# IoT EUROPEAN LARGE-SCALE PILOTS PROGRAMME

LARGE-SCALE PILOTS PROJECTS

European
Large-Scale Pilots
Programme

# CONTENT

# DEAR READER,

This brochure presents the IoT European Large-Scale Pilots (LSPs), providing an overview of the overarching goals of this initiative, and some facts and figures about each of the 7 EU-funded projects that comprise the Programme.

The IoT LSPs Programme was launched in 2016 with the aim to foster the deployment and evolution of Internet of Things (IoT) solutions through the integration of advanced IoT technologies, from development to testing and integration, and at as close as possible to operational conditions.

Each of the funded projects are applying IoT approaches to specific real-life challenges across different use cases, based on European relevance, technology readiness and socio-economic interest in Europe. With a total funding budget of €100M, these LSPs address five different and specific domain areas, from smart living environments for ageing well, smart farming and food security, wearables for smart ecosystems, reference zones in EU cities and to autonomous vehicles in a connected environment.

To promote and foster the take-up of IoT in Europe and to enable the emergence of an economically sustainable IoT ecosystem, the LSPs are seeking to involve the IoT community across the value chain, from supply side to demand side.

Enjoy your reading!

Kind regards,
**IoT European Large-Scale Pilots Programme Team**

# 01 INTRODUCTION

# The IoT European Large-Scale Pilots Programme includes the innovation consortia that are collaborating to foster the deployment of Internet of Things (IoT) solutions in Europe through integration of advanced IoT technologies across the value chain, demonstration of multiple IoT applications at scale and in a usage context, and as close as possible to operational conditions.

SPECIFIC PILOT CONSIDERATIONS

Mapping of pilot architecture approaches with validated IoT reference architectures such as IoT-A enabling interoperability across use cases

Contribution to strategic activity groups that were defined by the projects to foster coherent implementation of the different LSPs

Contribution to clustering their results of horizontal nature (interoperability approach, standards, security and privacy approaches, business validation and sustainability, methodologies, metrics, etc)

The programme projects are targeted, goal-driven initiatives that propose IoT approaches to specific real-life industrial/societal challenges. They are autonomous entities that involve stakeholders from supply side to demand side, and contain all the technological and innovation elements, the tasks related to the use, application and deployment as well as the development, testing and integration activities.

IoT European Large-Scale Pilots Programme includes projects addressing the IoT applications based on European relevance, technology readiness and socio-economic interest in Europe. IoT Large-Scale Pilots make use of the rich portfolio of technologies and tools so far developed and demonstrated in reduced and controlled environments, and extend them to real-life use case scenarios with the goal of validating advanced IoT solutions across complete value chains with actual users and proving its socio-economic potential. Support actions provide consistency and linkages between the pilots and complement them by addressing horizontal challenges critically important for the take-up of IoT at the anticipated scale.

The projects together form the IoT European Large-Scale Pilots Programme and a coordination body ensures an efficient interplay of the various elements of the IoT-Focus Area and liaise with relevant initiatives at European Union, Member State and international levels. The coordination is implemented by creating activity groups that address topics of common interest across the large-scale pilots. Research and innovation efforts in specific IoT topics ensure the longer-term evolution of the IoT.

## PROJECTS OVERVIEW


KEY OBJECTIVES

Integration, further research and development where needed of the most advanced technologies across the value chain (components, devices, networks, middleware, service platforms, application functions).

Operation at large scale to respond to real needs of end-users (public authorities, citizens, businesses), based on underlying open technologies and architectures that may be reused across multiple use cases and enable interoperability

Validation of user acceptability by addressing, in particular, issues of trust, attention, security and privacy through pre-defined privacy and security impact assessments, liability, coverage of user needs in the specific real-life scenarios of the pilot

Validation of the related business models to guarantee the sustainability of the approach beyond the project and the provision of solutions based on open standards and platforms.

# By 2020 the European IoT Market is expected to reach €200B. Most of EU companies already see IoT as strategic to their business

STRATEGIC ..... **60 %**

helps my organization compete more effectively, reduce costs, improve productivity

TACTICAL ..... 18 %

solves a specific business problem with a single solution

TRANSFORMATIONAL ..... 16 %

helps my organization innovate and generate additional revenues

# The IoT LSPs are addressing the European IoT market in different domains

European wearables market is expected to take a step forward reaching by the end of 2020 approximately **€9B in terms of value** (with a 23.8% CAGR* 2016-2020) and **about 42 B in units**. The bulk of this market is **represented by watches** (about 80% of total spending).

MONICA

EU Government IoT spending to foster IoT-enabled smart city scenarios is expected to **grow with a 14.5% CAGR*** (2016-2020). Among major use cases Environmental Monitoring Detection, Intelligent Transportation Systems, Public Infrastructure Asset Management, Public Safety and Emergency Response emerge.

SYNCHRONICITY

Spending of IoT based solutions and **services supporting smart living environments and personal wellness** (smart home, remote health monitoring, bedside telemetry) in Europe is expected to **grow with a 22% CAGR*** (2016-2020) , driven by hardware and services spending.

ACTIVAGE

IoT for **connected vehicles and intelligent transportation systems is expect to double** its level by the end of 2020 in Europe, **reaching €14.6 B**. The growth will be mostly driven by German and French markets.

AUTOPILOT

IoT solutions deployed to **foster farming and food chains** in Europe are expected to increase with a 9.7% CAGR* (2016-2020), **reaching €1.9 B by the end of 2020**. Major use cases include animal tagging, food traceability and field monitoring.

IoF2020

* Compound Annual Growth Rate

Source: IDC, 2018

## IoT ARCHITECTURE LAYERS

| LAYER | COMPONENTS | DESCRIPTION |
|---|---|---|
| COLLABORATION & PROCESSES | Business System Integration | Enables integration with existing enterprise and other external systems |
| APPLICATION | Visualization | Presents device data in rich visuals and / or interactive dashboards |
| SERVICE | Development Environment | Provide integrated development environment to simplify development of apps |
| | Service Orchestration | Supports mashup of different data streams, analytcs and service components |
| | Advanced Analytics | Allows insights from data to be extracted and more complex data processing to be performed |
| ABSTRACTION | Event & Action Management | Simple rules engine to allow mapping of low level sensor events to high level events and actions |
| | Basic Analytics Action | Provides basic data normalization, reformatting, cleansing and simple statistics |
| STORAGE | Storage / Database | Cloud based storage and database capabilities (not including on premise solutions) |
| PROCESSING | Device Management | Enables remote maintenance, interaction and management capabilities of devices at the edge |
| | Edge Analytics | Capabilities to perform processing of IoT data at devices at edge as opposed to cloud |
| NETWORK & COMMUNICATIONS | Connectivity Network / Modules | Offers connectivity networks/HW modules enabling air interface connectivity |
| | Edge Gateway (HW based) | Offers IoT gateway devices to bridge connectivity from IoT nodes into the cloud based platform |
| PHYSICAL / DEVICE LAYER | Operating System | Offers low-level system, SW managing HW / SW and runs applications |
| | Modules & Drivers | Offers adaptable modules, drivers, source libraries that reduce development and testing time |
| | MPU / MCU | Offers multi-purpose programmable electronic devices at Microprocessor/Microcontroller level |

# 02 **PROJECTS**

# ACTIVAGE

ACTIVATING INNOVATIVE IoT SMART LIVING ENVIRONMENTS FOR AGEING WELL

**ACTIVAGE is building the first European interoperable and open IoT ecosystem enabling the deployment, at large scale, of a wide range of Active & Healthy Ageing IoT based solutions and services. To achieve this, ACTIVAGE is integrating thousands of devices to collect and analyse older adults' environmental and lifestyle information, identify their needs, and provide customized solutions, ensuring users' data privacy and security.**

**49**
PARTNERS

**9**
USE CASES

**9**
TRIALS

Europe is undergoing major socio-economic changes that make the welfare state's foundations teeter; namely, an increased life expectancy and a drop in birth rate. And the numbers seem to have an upward trend.

Projections indicate that the older population (>65 years) in the European Union will grow from the current 18% up to 28% by 2060. In addition to the above demographic change, the increasing growth of social and health costs jeopardizes the sustainability of the current social and health system models.

The ACTIVAGE project takes base on these arguments, with the primary objective of developing evidence and bringing to life the positive impact of the technologies and solutions that are based on the IoT in order to improve the quality of life, the health and the autonomy of older adults. And all this, with the aim to ensure the sustainability of social and health systems in Europe.

This large-scale pilot will actively involve nearly 10,000 older persons across nine deployment sites in seven different European Union countries.

It is important to highlight that ACTIVAGE ambition is that end users from the different sites are involved in the piloting of several use cases, in such a way that it is considered a single pilot and not the sum of different pilots with diverged ambitions.

This has been thought intentionally to simulate real conditions that will emerge in an IoT-enabled European society sharing an homogenized offering of interoperable services, in order to maximize the adoption and minimize the effects of market fragmentation.

WEBSITE & SOCIAL MEDIA

www.activageproject.eu

@ACTIVAGEproject

ACTIVAGE project

TOTAL EC FUNDING

€20M

COUNTRIES

CH, DE, ES, FI, FR, GR, IE, IT, UK

COORDINATOR

Medtronic Ibérica SA (ES)

## TECHNICAL DETAILS

### TECHNOLOGIES & STANDARDS USED

OSGI, IETF, W3C, Bluetooth, OASIS, WiFi, OMA, Zigbee, OCF, Docker, W3C/OWL, SAREF, SSN, ETSI ISG CIM

### OPEN SOURCE SOFTWARE USED

FIWARE, OpenIoT, SENSINACT, IoTIVITY, UniversAAL, NodeRed, INTER-IoT, IoT Eclipse, OneM2M

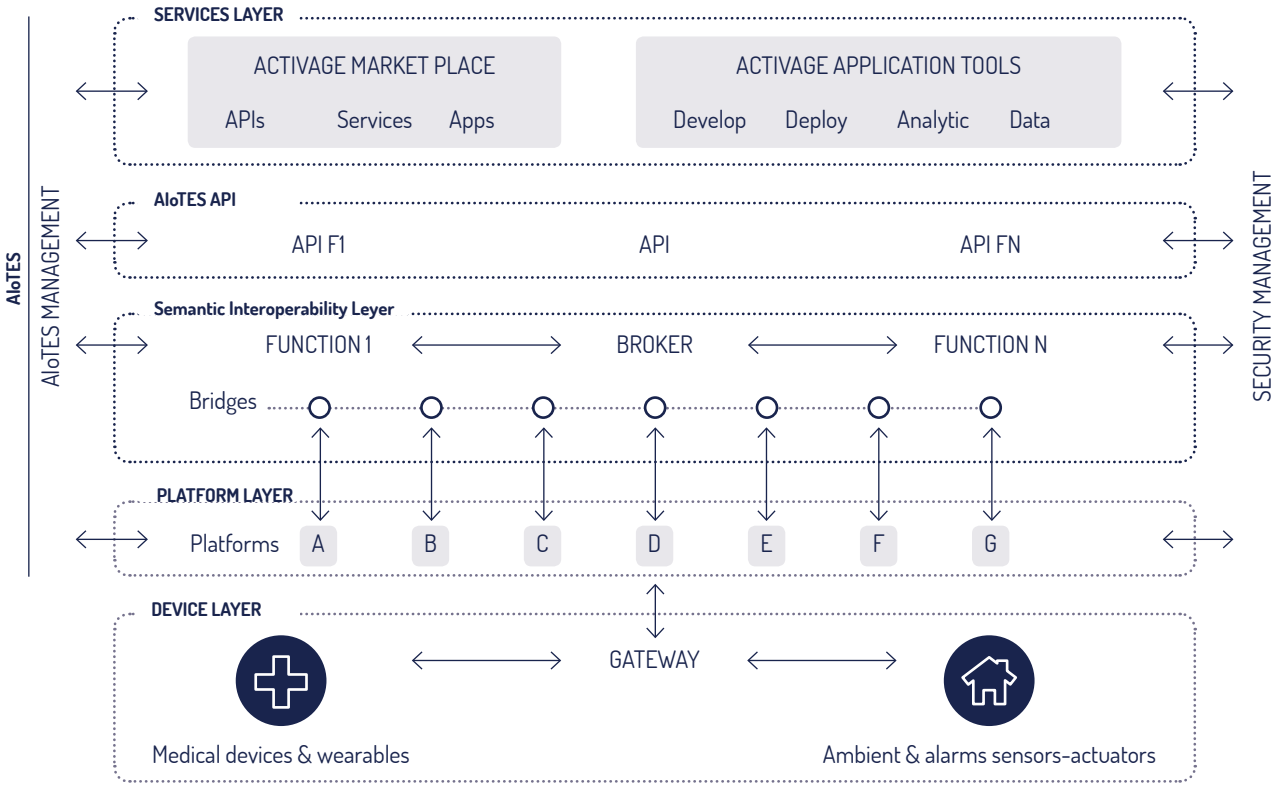
### COMMERCIAL PLATFORMS / SOFTWARE USED

SOFIA2, SENIORSOME, CareLife

## OPEN CALLS

| RUNNING PERIOD | TOTAL FUNDING | OBJECTIVES |
|---|---|---|
| I. JULY– OCTOBER 2018 | €900k | Support of third parties introducing complementary IoT enabled technologies in the existing deployment sites and within the existing IoT platforms. |
| II. APRIL– JULY 2019 | €600k | Introduction of new use cases and new deployment sites for extending, validating and evaluating the technologies introduced in ACTIVAGE. |

## REFERENCE ARCHITECTURE




ACTIVAGE architecture is designed to serve as common framework to build interoperable smart living solutions in the form of apps, software tools and services that can be deployed, extended and replicated at deployment sites across Europe. In other words, to allow future support of any additional platforms and services as far as they comply with the defined interoperability framework and standards. The ACTIVAGE architecture is in compliance with the IoT-A reference model, and it has been designed to provide semantic interoperability, that enables and orchestrates the interconnection of heterogeneous IoT devices, open IoT platforms and smart living services within a common ecosystem of solutions. The architecture includes management components to support the deployment in new sites; security and privacy by design in order to meet the different regulations;

## POSITIONING OF ACTIVAGE IN THE IoT ARCHITECTURE

| IoT ARCHITECTURE LAYERS | COMPONENTS | COVERED BY THIS PROJECT |
|---|---|---|
| COLLABORATION & PROCESSES | Business System Integration | ✓ |
| APPLICATION | Visualization | ✓ |
| SERVICE | Development Environment | ✓ |
| | Service Orchestration | ✓ |
| | Advanced Analytics | ✓ |
| ABSTRACTION | Event & Action Management | ✓ |
| | Basic Analytics Action | ✓ |
| STORAGE | Storage/Database | ✓ |
| PROCESSING | Device Management | ✓ |
| | Edge Analytics | ✓ |
| NETWORK & COMMUNICATIONS | Connectivity Network / Modules | ✓ |
| | Edge Gateway (HW based) | ✓ |
| PHYSICAL / DEVICE LAYER | Operating System | ✓ |
| | Modules & Drivers | ✓ |
| | MPU / MCU | ✓ |

## PARTICIPANTS

- AJT Wohn- und Quartierzentrums GmbH & Co KG (DE)
- Aurora Domus Cooperativa Sociale Onlus (IT)
- Azienda USL di Parma (IT)
- Centre Expert en Technologies et Services pour le Maintien en Autonomie a Domicile des Personnes Agees (FR)
- Commissariat a L'Energie Atomique et aux Energies Alternatives (FR)
- Consiglio Nazionale Delle Ricerche (IT)
- Cruz Roja Espanola Fundacion (ES)
- CSEM Centre Suisse D'electronique et de Microtechnique sa – Recherche et Developpement (CH)
- CUP 2000 SPA (IT)
- Departement de L'Isere (FR)
- Dimos Pylaias Chortiati (GR)
- Efarmoges Exypnou Logismikou Kykloforias & Metaforon AE (GR)
- eSeteli Palveluverkko Oy (FI)
- Ethniko Kentro Erevnas Kai Technologikis Anaptyxis (GR)
- Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung EV (DE)
- Fundacion de la Comunitat Valenciana para la Promocion Estrategica el Desarrollo y la Innovacion Urbana (ES)
- Fundacion Tecnalia Research & Innovation (ES)
- Fundacion Vodafone Espana (ES)
- Gestio Sociosanitaria al Mediterrani SL (ES)
- GNOMON Informatics SA (GR)
- GoodLife Technology (FI)
- HOP UBIQUITOUS SL (ES)
- IBM Research GMBH (CH)
- Institut du Bien Vieillir KORIAN (FR)
- Institute of Communication and Computer Systems (GR)
- Inter Mutuelles Assistance (FR)
- Intermunicipal Development Company Digital Cities of Central Greece SA (GR)
- Iniciativa Social Integral per al Benestar (ES)
- Leeds City Council (UK)
- MEDEA SRL (IT)
- Medtronic Iberica SA (ES)
- MSYPHERA SL (ES)
- Municipality of Metamorfosis (GR)
- National University of Ireland, Galway (IE)
- SageLiving GmbH (DE)
- Samsung Electronics (UK) Limited (IE)
- SE Innovations Oy (FI)
- Servicios de Teleasistencia SA (ES)
- Servizo Galego de Saude (ES)
- STMicroelectronics Grenoble 2 SAS (FR)
- TECHNOSENS (FR)
- Televes SA (ES)
- Tercera Edad Activa SL (ES)
- Turun Ammattikorkeakoulu OY (FI)
- Universidad Politécnica de Madrid (ES)
- Universita degli Studi di Parma (IT)
- Universitat Politecnica de Valencia (ES)
- University of Surrey (UK)
- WIND Telecomunicazioni SPA (IT)

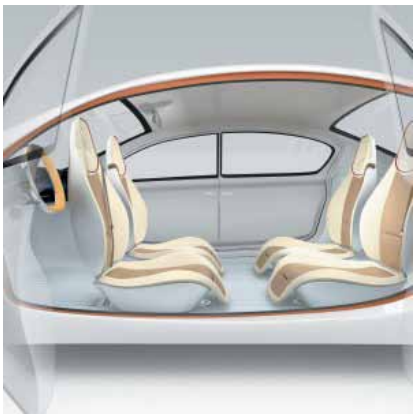
## USE CASES

| PILOT SITE | USE-CASES | DESCRIPTION |
|---|---|---|
| GALICIA (ES)  | Daily monitoring at home<br>Integrated care for chronic conditions<br>Emergency trigger<br>Cognitive stimulation | Providing knowledge-intensive services and products related to active ageing and a healthy lifestyle, focusing on the integration of social and health care services aiming at increasing the security and quality of life of the older people. |
| VALENCIA (ES)  | Daily activity monitoring at home<br>Monitoring outside home | Demonstrating how IoT solutions make easier, safer and helpful the environment for elderly people and give peace of mind to their care-givers, providing a continuous monitoring of elderly wellbeing inside and outside home. |
| MADRID (ES)  | Monitoring outside home<br>Exercise promotion<br>Cognitive stimulation | Focusing on the early detection and prevention of cognitive performance decrease and on the falling risk of elderly individuals providing a non-intrusive monitoring of activities of daily living (ADLs) in their living environment. |
| REGIONE EMILIA ROMAGNA (IT)  | Daily activity monitoring at home<br>Integrated care for chronic conditions<br>Exercise promotion<br>Prevention of social isolation | Supporting independent life and ageing in place, especially focused on delivering better outcomes for people with cerebrovascular pathologies living at home by enabling better communication between the user and the caregivers. |
| GREECE (GR)  | Daily activity monitoring at home<br>Integrated care for chronic conditions<br>Emergency trigger<br>Support for transportation & mobility | Identifying open-source low-cost AAL services offering better prevention, innovative home care and community-based solutions to make the old people to live healthy and independently at home as long as possible at minimum cost. |
| ISÈRE (FR)  | Daily activity monitoring at home<br>Emergency trigger<br>Exercise promotion<br>Prevention of social isolation | Proposing modular personalized IoT packs to enhance safety, comfort and social link to enable elderly to stay autonomous at home as long as they wish, following persons evolving needs along the ageing stage and supporting carers' intervention. |
| WoQuaZ (DE)  | Emergency trigger<br>Safety, comfort & security at home | Evolving construction projects for seniors to address the need for technical assistance in residential construction that enables safer and more comfortable environments for elderly, providing IoT infrastructure for added value AHA services. |
| LEEDS (UK)  | Daily activity monitoring at home<br>Emergency trigger<br>Prevention of social isolation | Deploying services around fall detection, emergency triggers, remote monitoring of vital health stats and non-intrusive behaviour /anomaly detection system to help give confidence for elders sustain their lives in their homes for longer time. |
| FINLAND (FI)  | Daily activity monitoring at home<br>Integrated care for chronic conditions<br>Exercise promotion | Creating an IoT based ecosystem focused on Digital Rehabilitation involving the elderly, their informal carers but also professionals of health and care to achieve a more effective rehabilitation process. |

# AUTOPILOT

AUTOMATED DRIVING PROGRESSED BY INTERNET OF THINGS

**AUTOPILOT will develop an IoT connected vehicle platform and IoT architecture based on the existing and forthcoming standards, as well as open source and vendor solutions. The IoT ecosystem will accommodate vehicles, road infrastructure and connected IoT objects, with particular attention to safety critical aspects of automated driving.**



**44**
PARTNERS

**5**
USE CASES

**6**
TRIALS

Automated driving is expected to increase safety, provide more comfort and create several new business opportunities for mobility services.

The market size is expected to grow steadily reaching 50% market penetration by 2035. IoT is about enabling connections between objects or "things". It is about connecting anything, anytime, anyplace, using any service over any network.

There is little doubt that automated vehicles will be part of the IoT revolution. Indeed, connectivity and IoT have the capacity for disruptive impacts on highly and fully automated driving along all value chains towards a global vision of Smart Anything Everywhere.

In order to stay competitive, the European automotive industry is investing in connected and automated driving, with cars becoming moving "objects" in an IoT ecosystem and eventually participating in BigData for Mobility. AUTOPILOT brings IoT into the automotive world to transform connected vehicles into highly and fully automated vehicles.

AUTOPILOT will develop a range of services combining autonomous driving and IoT, such as car sharing, autonomous valet parking, and better digital maps for autonomous vehicles.

AUTOPILOT IoT-enabled autonomous driving services will be tested in real conditions at large-scale pilot sites in the Netherlands, Italy, France, Finland, Spain and South Korea.

The test results will allow multi-criteria evaluations (technical, user, business, legal) of the IoT impact on advancing the level of autonomous driving.

WEBSITE & SOCIAL MEDIA

www.autopilot-project.eu

AUTOPILOT Project EU

@AUTOPILOT_EU

TOTAL EC FUNDING

€20M

COUNTRIES

BE, CH, CZ, DE, ES, FI, FR, GR, IE, IT, KR, NL, NO, SE, UK

COORDINATOR

ERTICO - ITS Europe (BE)

## TECHNICAL DETAILS

### TECHNOLOGIES & STANDARDS USED

Python, QT, C++, MQTT, HTTP REST, JSON, OneM2M, 4G, NoSQL, 3GPP LTE, NB-IoT, LTE-V2X, PexSi platform

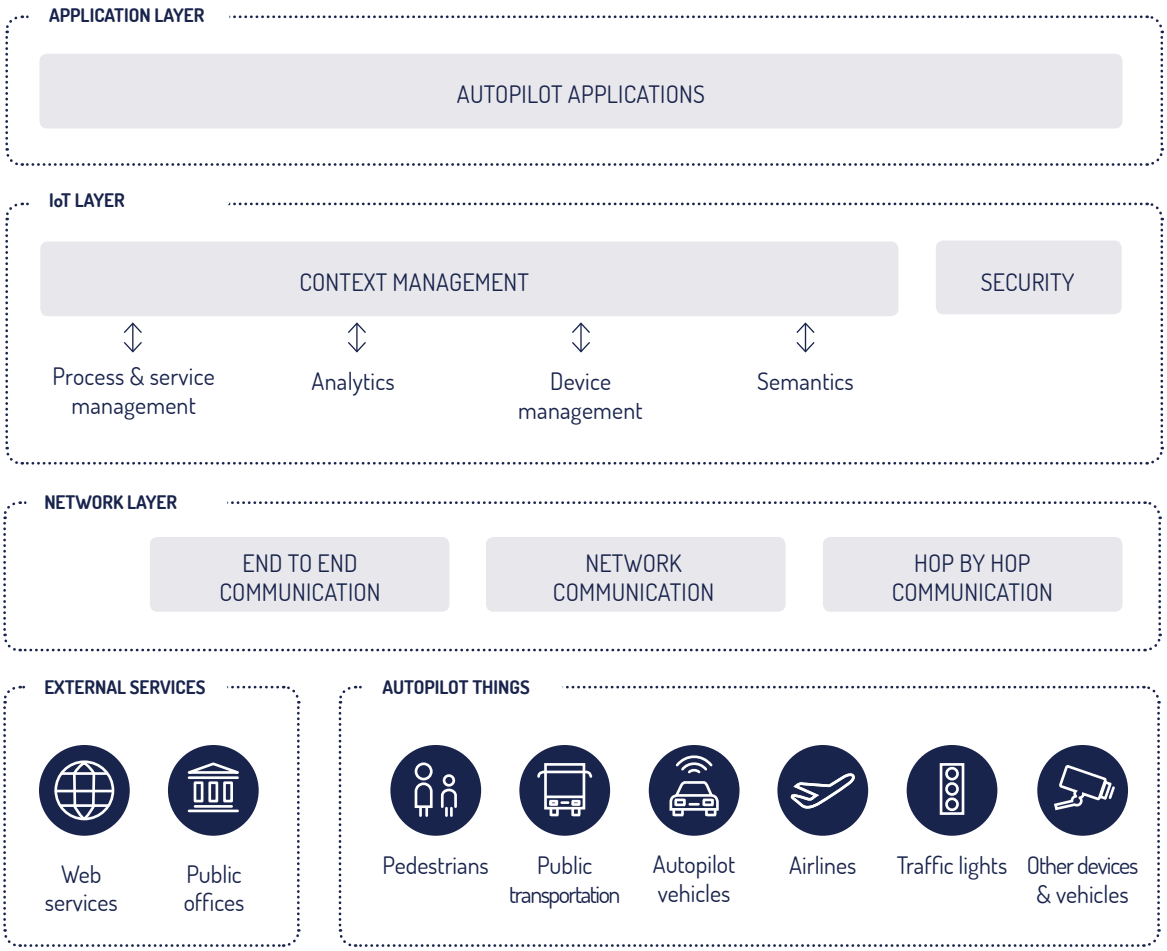
### OPEN SOURCE SOFTWARE USED

Mosquitto, OCEAN

### COMMERCIAL PLATFORMS / SOFTWARE USED

Windows 10 Pro, Intempora RTMaps, Amazon AWS

## REFERENCE ARCHITECTURE




The AUTOPILOT reference architecture is developed to leverage autonomous driving and innovative mobility services based on open IoT platforms. The AUTOPILOT architecture is used as a common framework to realise IoT-based automated driving use cases. IoT components are deployed at several permanent pilot sites across Europe. The reference architecture consists of a set of services that have various capabilities including processing, communication, resource management, context management, and security. This architecture is composed of an applications layer, an IoT layer, a network layer and an external services (e.g. web services) as well as IoT devices layer. The IoT devices include smart phones, cameras, roadside units, traffic lights and signs, autonomous vehicles, and drones. Within the IoT layer, open IoT platforms based on interoperable and federated models support IoT applications and services of

## POSITIONING OF AUTOPILOT IN THE IoT ARCHITECTURE

| IoT ARCHITECTURE LAYERS | COMPONENTS | COVERED BY THIS PROJECT |
|---|---|---|
| COLLABORATION & PROCESSES | Business System Integration | |
| APPLICATION | Visualization | ✓ |
| SERVICE | Development Environment | |
| | Service Orchestration | ✓ |
| | Advanced Analytics | ✓ |
| ABSTRACTION | Event & Action Management | ✓ |
| | Basic Analytics Action | ✓ |
| STORAGE | Storage/Database | ✓ |
| PROCESSING | Device Management | |
| | Edge Analytics | ✓ |
| NETWORK & COMMUNICATIONS | Connectivity Network / Modules | ✓ |
| | Edge Gateway (HW based) | ✓ |
| PHYSICAL / DEVICE LAYER | Operating System | ✓ |
| | Modules & Drivers | ✓ |
| | MPU / MCU | |

## PARTICIPANTS

- AKKA Informatique et Systemes (FR)
- AVR (IT)
- CEA – Commissariat a l'Energie Atomique et aux Energies Alternatives (FR)
- Centro Ricerche FIAT (IT)
- CERTH – Ethniko Kentro Erevnas Kai Technologikis Anaptyxis (GR)
- CETECOM (DE)
- CNIT – Consorzio Nazionale Interuniversitario per le Telecomunicazioni (IT)
- Communaute d'Agglomeration de Versailles Grand Parc (FR)
- Concello de Vigo (ES)
- Continental (FR)
- CTAG – Fundacion para la Promocion de la Innovacion, Investigacion y Desarrollo Tecnologico en la Industria de Automocion de Galicia (ES)
- Easy Global Market (FR)
- ERTICO – ITS Europe (BE)
- ETRI – Electronics and Telecommunications Research Institute (KOR)
- FIA – Fédération Internationale de l'Automobile (FR)
- Gemalto (CZ)
- Gemeente Helmond (NL)
- Huawei (DE)
- IBM Ireland (IE)
- IBM Research Zurich (CH)
- IDIADA Automotive Technology (ES)
- ISMB – Instituto Superiore Mario Boella (IT)
- Metabuild (KOR)
- NEC Europe (UK)
- NEVS – National Electric Vehicle Sweden (SE)
- NXP Semiconductors (NL)
- Peugeot Citroën Automobiles (FR)
- SENSINOV (FR)
- SINTEF (NO)
- STMicroelectronics (FR)
- Technische Universiteit Eindhoven (NL)
- Technolution (NL)
- Thales Italia (IT)
- The German Aerospace Center DLR (DE)
- TIM – Telecom Italia Mobile (IT)
- TNO - Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek (NL)
- TomTom (NL)
- T-Systems (DE)
- UITP – Union International des Transports Publics (BE)
- University of Leeds (UK)
- Valeo Comfort and Driving Assistance (FR)
- VEDECOM – Fondation Partenarial Mov'eotec (FR)
- Vicomtech-IK4 – Fundacion Centro de Tecnologias de Interaccion Visual y Communicaciones (ES)
- VTT Technical Research Centre of Finland Ltd (FI)

## USE CASES

| USE-CASES | PILOT SITE | DESCRIPTION |
|---|---|---|
| URBAN DRIVING | Eindhoven (NL)<br>Livorno-Florence (IT)<br>Versailles (FR)<br>Vigo (ES)<br>Tampere (FI)<br>Daejeon City (KR) | The Urban Driving use case requires automated driving vehicles to identify, predict and react in an array of complex situations. Fully automated vehicles will be tested driving from point A to B, without any action from the driver. However, the driver will be able to override and get back to manual driving at any time. |
| AUTOMATED VALET PARKING | Eindhoven (NL)<br>Vigo (ES)<br>Tampere (FI) | In the Automated Valet Parking (AVP) use case, the driver is able to leave the car at some predefined drop-off location and is able to retrieve it once he/she needs it back. The operations of parking and manoeuvring the car in the parking area (inside or outside), retrieving it, and possibly other additional services, such as fueling, recharging or cleaning, will be managed by the parking management system. |
| HIGHWAY PILOT | Eindhoven (NL)<br>Livorno-Florence (IT) | In the Highway Pilot use case, a cloud service merges the sensors' measurements from different IoT devices in order to locate and characterize road hazards. The goal is then to provide the following vehicles with meaningful warnings and adequate driving recommendations to manage the hazards in a safer or more pleasant way. |
| PLATOONING | Eindhoven (NL)<br>Versailles (FR) | The platooning use case demonstrates vehicular platoons consisting of a lead vehicle and one or more highly automated or driverless following vehicles which have automated steering and distance control to the vehicle ahead. The control is supported by V2V communication. |
| REAL TIME CAR SHARING | Eindhoven (NL)<br>Versailles (FR) | The objective is to allow commercial and individual car sharing services to use automated driving cars. The service platform collects the end user needs and uses relevant data in the IoT platform to suggest car sharing (pick-up / drop-off) possibilities. |

# IoF2020

INTERNET OF FOOD AND FARM 2020

**IoF2020 is dedicated to accelerating the uptake of IoT technologies in the European farming and food chains and ultimately strengthening their competitiveness and sustainability. How? By demonstrating, together with end-users, the use of IoT in 19 use-cases spread throughout Europe, and focusing on 5 areas: dairy, meat, arable crops, fruits and vegetables.**

**70+**
PARTNERS

**19**
USE CASES

**5**
TRIALS

The IoF2020 consortium gathers more than 70 partners, under the leadership of Wageningen University & Research.

The project builds on and leverages the ecosystem of previous key projects (e.g. FIWARE, IoT-A) to foster the end-user acceptance and adoption of IoT Solutions in agriculture.

At the heart of the project, 19 use-cases distributed in 5 trials: Arable, Dairy, Fruit, Vegetables and Meat. Under each trial, IoT integrators will make the business case for innovative IoT solutions applied to a large number of areas.

A lean multi-actor approach focusing on user acceptance, stakeholder engagement and the development of sustainable business models will boost technology and market readiness levels and push end-user adoption to the next stage. This development will be enhanced by an open IoT architecture and infrastructure of reusable components based on existing standards and a security and privacy framework.

Anticipating technological developments and emerging challenges for the farming and food industry, a €5M mid-term open call will allow to test intermediate results and extend the project to new technical solutions and test sites.

IoF2020 is designed to generate maximum impact right from the outset and in the long-run, bringing closer together and integrating the supply and demand sides of IoT technologies in the agri-food sector.

IoF2020 will pave the way for data-driven farming, autonomous operations, virtual food chains and personalized nutrition for European citizens.

WEBSITE & SOCIAL MEDIA

www.iof2020.eu

@IoF2020

@IoF2020

TOTAL EC FUNDING

€30M

COUNTRIES

AT, BE, CZ, DE, DK, ES, FR, GR, IT, KR, NL, NO, PT, RS, SE, UK

COORDINATOR

Stichting Wageningen Research (NL)

## TECHNICAL DETAILS

### TECHNOLOGIES & STANDARDS USED

LoRa Network, 365 Farmnet, Zoner, Crop-R and Akkerrweb platforms, Cloudfarm FMIS, Arvalis platform, ThingWorx IoT platforms, UNB technology, SigFox, oData, FiWare Analytics, infrared IoT sensors, collar-based cloud-based analytics, GPRS/4G and long RF communication, SensiNact IoT Platform, wireless sensor networks (HSPDA, UMTS, GPRS, GSM), ZIgbee technology, LinkSmart, Bluetooth 4.0 SmartBands, Google Fit LiveLog

### OPEN SOURCE SOFTWARE USED

Initiatives and platforms: FIWARE, FIspace, CRYSTAL, SOFIA, EPCIS, Fosstrack, AgroSense, Apache Cassandra, Apache Flink, Apache Spark

## OPEN CALLS

### RUNNING PERIOD

2018

### TOTAL FUNDING

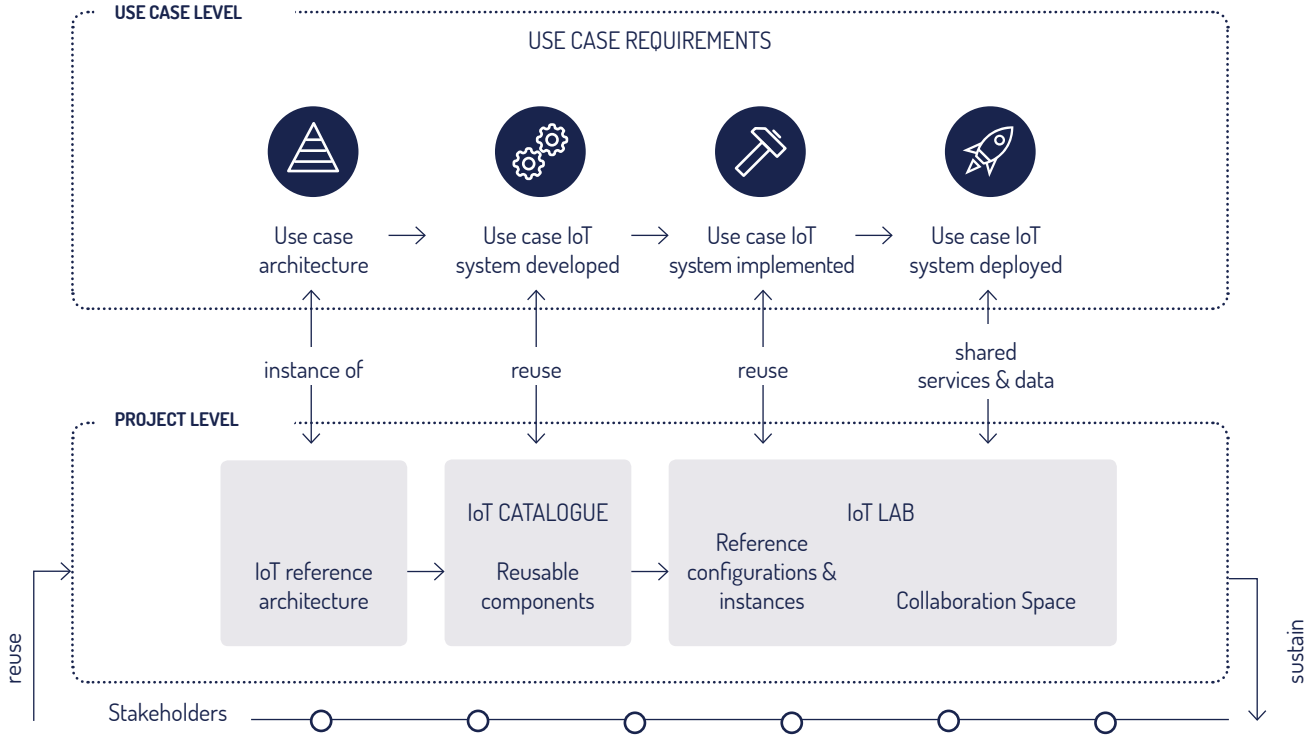
€5M

### OBJECTIVES

The objective is to develop additional IoT applications, and further deploy IoT technologies in new segments of the agri-food chain and in other regions of the EU.

- New regions: Welcoming test sites from other regions to improve IoF2020's coverage of the EU territory;
- New areas: Diversifying the fields of application of IoT in agriculture;
- New technologies: Addressing technology gap and including new technologies to test on site.

## REFERENCE ARCHITECTURE




IoF2020 follows a multi-stakeholder approach, whereby trials and use-cases form the core of the project and are the basis for knowledge and applications development. Stakeholders from research and business organisations work in close collaboration to quickly develop minimum viable products and create synergies through technical integration, governance and business modelling, and ecosystem development. IoF2020 focuses on interoperability and aims to provide a catalogue of re-usable system components, which can be

## POSITIONING OF IoF2020 IN THE IoT ARCHITECTURE

| IoT ARCHITECTURE LAYERS | COMPONENTS | COVERED BY THIS PROJECT |
|---|---|---|
| COLLABORATION & PROCESSES | Business System Integration | ✓ |
| APPLICATION | Visualization | ✓ |
| SERVICE | Development Environment | ✓ |
| | Service Orchestration | ✓ |
| | Advanced Analytics | ✓ |
| ABSTRACTION | Event & Action Management | ✓ |
| | Basic Analytics Action | ✓ |
| STORAGE | Storage/Database | ✓ |
| PROCESSING | Device Management | ✓ |
| | Edge Analytics | ✓ |
| NETWORK & COMMUNICATIONS | Connectivity Network / Modules | ✓ |
| | Edge Gateway (HW based) | ✓ |
| PHYSICAL / DEVICE LAYER | Operating System | ✓ |
| | Modules & Drivers | ✓ |
| | MPU / MCU | ✓ |

## PARTICIPANTS

- 365FARMNET Group GmbH & CO KG (DE)
- Aarhus Universitet (DK)
- Agricultural University of Athens (GR)
- Agrointelligence APS (DK)
- AGROM KG (AT)
- Agrotikos Synetairismos Poliseos Xiron Kai Nopon Stafylion Kiatoy Korinthias Pigasos (GR)
- Apofruit Italia - Soc. Coop. Agricola (IT)
- ARVALIS – Institut du Végétal
- ATB - Institut für Angewandte Systemtechnik Bremen GmbH (DE)
- Bayer Cropscience AG (DE)
- BioSense Institute – Research and Development Institute for Information Technologies in Biosystems (RS)
- BOLT Accelerator (ES)
- CEA – Commissariat à l'Energie Atomique et aux Energies Alternatives (FR)
- CEMA – European Committee of Agricultural Machinery (EU)
- CIHEAM-IAMB – Centro Internazionale di Altistudi Agronomici Mediterranei (IT)
- CNH Industrial Belgium (BE)
- COEXPHAL – Asociación de Organizaciones de Productores de Frutas y Hortalizas de Almería (ES)
- Connecterra BV (NL)
- Corizon B.V. (NL)
- CT Tecnova (ES)
- DCOOP – Sociedad Cooperativa Andaluza (ES)
- Denis Dubourdieu Domaines (FR)
- Donau Soja – Verain zur Fordering der Europäischen Sojaproduktion (AT)
- EEPC – European EPC Competence Center GmbH
- Et Venture – Startup Hub (DE)
- EuroPool System International Germany GmbH (DE)
- EXAFAN S.A. (ES)
- Fresh Care Convenience BV (NL)
- Fundación Tecnova – Fundación para las Tecnologias Auxiliares de la Agricultura (ES)
- GRIMME Landmaschinenfabrik GmbH COKG (DE)
- Grupo Hispatec Informatica Empresarial S.A. (ES)
- Grupo SADA P.A. S.A. (ES)
- GS1 Germany GmbH (DE)
- IFOAM-EU – International Federation of Organic Agriculture Mouvements, European Union Regional Group (EU)
- IK4-TEKNIKER (ES)
- ILVO – Instituut voor Landbouw en Visserijonderzoek (BE)
- INAGRO, Provinciaal extern verzelfstandigd agentschap in privaatrechtelijke vorm, VZW (BE)
- INiTS – Innovation into Business (AT)
- Institut polytechnique de Bordeaux (FR)
- ISMB – Istituto Superiore Mario Boella Sulle Tecnologie Dell'Informazione e delle Telecomunicazioni Associazione (IT)
- ISVEA SRL (IT)
- Koninklijke KPN NV (NL)
- Korea Advanced Institute of Science and Technology (KOR)
- Kühne Logistics University GmbH (DE)
- KvG Mechatronics - Kverneland Group Mechatronics BV (NL)
- Mieloo & Alexander BV (NL)
- Neways Technologies BV (DE)
- Nileas – Synetairismis Pistopoiimenon Agrotikon Proionton Dimou Nestoros Messinias
- NXP Semiconductors GmbH (DE)
- Orange SA (FR)
- Philips Lighting BV (NL)
- PORPHYRIO (BE)
- Qlip BV (NL)
- Schuttelaar & Partners, Public affairs & Communications Consultation on Food and Lifesciences NV (NL)
- Sensolus (BE)
- Spanish Co-op – Cooperativas agro-alimentarias de Espana, Coop Sociedad Cooperativa (ES)
- Steketee Machinefabriek B.V. (NL)
- Stichting HAS Opleidingen
- Stifterlsen SINTEF (NO)
- STMicroelectronics Grenoble 2 SAS
- Synelixis Lyseis Pliroforikis Automatismou & Tilepikoinion Monoprosopi EPE (FI)
- Sysman Progetti & Servizi SRL (IT)
- Telefonica Investigacion y Desarollo S.A. (ES)
- Universidad de Almeria (ES)
- University of Strathclyde (UK)
- UNPARALLEL Innovation LDA (PT)
- Valoritalia SRL (IT)
- Vinidea SRL (IT)
- VION Food (NL)
- Wageningen University & Research (NL)
- Wirelssinfo (CZ)
- ZLTO - Zuidelijke Land- en Tuinbouworganisatie Vereniging (NL)

## USE CASES

| TRIALS | USE-CASES | DESCRIPTION |
|---|---|---|
| ARABLE  | Within field management zoning | Defining specific field management zones by developing and linking sensing and actuating devices with external data, mainly in potato. |
| | Precision crop management | Introducing smart wheat crop management thanks to sensor data embedded in a low-power, long-range network. |
| | Soya protein management | Improving protein production by combining sensor data and translating them into effective machine task operations. |
| | Farm machine interoperability | Dat exchange between field machinery and farm management information systems for supporting cross-over pilot machine communication. |
| DAIRY  | Grazing cow monitor | Monitoring and managing the outdoor grazing of cows by GPS tracking within ultra-narrow band communication networks. |
| | Happy cow | Improving dairy farm productivity through IoT technology and machine learning technologies. |
| | Silent herdsman | Managing herd alerts through a high-node count-distributed sensor network and a cloud-based platform for improved decision-making. |
| | Remote milk quality | Assuring remote quality of accurate instruments, analysis and pro-active control in the dairy chain. |
| FRUITS  | Fresh table grapes chain | Implementing real-time monitoring and control of water supply, crop protection of table grapes, and predicting shelf life. |
| | Big wine optimization | Optimizing the cultivation and processing of wine by sensor-actuator networks and big data analysis within a cloud framework. |
| | Automated olive chain | Performing automated field control, product segmentation, processing and commercialisation of olives and olive oil. |
| | Intelligent fruit logistics | Achieving smart fresh fruit logistics by increasing the traceability of Returnable Transport Items (RTI) for fruit products thanks to intelligent trays within a low-power long-range network infrastructure. |
| VEGETABLES  | City farming of leafy vegetables | Implementing value chain innovation for leafy vegetables in convenience foods through integrated indoor climate control and logistics. |
| | Chain-integrated greenhouse production | Developing a full sensor-actuator-based system in tomato greenhouses to integrate the value chain and quality innovations. |
| | Added value weeding data | Boosting the value chain by harvesting weeding data of organic vegetables, obtained thanks to advanced visioning systems. |
| | Enhanced quality certification system | Achieving enhanced trust and simplification of quality certification systems through the use of sensors, RFID tags and intelligent chain analyses. |
| MEAT  | Pig farm management | Optimising pig production management through interoperable on-farm sensors and slaughterhouse data. |
| | Poultry chain management | Optimising the production, transport and processing of poultry meat through automated ambient monitoring and control, and data analyses. |
| | Meat transparency and traceability | Enhancing the transparency and traceability of meat based on monitored chain event data in an EPCIS-infrastructure. |

# MONICA

## MANAGEMENT OF NETWORKED IoT WEARABLES – VERY LARGE-SCALE DEMONSTRATION OF CULTURAL AND SOCIETAL APPLICATIONS

**MONICA is a large-scale demonstration of how cities can use existing and new IoT solutions to meet sound, noise and security challenges at big open-air cultural and sports events, which attract and affect many people. Innovations include the establishment of sound zones at outdoor concerts for noise mitigation as well as security measures improving crowd information and management.**

**29** PARTNERS

**6** CITIES

**20+** USE CASES

Several sound, security and user experience applications are deployed at large events in six European cities, involving more than 100,000 application users in total.

The applications are based on the use of IoT-enabled devices such as smart wristbands, video cameras, loudspeakers, smart glasses, airships and smartphones.

The applications offer enhanced monitoring and management of sound levels and crowds as well as value-added functionality for customers, crowds and citizens. To support the applications, MONICA deploys a cloud-based IoT platform, wirelessly connecting and handling the devices, whether fixed, worn or moved around.

As a first mover, MONICA will demonstrate how it is possible to securely operate a very dense cloud of different IoT-enabled devices and networks with a low probability of interference.

Six pilot sites will demonstrate the technology solutions at concerts, festivals, sports events and city happenings, which attract millions of people. Each of the sites will choose a number of relevant applications that they wish to deploy. Whereas some cities emphasise optimal concert sound and enhanced noise control, and others security and service, all pilots will actively involve their end users, engaging more than 10,000 people in the evaluation process.

Central to the project is the involvement of multiple stakeholders in the design, deployment and evaluation of the applications. Additionally, several innovation tools are made available in terms of open data, development kits, entrepreneurship packages and business models.

### WEBSITE & SOCIAL MEDIA

www.monica-project.eu

@MonicaIoTforCities

@MonicaProject

### TOTAL EC FUNDING

€15M

### COUNTRIES

DE, DK, FR, GR, IT, NL, SE, SK, UK

### COORDINATOR

Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (DE)

## TECHNICAL DETAILS

### TECHNOLOGIES & STANDARDS USED

SO/IEC/IEEE 42010:2011, AIOTI HLA; Bluetooth BLE / DASH7 / WiFi – IEEE 802.11, UWB – IEEE 802.15.4a / ETSI EN 300 220-2 V3.1.1 subGHz wristbands, ETSI EN 302 065-2 V2.1.1 for UWB wristbands, 3GPP NB-IoT /LoRA; IEEE LR-WPAN / IETF 6LoWPAN / IETF ROLL / IETF CoAP; OASIS MQTT; ETSI SAREF, W3C SSN; IETF Oauth / OASIS XACML; oneM2M Network Service Capability Layer / GW; OGC SensorThings API

### OPEN SOURCE SOFTWARE USED

LinkSmart, RioT, SCRAL

### COMMERCIAL PLATFORMS / SOFTWARE USED

Azure

## CALLS FOR HACKATHON

### RUNNING PERIOD

2018

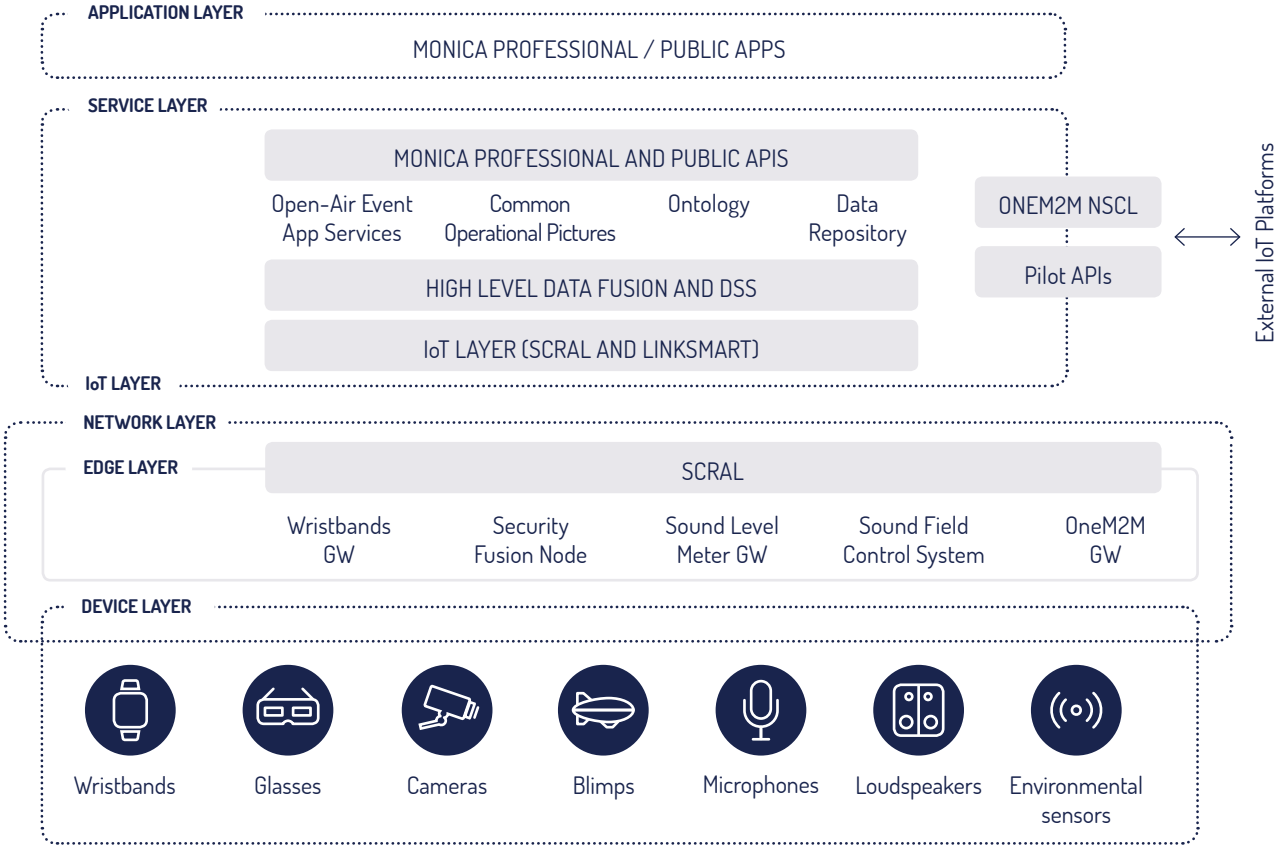
### TOTAL FUNDING

€150k

### OBJECTIVES

The objective is to foster innovative applications for user involvement and enhanced user experience in different event settings.

## REFERENCE ARCHITECTURE




The MONICA IoT platform consists of control systems which monitor the data collected and which can perform automated actions. Components analyse data and detect critical incidents, supporting operators in assessing the situation and making decisions. To ensure data security and trust, the solutions are built on Privacy by Design principles.

Based on open standards and architectures, the platform can be incorporated

## POSITIONING OF MONICA IN THE IoT ARCHITECTURE

| IoT ARCHITECTURE LAYERS | COMPONENTS | COVERED BY THIS PROJECT |
|---|---|---|
| COLLABORATION & PROCESSES | Business System Integration | ✓ |
| APPLICATION | Visualization | ✓ |
| SERVICE | Development Environment | |
| | Service Orchestration | ✓ |
| | Advanced Analytics | ✓ |
| ABSTRACTION | Event & Action Management | ✓ |
| | Basic Analytics Action | ✓ |
| STORAGE | Storage/Database | ✓ |
| PROCESSING | Device Management | ✓ |
| | Edge Analytics | ✓ |
| NETWORK & COMMUNICATIONS | Connectivity Network / Modules | ✓ |
| | Edge Gateway (HW based) | ✓ |
| PHYSICAL / DEVICE LAYER | Operating System | |
| | Modules & Drivers | ✓ |
| | MPU / MCU | |

## PARTICIPANTS

- Acoucité (FR)
- Atos IT Solutions and Services (SK)
- Brüel & Kjær Sound & Vibration Measurement A/S (DK)
- CERTH Information Technologies Institute (GR)
- City of Bonn (DE)
- City of Copenhagen (DK)
- City of Hamburg (DE)
- City of Torino (IT)
- CNet Svenska AB (SE)
- Dexels BV (NL)
- DigiSky SRL UAV & Robotic Systems (IT)
- Fraunhofer Institute for Applied Information Technology (DE)
- Hamburg University of Applied Science (DE)
- HW Communications Ltd (UK)
- In-JeT ApS (DK)
- Istituto Superiore Mario Bella (IT)
- Kingston University (UK)
- Leeds Beckett University (UK)
- Leeds Rugby (UK)
- Movement Entertainment Srl (IT)
- Optinvent S.A. (FR)
- Praesidio Group ApS (DK)
- Ring Advocacy ApS (DK)
- Technical University of Denmark (DK)
- Telecom Italia S.p.A. (IT)
- Tivoli A/S (DK)
- VCA Technology Ltd (UK)
- Vaeksthus Zealand (DK)
- Yorkshire County Cricket Club Ltd (UK)

## USE CASES

| PILOT SITE | DESCRIPTION | USE CASES |
|---|---|---|
| BONN  | 1. The open-air festival Rhine in Flames has up to 90,000 visitors per day. With three performing stages, a central aim is to achieve the best sound experience for the visitors and performers. Interest is also in crowd and capacity monitoring, health incidents and locating people.<br><br>2. The five-day funfair Pützchens Markt brings together one million visitors in a residential area with narrow streets. Here, crowd and capacity monitoring is key, together with health incidents and locating people. | Monitor sound level (1)<br>Detect & redirect high-risk queues (1 & 2)<br>Monitor & manage crowd based on capacity (1 & 2)<br>Detect, report & handle a health incident (1 & 2)<br>Report & locate missing person (1 & 2)<br>Report found person (1 & 2) |
| COPENHAGEN  | Tivoli Gardens is a world-famous amusement park and pleasure garden located in Copenhagen. The focus is on Tivoli's Friday Rock concert series that takes place during the park's summer season. Over the last 20 years, Friday Rock alone has attracted between 400,000 and 500,000 guests. Due to its central location in residential areas, sound monitoring and control is a central issue together with crowd management and locating missing persons. | Monitor & control sound level<br>Detect & redirect high-risk queues<br>Monitor & manage crowd based on capacity<br>Detect, report & handle a security incident<br>Report & locate missing person<br>Report found person |
| HAMBURG  | 1. During the Anniversary of Germany's largest port, more than one million visitors join the exciting atmosphere generated by ships from all parts of the world. In this setting, locating people is of special interest.<br><br>2. Hamburger DOM is Northern Germany's biggest funfair with more than 250 attractions and up to ten million visitors during the 91 DOM days per year, which are divided into three individual events (spring, summer, and winter DOM) of one month each. Of interest are solutions for crowd and capacity management and locating people. | Monitor & manage crowd based on capacity (2)<br>Handle security incident (2)<br>Report & locate missing person (1 & 2)<br>Report found person (1 & 2)<br>Locate parent/guardian & staff member (1 & 2) |
| LEEDS  | The Emerald Headingley Stadium is home to Yorkshire County Cricket Club and Leeds Rugby which in 2017 attracted 187,750 and 266,300 visitors, respectively. In MONICA, the Stadium is looking to enhance the visitor experience at its matches through improved communication and management of crowds. | Detect & redirect high-risk queues<br>Monitor & manage crowd based on capacity<br>Detect, report & handle a security or health incident |
| LYON  | 1. Lyon hosts the famous light festival, Fête des Lumières, where the residents of Lyon express gratitude towards Virgin Mary for sparing the city of the 1643 Plague. During four days, the city fills up with performers and millions of visitors in the city centre. Both sound and security solutions are focus areas.<br><br>2. Nuits Sonores is a huge electronic music festival which brings together various artists from France and all over the world with concerts, performances and shows. The main focus is on sound monitoring and control. | Monitor sound level (1 & 2)<br>Control sound level (2)<br>Detect & redirect high-risk queues (1)<br>Monitor & manage crowd based on capacity (1)<br>Detect a health incident (1 & 2)<br>Report & handle a health incident (1)<br>Report & locate missing person (1)<br>Report found person (1)<br>Locate parent/guardian & staff member (1 & 2) |
| TORINO  | 1. Movida is a spontaneous and crowded night happening in the San Salvario District with bars, restaurants, shops and lively nightlife. The aim is to strike a balance between amusement, security and quality of public space, reducing noise and annoyance for people living in the district.<br><br>2. The FuturFestival is an electronic music summer festival that takes place every year with two-day concerts and events in Parco Dora, close to a residential area. The festival attracts up to 50,000 people, thus challenging crowd management, security and sound propagation. | Monitor & control sound level (1 & 2)<br>Monitor & control free access in the area (1)<br>Detect & redirect high-risk queues (1 & 2)<br>Monitor & manage crowd based on capacity (1 & 2)<br>Detect, report & handle a security or health incident (1 & 2)<br>Locate staff member (1 & 2) |

# SynchroniCity

SYNCHRONICITY

## DELIVERING AN IoT-ENABLED DIGITAL SINGLE MARKET FOR EUROPE AND BEYOND

**The SynchroniCity consortium brings together 39 partners with worldwide outreach. The project represents the first attempt to deliver a digital single market for IoT-enabled urban services in Europe and beyond - in 8 European cities and more worldwide - connecting 39 partners from 13 countries over 3 continents.**

**39**
PARTNERS

**3**
USE CASES

**20**
OPEN CALLS

Building upon a mature European knowledge base, derived from initiatives such as OASC, FIWARE, EIP-SCC, FIRE, and including partners with leading roles in standardization bodies, e.g. IETSI, SF-SSCC, ITU, OMA, IETF, SynchroniCity will deliver a harmonized ecosystem for IoT-enabled smart city solutions where IoT device manufacturers, system integrators and solution providers can innovate and openly compete.

With an already emerging foundation, based on OASC Minimal Interoperability Mechanism (MIMs), SynchroniCity will establish a reference architecture model for the envisioned IoT-enabled city market place with identified interoperability points and interfaces and data models for different verticals. This will include tools for co-creation and integration of legacy platforms and IoT devices for urban services and enablers for data discovery, access and licensing lowering the barriers for participation on the market.

SynchroniCity will pilot these foundations in the cities together with a set of citizen-centered services in three high-impact areas, showing the value to cities, businesses and citizens involved, linked directly to the global market.

With a running start, SynchroniCity will serve as frontrunner initiative to inspire others to join the established ecosystem and contribute to the emerging market place. SynchroniCity takes an inclusive approach to growing the ecosystem by inviting businesses and cities to join through an open call, allowing them to participate on the pioneering market place enabling a second wave of successful pilots. They will strengthen the ecosystem by creating a positive ripple effect throughout Europe, and globally, to establish a momentum and critical mass for a strong European presence in a global digital single market of IoT-enabled urban services.

WEBSITE & SOCIAL MEDIA

www.synchronicity-iot.eu

@SynchroniCityiot

@SyncCityIoT

TOTAL EC FUNDING

€15M

COUNTRIES

BE, CH, DK, ES, FI, IT, KR, NL, PT, UK

COORDINATOR

Aarhus University (DK)

## TECHNICAL DETAILS

### TECHNOLOGIES & STANDARDS USED

OASC, FIWARE, NGSI, DCAT AP, OAuth 2.0 and XACLM, OneM2M, CoAP

### OPEN SOURCE SOFTWARE USED

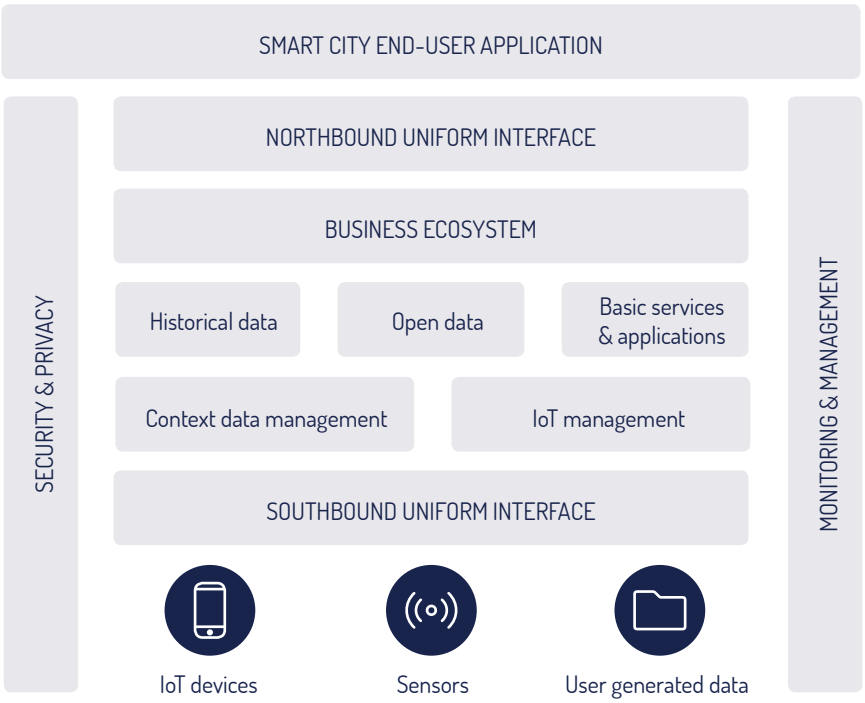
Orion Context Broker, Biz Ecosystem, CKAN, Backend Device Management - IDAS

## OPEN CALLS

### SCHEDULE

| | |
|---|---|
| JUNE 2018 | Open Call launches |
| 1ST WEEK OF JUNE 2018 | Open Call events will be held in Antwerp, Caruoge, Eindhoven, Helsinki, Manchester, Milan, Porto & Santander |
| JUNE 2018 | Webinar Open Call information |
| 10TH SEPTEMBER 2018 | Webinar Open Call information |
| OCTOBER–NOVEMBER 2018 | Selection of winning projects and announcement |
| NOVEMBER–DECEMBER 2018 | Finalising of administration and assignments |
| JANUARY 2019 | Start of piloting phase in all partnering cities |
| JANUARY–FEBRUARY 2019 | Workshop in London with the 8 partnering cities and the winning projects and project partners |
| OCTOBER 2019 | End of piloting phase |

## REFERENCE ARCHITECTURE MODEL




Design of the SynchroniCity architecture model started from the standard technologies and uniform analysis of relevant studies, coupled with a baseline of existing deployments in the partner cities. The analysis has been focused on finding commonalities of the similar works from the other studies. In order to make the in-depth comparison uniformed and straightforward, the analysis was conducted using a survey approach, by identifying the key points that showed the relevant aspects of core technologies and functionalities that underpin smart city platforms. The identified commonalities were the starting point to provide a common SynchroniCity framework for cities and they have been reflected into the design of the SynchroniCity framework.

## POSITIONING OF SYNCHRONICITY IN THE IoT ARCHITECTURE

| IoT ARCHITECTURE LAYERS | COMPONENTS | COVERED BY THIS PROJECT |
|---|---|---|
| COLLABORATION & PROCESSES | Business System Integration | ✓ |
| APPLICATION | Visualization | ✓ |
| SERVICE | Development Environment | ✓ |
| | Service Orchestration | ✓ |
| | Advanced Analytics | ✓ |
| ABSTRACTION | Event & Action Management | ✓ |
| | Basic Analytics Action | ✓ |
| STORAGE | Storage/Database | ✓ |
| PROCESSING | Device Management | ✓ |
| | Edge Analytics | ✓ |
| NETWORK & COMMUNICATIONS | Connectivity Network / Modules | ✓ |
| | Edge Gateway (HW based) | ✓ |
| PHYSICAL / DEVICE LAYER | Operating System | ✓ |
| | Modules & Drivers | ✓ |
| | MPU / MCU | ✓ |

## PARTICIPANTS

- Aarhus University (DK) – coordinator
- Aalto University (FI)
- Alexandra Institute (DK)
- Forum Virium Helsinki (FI)
- Engineering Ingegneria Informatica SpA (IT)
- Philips Lighting (NL)
- Atos (ES)
- Associocao Porto Digital (PT)
- University of Cantabria (ES)
- Santander City Council (ES)
- TST Sistemas (ES)
- Future Cities Catapult (UK)
- Manchester City Council (UK)
- Digital Catapult (UK)
- Manchester Metropolitan University (UK)
- Comune di Milano (IT)
- Imec (BE)
- Stad Antwerpen (BE)
- Rombit (BE)
- Hejmans Wegen BV (NL)
- Ubiwhere (PT)
- European Network of Living Labs (BE)
- Bronze Software Labs (UK)
- City of Eindhoven (NL)
- Mandat International (CH)
- City of Carouge (CH)
- UDG Alliance (CH)
- Korea Electronics Technology Institute (KR)
- Fondo de Información y Documentación para la Industria (MX)
- Instituto Tecnológico de Estudios Superiores de Monterrey (MX)
- Amio Ingenieros (MX)
- León Municipality (MX)
- HOP Ubiquitous (ES)
- NEC Laboratories Europe (DE)
- Ulike (KR)
- Seongnam Industry Promotion Agency (KR)
- FIWARE Foundation (DE)
- City of Bordeaux (FR)
- Open & Agile Smart Cities (BE)

## USE CASES

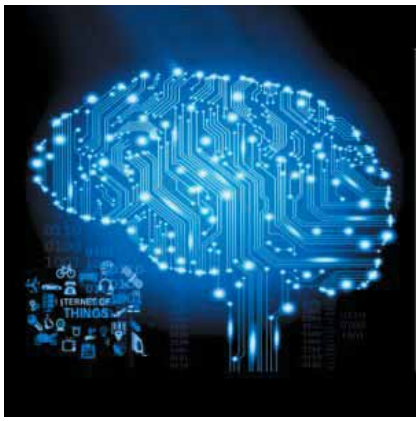
| USE CASE | DESCRIPTION |
|---|---|
| HUMAN-CENTRIC TRAFFIC MANAGEMENT | Data-driven bicycle mobility: Stimulate bicycle usage by to optimize cycling experience (flows, waiting times, safety) and improve infrastructure planning leveraging data from different sources throughout the city. |
| MULTI-MODAL TRANSPORTATION | Multi-modal assistant: seamlessly mix public and private transportation modes with new (shared) mobility services to enable smoother, more reliable and pleasant choice of transportation modes while improving city quality of life. |
| COMMUNITY POLICY SUITE | Agile governance: incorporate data-driven Agile Governance in city management and policy making that cuts across vertical organization models and enhances local authority responsiveness and improve citizen engagement. |
| OPEN CALL | SMEs and cities are invited to propose pilots which will explore an additional set of high-impact themes. |

# CREATE-IoT

CREATE-IoT

## CROSS FERTILISATION THROUGH ALIGNMENT, SYNCHRONISATION AND EXCHANGES FOR IoT

**CREATE-IoT's aim is to stimulate collaboration between IoT initiatives, foster the take up of IoT in Europe and support the development and growth of IoT ecosystems based on open technologies and platforms. This requires synchronisation and alignment on strategic and operational terms through frequent, multi-directional exchanges between the various activities under the IoT Focus Areas.**



**19**
PARTNERS

**8**
USE CASES

CREATE-IoT aligns the activities with the Alliance for Internet of Things Innovation (AIOTI) and coordinates and supports the upcoming LSPs in sustaining the ecosystems developed during those projects through mapping the pilot architecture approaches, address interoperability and standards approaches at technical and semantic levels for object connectivity, protocols, data formats, privacy, security, trusted IoT, open APIs and share the road-mapping with international initiatives.

The project fosters the exchange on requirements for legal accompanying measures, development of common methodologies and KPI for design, testing and validation and for success and impact measurement, federation of pilot activities and transfer to other pilot areas, facilitating the access for IoT entrepreneurs/API developers/ makers, SMEs, including combination of ICT and Art. CREATE-IoT builds strong connections with Member States' initiatives and transfers learning points to the broader IoT policy framework in a coordinated effort in Europe to accelerate the development and deployment of IoT technologies and applications.

The project coolaborates and coordinates the activities with contractual PPPs (e.g. Big Data, Factories of the Future, 5G-infrastructure), Joint Technology Initiatives (e.g. ECSEL – Electronic Components and Systems for European Leadership Joint Technology Initiative), European Innovation Partnerships (e.g. on Smart Cities) as well as with other FAs (e.g. on Autonomous transport).

The project maintains a coordinated working relationship with U4IoT that is addressing the Responsible Research and Innovation – Social Sciences and Humanities (RRISSH).

WEBSITE & SOCIAL MEDIA
www. create-iot.eu
@CREATE-IoT
@CreateIoT_eu

TOTAL EC FUNDING
€3M

COUNTRIES
BE, CH, ES, FR, IE, IT, NL, NO, PT, UK

COORDINATOR
SINTEF AS (NO)

## POSITIONING OF CREATE-IoT IN THE IoT ARCHITECTURE

| IoT ARCHITECTURE LAYERS | COMPONENTS | COVERED BY THIS PROJECT? |
|---|---|---|
| COLLABORATION & PROCESSES | Business System Integration | |
| APPLICATION | Visualization | ✓ |
| SERVICE | Development Environment | |
| | Service Orchestration | ✓ |
| | Advanced Analytics | ✓ |
| ABSTRACTION | Event & Action Management | ✓ |
| | Basic Analytics Action | ✓ |
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| PROCESSING | Device Management | |
| | Edge Analytics | ✓ |
| NETWORK & COMMUNICATIONS | Connectivity Network / Modules | ✓ |
| | Edge Gateway (HW based) | ✓ |
| PHYSICAL / DEVICE LAYER | Operating System | ✓ |
| | Modules & Drivers | ✓ |
| | MPU / MCU | |

## OBJECTIVES

COLLABORATION

Stimulate collaboration between IoT initiatives, foster the take up of IoT in Europe and support the development and growth of IoT ecosystems based in open technologies and platforms.

SYNCHRONIZATION

Strategic and operational synchronisation and alignment through frequent, multi-directional exchanges between the various activities under the IoT focus area.

ALIGNMENT

Cross fertilisation of the various IoT large-scale pilots for technological and validation issues of common interest across the different application domains and use cases.

## PARTICIPANTS

- Archimede Solutions Sarl (CH)
- Arthur's Legal Bv (NL)
- Artshare Investigacao Tecnologia Earte Lda (BE)
- Atos Spain Sa (ES)
- Bluspecs Innovation Sl (ES)
- Fundacion Centro Tecnoloxico De Telecomunicacions De Galicia (ES)
- Future Everything Cic (UK)
- Geie Ercim (FR)
- Gemalto Sa (FR)
- IDC Italia srl (IT)
- Institut de l'audiovisuel et des Telecommunications en Europe (FR)
- Institut Europeen des Normes de Telecommunication (FR)
- Istituto Superiore Mario Boella sulle Tecnologie dell'informazione e delle Telecomunicazioni Associazione (IT)
- Mandat International Alias Fondation pour la Cooperation Internationale (CH)
- National University of Ireland, Galway (IE)
- Philips Lighting B.V. (NL)
- SINTEF AS (NO)
- Trialog (FR)
- Unparallel Innovation Lda (PT)

# U4IoT

## USER ENGAGEMENT FOR LARGE SCALE PILOTS IN THE INTERNET OF THINGS

**End-user and societal acceptance is critical to the success of the IoT large-scale pilots. U4IoT combines complementary RRI-SSH expertise encompassing social and economic sciences, communication, crowdsourcing, living labs, co-creative workshops, meetups, and personal data protection to actively engage end-users and citizens in the large scale pilots.**


**8**
PARTNERS

**4**
USE CASES

U4IoT develops a toolkit for LSPs end-user engagement and adoption, including online resources, privacy-compliant crowdsourcing tools, guidelines and an innovative privacy game for personal data protection risk assessment and awareness, online training modules.

The partners provide direct support to mobilize end-user engagement with co-creative workshops and meetups, trainings, Living Labs support, and an online pool of experts to address LSPs specific questions.

U4IoT enables a citizen-driven process by combining multidisciplinary expertise and complementary mechanisms from the European state-of-the-art.

The project analyses societal, ethical and ecological issues and adoption barriers related to the pilots with end-users and make recommendations for tackling IoT adoption barriers, including educational needs and sustainability models for LSPs and future IoT pilots' deployment in Europe.

The activities are supporting communication, knowledge sharing and dissemination with an online portal and interactive knowledge base gathering the lessons learned, FAQ, tools, solutions and end-user feedbacks.

U4IoT encompasses the whole lifecycle of end-user engagement in LSPs.

This means that support for end-user engagement from the early stages of need-finding, co-creative design, real world implementations and tests, and exploitation and assessment will be offered.

Privacy-friendly crowdsourcing and survey tools enable to monitor the end-user perception and acceptance of IoT applications.

WEBSITE & SOCIAL MEDIA
www.u4iot.eu
U4IoT
@U4IoT

TOTAL EC FUNDING
€1M

COUNTRIES
BE, CH, NL, RS, SE

COORDINATOR
Lulea Tekniska Universitet (SE)

## POSITIONING OF U4IOT IN THE IoT ARCHITECTURE

| IoT ARCHITECTURE LAYERS | COMPONENTS | COVERED BY THIS PROJECT? |
|---|---|---|
| COLLABORATION & PROCESSES | Business System Integration | |
| APPLICATION | Visualization | ✓ |
| SERVICE | Development Environment | ✓ |
| | Service Orchestration | ✓ |
| | Advanced Analytics | ✓ |
| ABSTRACTION | Event & Action Management | ✓ |
| | Basic Analytics Action | ✓ |
| STORAGE | Storage/Database | ✓ |
| PROCESSING | Device Management | ✓ |
| | Edge Analytics | ✓ |
| NETWORK & COMMUNICATIONS | Connectivity Network / Modules | ✓ |
| | Edge Gateway (HW based) | ✓ |
| PHYSICAL / DEVICE LAYER | Operating System | ✓ |
| | Modules & Drivers | ✓ |
| | MPU / MCU | ✓ |

## OBJECTIVES

Develop a toolkit for LSPs end-user engagement and adoption, including online resources, privacy-compliant crowdsourcing tools, guidelines and an innovative privacy game for personal data protection risk assessment and awareness, online training modules.

Provides the pilots with cutting-edge end-user engagement methodologies, including co-creative workshops, focus groups, crowdsourcinand Living Labs. It will provide online tools and resources for end-use engagement, crowd sourcing and personal data protection. The project will provide direct support to the pilots, including training and coaching. A knowledge database will enable to collect, mutualise and capitalise on end-user engagement feedback and experience.

U4IoT will analyses societal, ethical and ecological issues emerging from the various pilots. It will leverage on workshops and the crowdsourcing tool to collect anonymised inputs from the pilot stakeholders and end-users, as well as on the interaction and support provided to the pilots, to identify issues and solutions.

## PARTICIPANTS

- Archimede Solutions SARL (CH)
- Drustvo za Konsalting, Razvoj i Implementaciju Informacionih i Komunikacionih Tehnologija DUNAVNET DOO (RS)
- European Network of Living Labs (BE)
- Lulea Tekniska Universitet (SE)
- Mandat International Alias Fondation pour la Cooperation Internationale (CH)
- Martel GmbH (CH)
- Interuniversitair Micro-Electronica Centrum IMEC VZW (BE)
- Stembert Design (NL)

www.european-iot-pilots.eu @IOTEULSP @IoT_euLSP

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