], [2], [13], [17], [18], [22], [115], [189], [193], [204], [207], [227], [253], [258], [275], [278]
Product Name:	INTER-LogP
Identified by:	NEWAYS Technologies (NEWAYS)
Registration Date:	18/Nov/16
Update Date:	18/Nov/16

[INTERIOT-825] Container distribution Created: 18/Nov/16 Updated: 24/Nov/16 Resolved: 22/Nov/16	
Identifier:	49
Name:	Container distribution
Description:	A containership has arrived at the dock and is ready to be unloaded. The IoT system will give the crane operator instructions of which container should be picked up, the truck or container distribution system will be ready to bring the container to the reserved location or the truck will pick up the container for further transport.
Reference Scenario:	[14] Train arriving to the port [29] Reliable control of robotic cranes and trucks in port terminals
Layer Level:	Service
Objectives:	Optimize container movement through the harbour.
Actors:	Physical entity: The container that has a reserved location in the terminal. Physical entity: The vehicle that is accessing a place. IoT platform: The platform that manages and assesses the containers positions.
Pre-conditions:	A container must have a reserved location or a transport truck allocated.
Trigger:	A vessel is in the port to unload the containers.
Expected results:	Optimal container routing.
Design choices:	The IoT system will calculate an optimal unloading sequence.
Notes and issues:	Assumption is that an optimal unloading sequence can be found.
Main execution:	1. The vessel IoT platform sends information about the containers on board to be unloaded.

	2. The terminal IoT platform calculates the optimal distribution of the containers on the yard for each container. 3. The terminal IoT platform sends the orders to each crane.
Requirements involved:	[1], [3], [17], [19], [84], [94], [142], [193], [196], [197], [198], [203], [223], [224], [241], [245], [246], [247], [248], [249], [275], [278]
Product Name:	INTER-LogP
Identified by:	NEWAYS Technologies (NEWAYS)
Registration Date:	18/Nov/16
Update Date:	18/Nov/16

INTER-Health use cases

[INTERIOT-810] Creates and operates users /services Created: 17/Nov/16 Updated: 24/Nov/16 Resolved: 20/Nov/16	
Identifier:	1
Name:	Creates and operates users /services
Description:	Administrators/ Sanitary Operators (e.g. ASL TO 5) will be able to create and manage users (e.g. patients, doctors, nurses) and their information needed by the services.
Reference Scenario:	[12] Heart failure disease and mild Alzheimer disease [15] Surveillance systems for prevention programs [16] Elderly monitoring [31] Chronic disease prevention
Layer Level:	Service
Objectives:	• To create and modify users of the services, assigning roles and related permissions, enabling users the access to functionalities provided by different platforms in a cooperative way or using a platform as a master. • To define a method to recognize a data entity identity and to map and group different instances of different platforms representing the same entity. For entity, we assume, for example, users or anthropometric information such as gender, etc. • To access and synchronize data exchange among the involved platforms (databases, directories, file systems and so on, and applications).
Actors:	Administrator of the INTER-Health platform. Sanitary Operator ASL TO 5 that operate the service. Platforms that concur to create services of the INTER-Health platform (e.g. eCare and BodyCloud).
Pre-conditions:	Availability of a request containing: Information on user, roles and permission on the service of interest. The user that performs the required activities should have suitable permissions and roles.
Trigger:	Request of activation / modification of a new user on an INTER-health service.
Expected results:	Creation /modification of a user on INTER-Health and on the integrated platforms (e.g. eCare and BodyCloud).

Design choices:	For the interoperability at the service layer it is possible to use one of the existing interfaces of the integrated platforms or it is possible /necessary to develop a new interface. In the first case standard APIs suites for the interoperability are recommended for the Synchronisation of the systems. In the second case must be built a new user interface that supplies a common unified view. It is possible to develop both solutions starting from the first to arrive to the final. For the interoperability at Data and Semantics layer it is possible to achieve the goal in two different ways: 1. Grouping entity instances matching a set of significant information common to all platforms involved 2. Defining and developing algorithms to discover similarity, to group and map instances of the same entity, analysing the content of data. For the Synchronization (interoperability at Middleware layer) it is possible to achieve the goal in different ways: 1. Replicating in a P2P way every information to every peer 2. Defining a platform as a master and keep other platforms updated only for the proper information. The choices must be in line with the architectural design defined in the requirements. INTER-health architectural scenario [171]
Main execution:	The user (administrator or Sanitary Operator) uses the INTER-Health web interface to handle the requirement to add /modify a new user to the specified service (e.g. chronic disease prevention of ASL TO 5). The user performs the action requested for the specified user / service (creation of a new user or modification of same attribute of the specified user).
Exceptions:	In case the service doesn't exist it is not possible to proceed. In case the user to be modified doesn't exist it is not possible to proceed. In case the user to be created already exists it is not possible to proceed.
Requirements involved:	[104], [106], [171], [174]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-811] Sets Citizens /patients protocol parameters Created: 17/Nov/16 Updated: 20/Nov/16 Resolved: 20/Nov/16	
Identifier:	2
Name:	Sets Citizens /patients protocol parameters
Description:	Sanitary Operators will be able to choose and set patients protocols, devices, thresholds, measures scheduling to perform.
Reference Scenario:	[12] Heart failure disease and mild Alzheimer disease [16] Elderly monitoring [31] Chronic disease prevention
Layer Level:	Service
Objectives:	• To assign/de-assign due measures to patients, to define appropriate measures calendars and measures thresholds for their patients.

	• To define a method to recognize a data entity identity and target values used in setting health protocols (e.g. thresholds for measures). For entity, we assume for example: type of measure, target reference (i.e. WHO: World Health Organization) for thresholds.
Actors:	Doctors that define the monitoring program. Platforms that co-work to create services of the INTER-Health platform (e.g. eCare and BodyCloud).
Pre-conditions:	Provisioning of users involved: i.e.: Physicians, patients and health operator and due association (i.e.: physician to patients, health operators to patients).
Trigger:	Request of activation / modification of a new measures, calendars and thresholds for patients on an INTER-health service.
Expected results:	Assignment /de-assignment of measures, calendars and thresholds on INTER-Health and on the integrated platforms (e.g. eCare and BodyCloud).
Design choices:	It is possible to use one of the existing interfaces of the integrated platforms or it is possible /necessary to develop a new interface. In setting protocol parameters, it could be useful to keep the origin of the referring target for some entity: kind of measures, kind of threshold and so on.
Main execution:	1. The user (Sanitary Operator) uses the INTER-Health web interface to handle the requirement to add / remove a new measure, calendar or threshold 2. The patient profile will be updated; consequently he will perform the health monitoring using the new protocol defined.
Exceptions:	In case the user doesn't have any measure associated it is not possible to proceed set protocol (calendars thresholds). In case the user to be modified doesn't exist it is not possible to proceed. A patient must be associated to only one calendar/threshold for measures in a period of time.
Requirements involved:	[173], [174]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-812] Performs objective and subjective measures (questionnaires) Created: 17/Nov/16 Updated: 20/Nov/16 Resolved: 20/Nov/16	
Identifier:	3
Name:	Performs objective and subjective measures (questionnaires)
Description:	Patients/ Citizens will be able to perform subjective measures compiling the assigned questionnaires. They will be able to perform also objective measures taken by medical and wearable devices.
Reference Scenario:	[12] Heart failure disease and mild Alzheimer disease [31] Chronic disease prevention
Layer Level:	Service
Objectives:	To associate medical devices to the gateway on smartphone (i.e. Bluetooth pairing), to perform measures in time as defined in the protocol and to send them to the platforms involved.

Actors:	Patients (i.e. the final users) of the INTER-Health platform. Sanitary Operator that operates in surgeries to perform some measures that require more than patients expertise. Platforms and Devices that cooperate to perform and save all the measures included in the services of the INTER-Health platform (e.g. eCare and BodyCloud).
Pre-conditions:	Availability of a protocol defining measures to perform for the patients.
Trigger:	Trigger Measures execution using devices and requesting to send them to the INTER-Health platform.
Expected results:	Acquiring /sending measures of a user and recording them on INTER-Health and on the integrated platforms (e.g. eCare and BodyCloud).
Design choices:	It is possible to use one of the existing interfaces of the integrated platforms or it is possible /necessary to develop a new interface, both at the platform level and at the device level. For the interoperability towards Platforms, two different approaches are possible: • Real Time Update Execution is briefly described: 1. Checking how many platforms are interested in the updating, verifying, in case of creation, that the entity instance does not exist, in case of update and delete that it is already present. 2. Making update of the information of the starting or main platform 3. Making update of the involved platforms 4. Committing updates on all platforms 5. Rolling back the updates in presence of mistakes. The final user will be notified if the operation has been done well In alternative to the real time execution could be implement a: • Background alignment In this case the updating could be divided into the following steps: 1. Checking how many platforms are interested in the updating verifying, in case of creation, that the entity instance will not exist, in case of update and delete that it is already present. 2. Making update and commit of the information of the starting or main platform and later of the remaining platforms. 3. In case of errors a Background update should guarantee the alignment later. The management of a log of out of date data is needed. For the interoperability between devices and platforms the means to use are essentially two: Using APIs supporting standard protocols or custom ones. Two different kinds of measure streams are exchanged between devices and platforms , simultaneously present in the same service: • Single measure sending: Patients or health operators perform the single measure locally to the gateway at a defined point of time and send it immediately to the target platform • Continuous measure sending: Devices worn by patients perform measures during a period of time; the gateway picks up measures in continuous, elaborate them and send them or a part of them automatically at fixed time to the target platform. Questionnaires are part of portals and don't involve device layer.
Main execution:	1. The final user (patient or health operator) uses the INTER-Health web interface to handle questionnaires and the INTER-Health gateway to handle objective measures (sent by wireless devices: e.g. via Bluetooth). 2. The user sends performed measures to the platform: updating the questionnaire or using the due gateway functions for objective measures.

Alternative execution:	It is possible to forward to the platforms measures previously kept and updated locally to the gateway in case of network problems. This is valid only for objective measures, not for questionnaires.
Exceptions:	In case the measure isn't assigned it is not possible to proceed. In case the user doesn't exist or is not active it is not possible to proceed.
Requirements involved:	[101], [102], [172], [176], [177]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-813] Monitors subjective and objective parameters Created: 17/Nov/16 Updated: 20/Nov/16 Resolved: 20/Nov/16	
Identifier:	4
Name:	Monitors subjective and objective parameters
Description:	Sanitary Operators will be able to analyse in real time their patients' measures and monitor the healthy state.
Reference Scenario:	[12] Heart failure disease and mild Alzheimer disease [16] Elderly monitoring [31] Chronic disease prevention
Layer Level:	Service
Objectives:	To access and deal subjective and objective measures using different filters and criteria to monitor the patients.
Actors:	Sanitary Operator that operates the service. Platforms that concurs to create services of the INTER-Health platform (e.g. eCare and BodyCloud).
Pre-conditions:	The user that performs the required activities should have suitable permissions and roles.
Trigger:	Users under monitoring that send measures.
Expected results:	Chronological measures query, Measures Type query, Synthetic query and dashboard.
Design choices:	To match the interoperability at service layer different approaches are possible: • To interface existing reporting solutions using APIs to use functionalities of different systems. • To recall a new interface that supplies a common unified view, such as 'Ubiquity of the reporting to monitor patients status from different platforms' (for example to allow each platform involved to access a common place where each platform shares its results or define a common functionality for reporting). • Developing both solutions starting from the first to arrive to the final. To achieve the data and semantics interoperability, exposing coherent information, two different ways are possible: 1. Grouping entity instances matching a set of significant information common to all platforms involved. 2. Defining and developing algorithms to discover similarity, to group and map instances of the same entity, analysing the content of data.
Main execution:	Doctors can monitor measures using:

	1. Data filtering in a period of time for the user under their control 2. Downloading in different file formats 3. Continuous time analysis of measure kept by wearable devices. Patients can auto-monitor themselves using or downloading only their own measures.
Exceptions:	In case the service is not active (server down, network failures) it is possible to use simple queries locally to the gateway.
Requirements involved:	[101], [102], [107], [172], [173]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-814] **Sets geolocation parameters for patients** Created: 17/Nov/16 Updated: 20/Nov/16 Resolved: 20/Nov/16	
Identifier:	5
Name:	Sets geolocation parameters for patients
Description:	Doctors/Relatives shall be able to set geolocation parameters for the patients assigned to control patients' position and be informed about possible danger occasions.
Reference Scenario:	[12] Heart failure and mild Alzheimer disease
Layer Level:	Service
Objectives:	• To assign/de-assign location parameters (such as polling frequency and Safe Area radius) to patients. For Safe Area we mean a circle with the centre in the patient position (latitude and longitude) and pre-fixed radius. • To activate/deactivate localization functionalities: i.e. deactivating the localization during the night etc.).
Actors:	Relatives/Doctors that define the Safe Area dimension or polling frequency. Platforms that provide the location functionalities (Location Platform) that co-work to create services of the INTER-Health platform (e.g. eCare).
Pre-conditions:	Presence of users involved: i.e.: patients, relatives and/or doctors and due associations (i.e.: relatives to patients, doctors to patients).
Trigger:	Request of activation / modification of localization parameters/service.
Expected results:	Assignment /de-assignment of the service to patients, Changing of polling frequency and Safe Area features on INTER-Health location platform and on the integrated platforms (e.g. eCare and localisation platform).
Design choices:	It's possible to use one of the existing interfaces of the integrated platforms (using for example the Location Platform as a master) or it is possible /necessary to develop a new interface.
Main execution:	1. Relatives/Location Operators change location parameters. 2. The new location parameters are sent to the location system. 3. The location system updates its settings and runs using new parameters.
Exceptions:	In case the user doesn't have geolocation service it will not be possible assigning-deassigning geolocation parameters.

Requirements involved:	[173], [174]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-815] Detects and acquires patients position Created: 17/Nov/16 Updated: 20/Nov/16 Resolved: 20/Nov/16	
Identifier:	6
Name:	Detects and acquires patients position
Description:	Patients will be able to be localized wearing a geo location device that automatically sends measures to the target platform where they will be stored in the database.
Layer Level:	Service
Objectives:	• To detect patients position periodically at a fixed period of time. • To compute the position comparing it with the safe limits (within the Safe Area) and generate alarm events in case of a possible danger.
Actors:	Patients (i.e. the passive users) of the INTER-Health location platform. Patients' relatives or doctors that are the real end users and key role for the positioning control. Platforms and Devices that cooperate to perform and save all the measures in the services of the INTER-Health platform (e.g. Geo Location).
Pre-conditions:	Availability of geo location settings for the patients.
Trigger:	Normally periodic measurement is running based on geo location settings. There is also the possibility of real time positioning request made by relatives or doctors.
Expected results:	Acquiring /sending measures of a user and recording them on INTER-Health and on the integrated platforms (e.g. Geo Location).
Design choices:	It is possible to create an integration between INTER-Health and Geo Location platform to share measures or send the geolocation measures to INTER-Health using the Geolocation platform just as a gateway.
Main execution:	Periodic position detection. The gateway picks up measures in continuous, elaborates them and send them or a part of them automatically at fixed time to the target platform.
Alternative execution:	Real Time request. In case of urgent need (for example when patients exit the Safe Area), the doctors (or patient relatives) can request the position directly using INTER-Health portal or app.
Exceptions:	In case the service isn't assigned or not active, it is not possible to proceed.
Requirements involved:	[101], [176], [177]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16

Update Date:	08/Nov/16

[INTERIOT-816] Monitors patients position and manages alarms Created: 17/Nov/16 Updated: 24/Nov/16 Resolved: 20/Nov/16	
Identifier:	7
Name:	Monitors patients position and manages alarms
Description:	Doctors/Relatives will be able to monitor the position of the assigned patients and control and be informed about possible danger conditions.
Reference Scenario:	[12] Heart failure and mild Alzheimer disease
Layer Level:	Service
Objectives:	• To monitor alarms (for Safe Area exits) using different filters and criteria. • To receive alarm notifications for patients going outside the Safe Area. • To define an algorithm for generation of alarms.
Actors:	Doctors, Relatives. Platforms that concur to create services of the INTER-Health platform (e.g. eCare and Geo Location).
Pre-conditions:	The user that performs the required activities should have suitable permissions and roles.
Trigger:	Users under monitoring that send measures.
Expected results:	Chronological measures query, Out of Safe Area Measures query, Synthetic visual dashboard, Geographic visualization through a map.
Design choices:	To match the interoperability at service layer different approaches are possible: • To interface Localization capabilities of the existing Geo Location platform using APIs for location monitoring • To bring in the INTER-Health platform all the information (measures, settings and so on) using the Geo Location system only as a gateway and building a new reporting on INTER-Health platform. To achieve the data and semantics interoperability, exposing coherent information, two different ways are possible: 1. Grouping entity instances matching a set of significant information common to all platforms involved 2. Defining and developing algorithms to discover similarity, to group and map instances of the same entity, analysing the content of data.
Main execution:	Doctors/Relatives can monitor measures. 1. Using synthetic information (alarms, events). 2. Accessing to detailed information or asking a real time localization.
Requirements involved:	[101], [107]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-817] Sets Prevention program for students

Created: 17/Nov/16 Updated: 20/Nov/16 Resolved: 20/Nov/16	
Identifier:	8
Name:	Sets Prevention program for students
Description:	ASL doctors shall be able to set parameters for a student healthy growth (growth percentiles) referred to children age.
Reference Scenario:	[15] Surveillance systems for prevention programs
Layer Level:	Service
Objectives:	• To assign/de-assign due measures to patients, to define appropriate measures for students and measures thresholds for obesity prevention. • To define a method to recognize a data entity identity and target values used in setting health protocols (e.g. thresholds for measures depending on age on gender, and so on). For entity, we assume for example: type of measure, target reference (i.e. WHO: World Health Organization) for thresholds. Calendars and reminders for measuring are not useful for this kind of massive measures taken at School at fixed time (twice a year).
Actors:	ASL doctors in setting students health protocol. Platforms that co-work to create services of the INTER-Health platform (e.g. eCare and Business Analytics).
Pre-conditions:	Provisioning of users involved: i.e.: Physicians, students and School operators and due association (i.e.: school operators to students class).
Trigger:	Request of activation / modification of a new measure, thresholds for students on an INTER-health service.
Expected results:	Assignment /de-assignment of measures and thresholds on INTER-Health.
Design choices:	It is useful to use only one of existing user interfaces of the integrated platforms and propagate asynchronously the updates to the others; the goal of this scenario is analysis of measures during a long period of time (School Year) without real time requirements.
Main execution:	1. The ASL Doctors use the INTER-Health web portal to add / remove a new measure or threshold. 2. The students profile will be updated; consequently students will perform the health monitoring using the new protocol defined.
Exceptions:	In case the student doesn't have a measure associated it is not possible to proceed to set protocol. In case the user to be modified doesn't exist it is not possible to proceed. A student must be associated to only threshold for measures in a period.
Requirements involved:	[173], [174]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-818] **Detects and acquires students measures** Created: 17/Nov/16 Updated: 24/Nov/16 Resolved: 20/Nov/16	
Identifier:	9

Name:	Detects and acquires students measures
Description:	Students will be able to perform measures using at school multifunctional device (healthy kiosk) that sends measures to the target platform where they will be stored in the database.
Reference Scenario:	[15] Surveillance systems for prevention programs
Layer Level:	Service
Objectives:	• Pairing between device and gateway: the association to the gateway is done once for all users; two main goals are: • Measure taking. o Measure detection for objective measures is done massively for all the students of the class. o Subjective Measures: at the same time students are requested to fill on the web portal questionnaires assigned to them by ASL doctors. • Measure Storing: o Questionnaires are immediately stored on the IINTER-Health database. o Objective measures can be temporarily stored on gateway and send to the target platform later.
Actors:	Students (they are passive users for objective measures, for subjective measures they are users of the web portal) of the INTER-Health platform. School operators that help students performing objective measures. Platforms and Devices that cooperate to perform and save all the measures included in the services of the INTER-Health platform (e.g. eCare and Business Analysis).
Pre-conditions:	Availability of a protocol defining measures to perform for the students.
Trigger:	Single measure
Expected results:	Acquiring /sending measures of a user and recording them on INTER-Health database and on the integrated platforms (e.g. eCare and Business Analysis).
Design choices:	For the interoperability between the main Platform and Business Analysis Platforms, two different approaches are possible: • Mixed solution (detailed data on the main platform, synthetic data on Data warehouse of the Business Analysis Platform). Execution is briefly described: 1. Definition of the data warehouse schema on the Business Analysis. 2. Definition of models and algorithms for aggregation. 3. Update on the data warehouse only synthetic information leaving run time information on the original platform. In alternative could be implemented a: • Data warehousing full approach on business analysis platform. In this case the updating could be divided into the following steps: 4. Creating on the Business Analysis platform a database speculate of the run time DB, duplicating each information useful for the business analysis. This twin database is periodically refreshed using batch approach. 5. For aggregated information the executions of previous case are still valid. The management of a log of out of date data is needed. For the interoperability between devices and platforms, the means to use are essentially two: • APIs supporting standard protocols or • APIs supporting custom protocols.
Main execution:	1. The final user (student) uses the INTER-Health web interface to handle questionnaires.

	2. The final user (school operator) uses the INTER-Health gateway to handle objective measures (sent by wireless devices: e.g. via Bluetooth). 3. The school operator sends performed measures to the target platform: updating the questionnaire or using the due gateway functions for objective measures. 4. Background updating of Business analysis database/data warehouse.
Alternative execution:	It is possible to forward to the platforms measures previously kept and updated locally to the gateway in case of network problems. This is valid only for objective measures, not for questionnaires.
Exceptions:	In case the measure isn't assigned it is not possible to proceed. In case the user doesn't exist or is not active it is not possible to proceed.
Requirements involved:	[101], [102], [172], [177]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-819] Analyses students' measures and manages health feedbacks Created: 17/Nov/16 Updated: 24/Nov/16 Resolved: 20/Nov/16	
Identifier:	10
Name:	Analyses students' measures and manages health feedbacks
Description:	ASL doctors or School Operators will be able to monitor, at fixed point in the school year, the students growth and control and be informed about possible obesity conditions.
Reference Scenario:	[15] Surveillance systems for prevention programs
Layer Level:	Service
Objectives:	To define a multidimensional reporting to monitor measures; possible filters are: age, gender, and period of time.
Actors:	School Operators that run the service. Parents or Students (when they become adults). Platforms that concur to create services of the INTER-Health platform (e.g. eCare and Business Analysis).
Pre-conditions:	The user that performs the required activities should have suitable permissions and roles.
Trigger:	Periodic update and population of the data warehouse.
Expected results:	Multidimensional reporting: filtering for: school, age, School year, gender and so on.
Design choices:	In developing of Business Analysis reporting: two approaches are possible depending on the choices done in the previous use case: Mixed approach: the reporting uses synthetic data from Business Analysis Data warehouse and analytic information accessing to the original platform database by APIs. Full data warehouse reporting. In this case the report will read both synthetic data and analytic ones from the warehouse (Business Analysis Platform).

Main execution:	School operators /parents can monitor measures using: 1. Data filtering in a period of time for the user under their control. 2. Drill down and swap. 3. Downloading in different file formats.
Exceptions:	In case the service is not active (server down, network failures) it is possible to use simple queries locally to the gateway.
Requirements involved:	[107], [171], [173]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-820] Detects and acquires elderly people measures Created: 17/Nov/16 Updated: 20/Nov/16 Resolved: 20/Nov/16	
Identifier:	27
Name:	Detects and acquires elderly people measures
Description:	Patients will be able to perform measures using a fixed gateway that collects and automatically send measures to the server (gateway hub). The service is studied for elderly people digitally inexperienced.
Reference Scenario:	[16] Elderly monitoring
Layer Level:	Service
Objectives:	• User friendly measure detection without the need of user interaction. • Automatic and safe measure sending to the server platform. • No subjective measures are requested since users are already included in cure programs.
Actors:	Patients (i.e. the final users) of the INTER-Health platform. Sanitary Operators or doctors that operate in hospitals-surgeries to control health status of their patients. Platforms and Devices (gateway hub such as CoXnico) that cooperate to perform and save all the measures included in the services of the INTER-Health platform (e.g. eCare).
Pre-conditions:	Availability of a protocol defining measures to perform for the patients.
Trigger:	Measures execution using devices and immediate acquisition on the INTER-Health platform.
Expected results:	Acquiring /sending measures of a user and recording them on INTER-Health and on the integrated platforms (e.g. eCare).
Design choices:	It is possible to use one of the existing interfaces of the integrated platforms or it is possible /necessary to develop a new interface, both at the platform level and at the device level.
Main execution:	The final user (patient or Sanitary operator) uses the INTER-Health fixed gateway to handle objective measures.
Alternative execution:	In case of networking failures the gateway will be able when it will be connected again, to send automatically not sent measures to the server platform.
Exceptions:	In case the measure isn't assigned it is not possible to proceed.

	In case the user doesn't exist or is not active it is not possible to proceed.
Requirements involved:	[62], [103], [176]
Product Name:	INTER-Health
Identified by:	Telecom Italia S.P.A (TI)
Registration Date:	02/Sep/16
Update Date:	08/Nov/16

[INTERIOT-792] Treatment plan Created: 16/Nov/16 Updated: 17/Nov/16 Resolved: 17/Nov/16	
Identifier:	42
Name:	Treatment plan
Description:	Improving health services access, efficiency and quality of our nutritional outpatient using an experimental trial which allow health operator to give subject a continuous decentralized treatment plan.
Reference Scenario:	[1] Chronic disease prevention [10] Health monitoring system with passengers aboard a ferry [11] Primary prevention of cognitive decline [12] Health failure disease and mild Alzheimer disease [15] Surveillance systems for prevention programs [16] Elderly monitoring [17] Health monitoring system with passengers aboard a train [21] Giulia, young teacher with a low risk of developing chronic diseases [22] Claudia, young housewife with increased risk of developing chronic diseases [23] Giorgio, unemployed electrician with high risk of developing chronic diseases [24] Rosa, employed with very high risk of developing chronic diseases [25] Umberto, nurses with extremely high risk of developing chronic diseases
Layer Level:	Service
Objectives:	The treatment plan aim to improve the quality of the health operator work through the use of technologies that could increase efficiency reducing time and resources and improving services. The treatment plan promotes, with the diffusion of electronic medical records, the concept of telemedicine, mHealth, and the decentralized monitoring for healthy subjects using Internet of Things, interoperability and standardization of devices.
Actors:	Nutritional outpatients' health operator (medical doctor, biologist nutritionist, dietitian, food technologist) who interact with recruited subjects (control group and experimental group), physician, family doctor, hospital linked to the nutritional outpatient work and in general to the prevention department role in the health system.
Pre-conditions:	The traditional nutritional counselling and the use of new technologies for develop an experimental nutritional counselling need first of all the information of the recruited subjects through the information sheet and signing the Informed consent under the approbation of the Bioethical Committee.
Trigger:	During the traditional nutritional counselling, there is no contact with subjects between planned visits for several weeks. During this period, health operators does not know if the subject is compliant with our counselling or not. Only when

	the subject returns to the outpatient for the visit health operator can assess the efficacy of the counselling collected and analysed data.
Expected results:	In order to improve the efficacy of the experimental nutritional counselling, we develop a continuous treatment plan called inter Health. eHealth is an Internet of Things system that provides the outpatient and its health operators with real-time information about subjects monitoring during the whole pilot and evaluate their adherence to the nutritional counselling.
Design choices:	The subject involved into the experimental group will be linked to the nutritional outpatient in order to follow his health status through his smartphone or tablet filling the electronic questionnaire about his eating habits and physical activity, checking periodically his weight with an electronic scale and if is a hypertensive subject monitoring his blood pressure. Wearing body sensor the subject will be monitored at home and in mobility during the whole period and from the outpatient, health operators could give him health advice or feedback on his health status. IoT devices will be protected by the developers of this integrate system and the treatment of subjects' data will be protected under privacy code law.
Extends:	[1] Creates and operates users /services [2] Sets Citizens/patients protocol parameters [3] Performs objective and subjective measures (questionnaires) [4] Monitors subjective and objective parameters [8] Sets prevention program for students [9] Detects and acquires students measures [10] Analyses students measures and manages health feedbacks [27] Detects and acquires elderly people measures [45] Human injury detection
Specializes:	[5] Sets geolocation parameters for patients [6] Detects and acquires patients position [7] Monitors patients position and manages alarms [50] Parameter Validation [51] Alert Sending
Notes and issues:	- Processing of personal and health data - Data collection will be aggregate in order to maintain the subject privacy but at the same time allow the health operator to check their health status. - Evaluation of the IoT system impact in our nutritional outpatient and improvement of health in our subjects.
Main execution:	1. Bioethic Committee approval for clinical experimentation 2. Information sheet reading by the subjects involved 3. Informed consent reading and signing by recruited subjects 4. Data treatment in respect of national and European laws
Requirements involved:	[62], [101], [102], [103], [104], [105], [106], [107], [143], [144], [145], [146], [147], [148], [149], [150], [154], [155], [156], [157], [158], [171], [172], [173], [174], [175], [176], [177], [190], [191], [192], [208], [209], [210], [211], [212], [213], [217], [218]
Product Name:	INTER-Health
Identified by:	Azienda Sanitaria Locale TO5 (ASLTO5)
Registration Date:	15/Nov/16

[INTERIOT-793] **Human injury detection**

Created: 16/Nov/16 Updated: 07/Dec/16 Resolved: 17/Nov/16	
Identifier:	45
Name:	Human injury detection
Description:	Decentralized monitoring and detection of objective (weight, height, BMI, waist circumference, blood pressure) and subjective measures (eating habit and physical activity practice) during the traditional and experimental nutritional counselling (in the outpatient and at home) through electromedical and wearable device to prevent chronic diseases.
Reference Scenario:	[1] Chronic disease prevention [9] Accident at the port area [10] Health monitoring system with passengers aboard a ferry [11] Primary prevention of cognitive decline [12] Health failure disease and mild Alzheimer disease [15] Surveillance systems for prevention programs [16] Elderly monitoring [17] Health monitoring system with passengers aboard a train [21] Giulia, young teacher with a low risk of developing chronic diseases [22] Claudia, young housewife with increased risk of developing chronic diseases [23] Giorgio, unemployed electrician with high risk of developing chronic diseases [24] Rosa, employed with very high risk of developing chronic diseases [25] Umberto, nurses with extremely high risk of developing chronic disease [26] Alcohol / Drug testing for truck/ bus drivers
Layer Level:	Device
Objectives:	Using electromedical and wearable device, all the detected measures become objective, in a real time mode for the mobile health system; this condition provides more effective and accurate instruments for the healthy prevention action.
Actors:	Nutritional outpatients' health operator (medical doctor, biologist nutritionist, dietitian, food technologist) who interact with recruited subjects (control group and experimental group), physician and family doctor.
Pre-conditions:	Treatment of healthy subjects' sensitive data: weight, height, BMI, waist circumference, blood pressure eating habit and physical activity practice.
Trigger:	Detection of healthy subjects' sensitive data: weight, height, BMI, waist circumference, blood pressure eating habit and physical activity practice through electromedical and wearable device. The detection will be in real time, at the subjects' home and in movement.
Expected results:	Collection of all data on the computerized nutritional folder. Subjects and health operators at the same time, sharing data. The subject is more conscious of his health status, while the health operator can attend him in a decentralized way (for example: alert on mobile phone).
Design choices:	- Bluetooth scale and sphygmomanometer - Wearable device (fitbit) - PC, smartphone - Computerized Nutrition folder
Extends:	[1] Creates and operates users /services [4] Monitors subjective and objective parameters [5] Sets geolocation parameters for patients [6] Detects and acquires patients position [7] Monitors patients position and manages alarms

	[10] Analyses students measures and manages health feedbacks [50] Parameter Validation [51] Alert Sending
Specializes:	[2] Sets Citizens/patients protocol parameters [3] Performs objective and subjective measures (questionnaires) [8] Sets prevention program for students [9] Detects and acquires students measures [27] Detects and acquires elderly people measures [42] Treatment plan
Notes and issues:	- Weight - Height - BMI - Waist circumference - Blood pressure - Eating habits - Physical activity practice
Main execution:	1. During the traditional nutritional counselling all the measures will be detected every 3 months in outpatient. 2. During the experimental nutritional counselling all the measures will be detected every 6 months in outpatient; the weight will be detected at home once a week; the eating habit and physical activity practice twice a months through online questionnaire; physical activity practice every day. 3. All the data will be collected on Computerized Nutritional folder. 4. INTER-IoT (mobile health) provides mechanisms to register aggregate and anonymous data of healthy subjects.
Requirements involved:	[62], [101], [102], [103], [104], [105], [106], [107], [143], [144], [145], [146], [147], [148], [149], [150], [154], [155], [156], [157], [158], [171], [172], [173], [174], [175], [176], [177], [190], [191], [192], [208], [209], [210], [211], [212], [213], [217], [218]
Product Name:	INTER-Health
Identified by:	Azienda Sanitaria Locale TO5 (ASLTO5)
Registration Date:	15/Nov/16

[INTERIOT-783] Parameter Validation Created: 14/Nov/16 Updated: 16/Nov/16	
Status:	In Progress
Identifier:	50
Name:	Parameter Validation
Description:	Module should be used to validate parameters, if they belong to a certain range
Reference Scenario:	[26] Alcohol / Drug testing for truck/ bus drivers [27] Vitamins intake analyser [28] Calories / nutrition mixer / cookware counter
Layer Level:	Service
Objectives:	A user of a system will be able to know if the parameters belong to a specific range.
Actors:	Human user: the person using the system. IoT platform: the platform reacting to the validation of the parameters.

Pre-conditions:	A measurement has been done; validation parameters have been set.
Trigger:	When user interacts with sensor or device.
Expected results:	Validation of parameters (yes / no).
Notes and issues:	Validation has to happen near real-time.
Main execution:	1. Validation parameters are entered 2. Data to be validated is entered 3. IF parameter are within range THEN validation successful
Requirements involved:	[3], [9], [10], [11], [12], [13], [21], [192]
Product Name:	INTER-Health
Identified by:	Alessandro Bassi Consulting (ABC)
Registration Date:	01/Nov/16
Update Date:	01/Nov/16

[INTERIOT-785] Alert Sending Created: 14/Nov/16 Updated: 16/Nov/16	
Identifier:	51
Name:	Alert Sending
Description:	An alert is sent triggered by an event.
Reference Scenario:	[27] Vitamins intake analyser.
Layer Level:	Service
Objectives:	To send an alert in case some parameters are out of range.
Actors:	Human: for whom the alert is created. Device: where the alert is published. Module: that triggers the alert.
Pre-conditions:	Value that triggers the alert.
Trigger:	Measured parameter outside a specified range.
Expected results:	Visual and/or audio notification of alert.
Extends:	[50] Parameter Validation
Notes and issues:	Precondition can be binary or value.
Main execution:	1. Call the module 2. Publish the value
Requirements involved:	[12, [13], [44], [131], [154], [168], [193], [276]
Product Name:	INTER-Health
Identified by:	Alessandro Bassi Consulting (ABC)
Registration Date:	01/Nov/16
Update Date:	01/Nov/16

[INTERIOT-786] Add Ingredients Created: 14/Nov/16 Updated: 16/Nov/16	
Identifier:	52

Name:	Add Ingredients
Description:	Adding ingredients to the mixer.
Reference Scenario:	[28] Calories / nutrition mixer / cookware counter
Layer Level:	Service
Objectives:	To have all necessary ingredients added to the mixer in order to process the calories counter.
Actors:	User – that adds the ingredients. IoT Cookware Platform – that performs the cooking.
Pre-conditions:	Ingredients have been selected and added.
Trigger:	User adds ingredients to the mixer.
Expected results:	Ingredients are in the mixer ready to be analysed and cooked.
Main execution:	1. User adds ingredients
Requirements involved:	[12], [28], [147], [150], [190], [191]
Product Name:	INTER-Health
Identified by:	Alessandro Bassi Consulting (ABC)
Registration Date:	01/Nov/16
Update Date:	01/Nov/16

[INTERIOT-787] Perform cooking Created: 14/Nov/16 Updated: 16/Nov/16	
Identifier:	53
Name:	Perform cooking
Description:	Perform the selected cooking with the ingredients in the mixer.
Reference Scenario:	[28] Calories / nutrition mixer / cookware counter
Layer Level:	Service
Objectives:	Food is prepared as planned.
Actors:	User – that will eat. IoT Cookware platform – that performs the cooking.
Pre-conditions:	Ingredients are in the mixer - Cooking has been selected
Trigger:	Preconditions are met.
Expected results:	Food is cooked.
Extends:	[52] Add Ingredients
Main execution:	1. Food is cooked.
Requirements involved:	[110], [188], [189], [190]
Product Name:	INTER-Health
Identified by:	Alessandro Bassi Consulting (ABC)
Registration Date:	01/Nov/16

Update Date:	01/Nov/16

[INTERIOT-788] Select cooking Created: 14/Nov/16 Updated: 16/Nov/16	
Identifier:	54
Name:	Select cooking
Description:	Selection of the cooking for the ingredients.
Reference Scenario:	[28] Calories / nutrition mixer / cookware counter
Layer Level:	Service
Objectives:	To select the cooking.
Actors:	User IoT cookware platform
Pre-conditions:	Food has been added.
Trigger:	Food was added.
Expected results:	Selection of cooking method.
Main execution:	1. Select cooking method
Requirements involved:	[13], [56], [168], [189], [190], [191]
Product Name:	INTER-Health
Identified by:	Alessandro Bassi Consulting (ABC)
Registration Date:	01/Nov/16
Update Date:	01/Nov/16