



# ANNUAL REPORT





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# PRESENTATION

The i2CAT Foundation, as the Government of Catalonia's benchmark instrument in the field of Internet research and innovation, has to play a key role in the new "mission-driven" Catalan High-Tech programme



**Jordi Puigneró i Ferrer**  
President of i2CAT Foundation

Catalonia needs to create a high-tech model of research and innovation in the ICT field. This new model must complement the current science and technology model while involving the many Catalan ICT research and innovation institutions. It is imperative that they work together to meet the technological challenges brought about by the deployment of the SmartCAT strategy set out by the Government of Catalonia and to improve the positioning of our ICT research in the European arena.

The High-Tech programme must focus on research and disruptive innovation, starting with ICT in the areas of specialization where Catalonia and Europe can be world leaders, such as health, industry or culture. This programme must be "mission-driven", applying the "dual use" methodology, led by the public sector and then transferred to the private sector to generate economic growth, create jobs and achieve global leadership.

The i2CAT Foundation, as the Government of Catalonia's benchmark instrument in the field of Internet research and innovation, has to play a key role in this High-Tech programme. i2CAT is a creative and open institution, ready to cooperate in order to integrate, enrich, produce and contribute to the application of its knowledge of smart technologies to the transformation of cities, territory, industry, health and culture.

During 2015, i2CAT led activities aligned with the SmartCAT strategy set out by the Government of Catalonia. In coordination with the Catalan Government's ICT Directorate, i2CAT created the Internet of Things Catalan Alliance and developed a smart health application, the Telecremats platform, which is currently being tested in the Catalan public health system.

The Industrial Ring 4.0 is another strategic initiative that i2CAT launched in 2015. With the support of the Industry Directorate and the ICT Directorate, and in collaboration with Eurecat, the Industrial Ring 4.0 will serve as an

advanced technology platform to foster smart industry in Catalonia, enabling the implementation of Industry 4.0 strategies and services.

With the aim of fostering innovation and increasing the impact generated on local industry, throughout 2015 i2CAT participated actively along with local companies and other research and academic institutions in defining several RIS3CAT communities specifically in the areas of health industries and sustainable mobility.

In terms of research, i2CAT continued to strengthen its excellent position in Europe and was able to attract new European funding. It was awarded five new R&D&I grants under Horizon 2020 in areas like advanced 5G networking, advanced cloud infrastructures, technologies for creative industries and media convergence or digital security.

As for international collaborations, during 2015 i2CAT entered into a strategic alliance with an American start-up that raised VC funds from US and decided to develop a new technology-based solution in Catalonia, setting up an R&D team that included i2CAT researchers. This is a testament to the reliability of the research and innovation knowledge generated by i2CAT as well as its ability to have a social and market impact.

To sum up, during 2015 i2CAT successfully developed several local and international R&D projects and strategic initiatives, tackling the challenge of improving the generation of knowledge and fostering collaboration with industries to transform this knowledge into new advanced solutions able to generate social and economic impact.

I would like to share this success with all the people, companies and institutions that made this achievement possible and to thank them for their talent, support and commitment.



<b>1 Annual Highlights:</b>	<b>7</b>
Internal Developments: New i2CAT Director	7
Facts & Figures	9
International R+D+I Initiatives	10
Catalonia R+D+I Initiatives	11
Strategic Partnership	13
<b>2 Research Areas</b>	<b>14</b>
<b>3 Business Units</b>	<b>22</b>
<b>4 Living Labs &amp; Digital Social Innovation Group</b>	<b>28</b>
<b>5 i2CAT at a Glance</b>	<b>30</b>

# 1. ANNUAL HIGHLIGHTS

## 2015, Year in Review

2015 has been a very productive year, starting new strategic projects and activities, and strengthening other initiatives that were being carried out in the precedent years, both at national and international level.

The main efforts have been focused on:

- **Generating high-tech research knowledge with international relevance** by participating in new R+D European projects.
- **Fostering flagship initiatives** to support ICT and innovation strategies of the Government of Catalonia.
- **Improving the impact of the knowledge transfer to the market by collaborating and setting up strategic alliances** with new local and international companies.
- **Participating actively in the main technological fairs held in Catalonia** (Mobile World Congress, IoT Solutions World Congress, Smart City Expo World Congress).

# 2015

## Prof. Josep Paradells, new i2CAT Director. Welcome on board!

All our gratitude to Prof. Sebastià Sallent, our former and founding director!



In 2015 i2CAT has appointed Prof. Josep Paradells as its new Director, after the resignation of Prof. Sebastià Sallent who held the position since 2003.

Prof. Josep Paradells, a good partner and collaborator of i2CAT project since its inception, was appointed by the Advisory Board on 18 June 2015.

The new i2CAT Director is Professor of Electronic Engineering at UPC and Head of the field of electricity, electronics and communications, with experience in wireless networks, Internet of Things, Smart Cities, connected vehicles and sensor networks.

The early months of Josep Paradells in i2CAT have been marked by a strong commitment to continue generating know-how but with a clear aim to generate business opportunities. This has already generated success stories that you will see reported in this document.

Welcome on board and all the best within i2CAT team, Prof. Paradells.



More than 15 years ago, in 1999, a group of members of the UPC (including Artur Serra, and lecturers and professors of the UPC) started a project called i2CAT, a groundbreaking and promising project that aimed to introduce and deploy Internet, not only in the research and development environments, but also in the human activities and in the social fabric.

Prof. Sebastià Sallent, altogether with other partners and colleagues, led successfully this innovative project that has become a research and innovation centre with key values: to think open, to be innovative and to work in cooperation. All i2CAT team members would like to thank Sebastià Sallent for his work.

# Facts & Figures

## Active projects



18% National

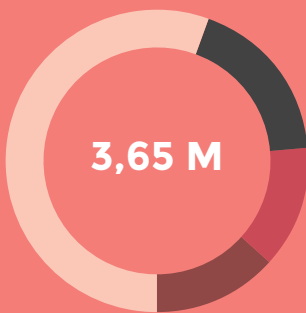
82%  
International



82% National

18%  
International

## Incomes



19% R+D+I  
Services to  
Companies

13%  
Government of  
Catalonia Core  
Funding

55%  
Competitive Grants

13%  
Project  
Contributions

## Staff



2%  
PhD candidates

27% PhDs

71% Engineers  
& Graduates

## +30 Publications

Conferences, Journals, Book Chapters.

## +40 Fairs & congresses

More than 40 participations in scientific and commercial events.







## Key R+D player in the H2020 Work Programme

- Participation in 32 R+D European projects during 2015
- 9 New H2020 projects have been achieved

The success in the Horizon 2020 calls for funding during 2015 it is also one of the remarkable achievements. Thanks to the effort and quality research developed by the different areas and departments, i2CAT has obtained 9 new H2020 projects under the following topics:

- **Advanced Cloud Infrastructures and Services**
- **Smart Cities and Communities**
- **Experiments and facilities in FIRE+**
- **Collective Awareness Platforms for sustainability and social innovation**
- **Research Infrastructures**
- **Digital Security**

Special reference should be made of **Advanced 5G Network Infrastructure for the Future**

**Internet:** i2CAT gained 4 projects under this topic out of total 18 projects funded by the European Commission. In one of them i2CAT is assuming the coordinator role.

Additionally, i2CAT is leading this project about immersive TV under the topic **Technologies for creative industries, social media and convergence.**

### CHARISMA

i2CAT coordinates this H2020 project that proposes an intelligent hierarchical routing and paravirtualised architecture.

Fully aligned and committed to the 5G-PPP principles and KPIs, the project brings together 10G-wireless access and 100G fixed optical solutions through an intelligent cloud radio-access-network (C-RAN) and intelligent radio remote head (RRH) platform with IPv6 Trust Node routing featuring very low-latency for the traffic management.

[5g-ppp.eu/charisma/](http://5g-ppp.eu/charisma/)

### IMMERSIA TV

i2CAT coordinates this H2020 project that aims to create new formats of television, bringing revolutionary ways to watch TV at home. A novel form of broadcast omnidirectional video, content production and delivery that offers end-users a coherent audiovisual experience across head mounted displays, second screens and the traditional TV set, instead of having their attention divided across them.

[www.immersiatv.eu/](http://www.immersiatv.eu/)

### 5G-XHaul

i2CAT leads the Technical coordination of this H2020 project within the 5G-PPP initiative.

Dynamically Reconfigurable Optical-Wireless Backhaul/Fronthaul with Cognitive Control Plane for Small Cells and Cloud-RANs

5G-XHaul proposes a converged optical and wireless network solution able to flexibly connect Small Cells to the core network. Exploiting user mobility, our solution allows the dynamic allocation of network resources to predicted and actual hotspots.

[www.5g-xhaul-project.eu/](http://www.5g-xhaul-project.eu/)



## Main initiatives with Board of Trustees institutions

### Alcatel-Lucent

VINTAGE – New Generation Interactive Video  
SDPN– Software Defined Private Networks

### Cellnex

V2X-Arch– Experimental evaluation of architectures and technologies of V2X communications

### Vodafone

RADAR – Health and Social Care Tracking platform

### Orange, TicSalut

Telecremats – Telemedicine Platform

### Cisco

Cisco Fog Computing Proof of Concept

### Juniper Networks

Juniper OpenContrail Hackathon

### Barcelona City Council

Poppy: A new educational innovation community

### Epson

Moverio Smartglasses Competence Center



## Technology transfer to market

Developing R&D collaborations with companies to produce innovative market-oriented technologies and solutions that have an added-value impact in the society and economy.

During 2015 i2CAT has set up synergies with the different types of companies with the aim to design and deploy varied pre-commercial trials for technological and functional validation purposes.

### Internet of Things



### eHealth Platforms



### Wireless Sensor Networks



### Networked Media



# Active involvement in the Research and Innovation Strategy for the Smart Specialization of Catalonia (RIS3CAT)

## IoT



- **Collaboration with the Government of Catalonia to define IoT as an emerging technology within RIS3CAT pillar 2.**
- **During 2015 i2CAT has worked with the RIS3CAT communities of Health and Sustainable Mobility.**  
**2 RIS3CAT Health projects have been granted.**



### **Strategic initiative on Industry 4.0 supported by the Government of Catalonia**

Since 23 January 2015, Catalonia holds the presidency of the Four Motors for Europe with the clear objective to advance towards a new economic model based on innovation, intelligence and sustainable production.

i2CAT is working also with the commitment to discuss and exchange innovative, intelligent and sustainable experiences that will enable us to continue being a leading territory in the rest of Europe.

As part of this strategy i2CAT has presented **Industrial Ring 4.0**: A services and collaborative platform for the Catalonia Smart Industry

An open and inter-sectoral collaboratory that merges leading industrial fabrics, Internet and ICT tools with the aim to accelerate innovation processes by creating advanced products with high added-value.

# Collaboration with the Government of Catalonia to foster the SmartCAT strategy



## Creation of the IoT Catalan Alliance

SmartCat aims to make Catalonia a leading international smart region to take advantage of technology and use digital information to innovate.

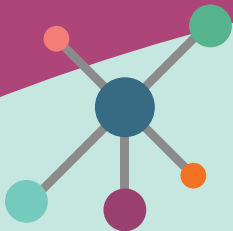
i2CAT is a key partner in the deployment of the SmartCAT strategy. The centre is setting synergies with the local environment by coordinating with local partners, public administrations and users, the design and the deployment of pre-commercial trials for technological and functional validation

purposes. By fostering strategic alliances, i2CAT works to produce innovative market-oriented technologies and solutions.

In this sense, the centre has created the **IoT Catalan Alliance**: an initiative within the SmartCAT strategy to create a strategic model between all stakeholders in the IoT value chain of Catalonia.

The alliance has now more than 30 members and more than 25 actual use cases.

Some of them are:



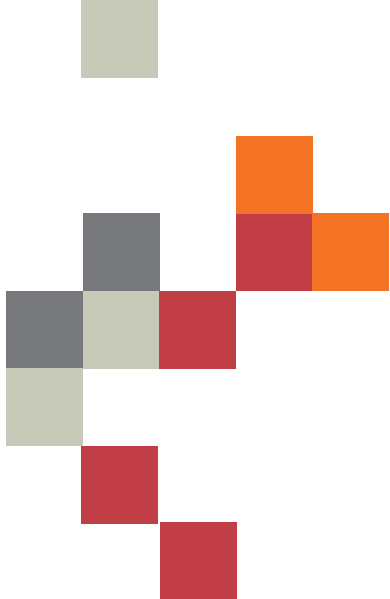
## Partnership with the US start-up VOLTA Networks

### SDN on-demand networking for elastic clouds

In 2015 i2CAT signed a strategic partnership agreement with Volta. This agreement established the basis to set up the Volta's R&D team in Barcelona, together with the i2CAT's researchers. This allowed Volta to have a team from scratch and with high qualified researchers with full experience on the state of the art expertise of the topics required. This strategic partnership facilitated Volta to speed up on the proof of concept development and time to market reduction. This strategic and innovative agreement put the basis to give Volta equity to i2cat and so establish long term relationship.



Volta Networks is a software company building the next generation of Software Defined Network (SDN) technology. The core innovation is to apply principles of recursive network hierarchical addressing to white/bright box switches -- which makes 'internet scale' addressing and provisioning possible on modestly resourced merchant silicon based switches -- yielding maximum CAPEX savings.



## **i2CAT offices reshaping with open spaces to enhance creativity and innovation**

to improve the corporate identity and the workplace



It has been a year in which the entity working spaces have been reconceived and remodelled in order to further reflect i2CAT DNA: a non-profit research and innovation centre which promotes mission oriented R+D+I activities using an innovative open innovation framework.

Thus, the people working in the different spaces of the Headquarters have been gathered in fresh, more luminous and innovative premises.

We are presenting you i2CAT new Headquarters: take a look at the images and decide for yourself. You are invited to come and visits us.

## 2. RESEARCH AREAS

The next step is to advance in the research of an internet based on intelligent systems and smart technologies.

**The internet of knowledge and creativity is the new challenge to face.**

The three i2CAT research areas are:



Internet  
Architectures  
& Services



Mobile Wireless  
Internet



Media  
Internet

Internet has produced a superabundance of data, information and networks. The next step is to move forward in the research and innovation of an Internet based on Artificial Intelligence and smart technologies. The Internet of knowledge and creativity is the new challenge.

i2CAT has a wide experience in multiple national and European R+D+I projects, leading research lines in new fixed & mobile network architectures, wireless sensor networks, and content-based multimedia technologies, with the aim to develop new products, services and applications in the fields of eHealth, Smart Cities & Smart Regions, Advanced Manufacturing and Culture/Creativity.

This know-how has a clear outcome also in 2015 Horizon 2020, the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) that is aimed at securing Europe's global competitiveness.

The challenges of the three i2CAT research areas, Media Internet, Mobile Wireless Internet and Internet Architectures and Services, are aligned with the following topics within Horizon 2020.

- Advanced Cloud Infrastructures and Services (1)
- Smart Cities and Communities (1)
- Advanced 5G Network Infrastructure for the Future Internet (4)
- Experiments and facilities in FIRE+ (1)
- Technologies for creative industries, social media and convergence (1)
- Collective Awareness Platforms for sustainability and social innovation (1)
- Research Infrastructures (1)
- Digital Security (1)

Along the 2015, the European Commission has granted several projects of i2CAT Research Areas under the following topics of the 2015 call for funding:

- Trust eServices
- Integrating experiments and facilities in FIRE+
- Technologies for creative industries, social media and convergence
- Collective Awareness Platforms for Sustainability and Social Innovation
- ICT Innovation for Manufacturing SMEs

## Research Areas



### Internet Architectures & Services - IAS



TEAM: Eduard Grasa, Miquel Tarzán, Cristina Ruiz, Amaia Legarrea, Leonardo Bergesio, Bernat Gastón, Carolina Fernández, Jordi Ferrer, José Ignacio Aznar, Shuaib Siddiqui, Josep Batallé, Daniel Guija, Pooria Khodashenas, Albert Viñés, Cristian Davila, Oriol Fort. DIRECTOR: Eduard Escalona.

#### Key player in the 5GPPP community

An Internet of intelligence requires new architectures and services able to interconnect people, objects and nature in more efficient and dynamic ways than the current Internet.

New systems and protocols are also needed to transform information into new knowledge by creating intelligent environments. Users shall be empowered to design, reconfigure and manage the networks based in their own interests and needs.

i2CAT focuses on exploring and defining new ways to manage the Future Internet networks, enabling new functionalities and business models by means of integrating technologies such as Cloud, Software Defined Networking (SDN) and Network Function Virtualization, while developing novel pioneer Internet architectures based on new paradigms beyond TCP/IP such as Recursive Inter Network Architectures (RINA).

## RESEARCH CHALLENGES

### 1. 5G Network Architectures

5G technologies represent the next generation of communication standards able to provide ultra-high connection speeds, increased coverage, spectral efficiency, very low latency, allowing connectivity among billions of devices. This line aims to investigate novel networking solutions for providing 5G services in a versatile, fast and efficient way.

**Technologies:** Software Defined Networking (SDN) / Network as a Service (NaaS) / Network Function Virtualisation (NFV) / Recursive Internet Architectures

**Applications:** Multi-tenancy in Open Access Networks / Virtual network security / Dynamic network overlays / Mobility and multi-homing

### 2. Cloud technologies

Cloud technologies are one of the main drivers of the digital transformation, enabling distributed computing and storage with secure and robust connectivity. IAS is actively innovating in cloud technologies bringing automation to cloud and network services, while lowering the transformation barrier for SMEs and more traditional industries.

**Technologies:** Cloud computing / Fog/Edge computing / Infrastructure as a Service (IaaS)

**Applications:** Cloud networking / Hybrid clouds / Deployment of complex cloud applications / Data integration and slicing / OpenStack, Dockers and Micro-services

### 3. Big Data

To promote the data sharing culture among different industrial sectors and domains by providing a technological solution that addresses its main challenges: security, privacy, monetization and simple access.

This solution, I-SPACE, leverages the last virtualization techniques to create slices of data tailored to the client needs.

**Keywords/Topics:** Data virtualization / Data processing / Data integration / Data enrichment / Data curation.

**Technologies:** Hadoop / Spark / ElasticSearch / Python

**Applications:** Data as a Service / Data analysis / Business intelligence / Data visualization



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## OUTSTANDING PROJECTS

**CYCLONE** project is an Horizon 2020 innovation action which aims at integrating existing cloud management software to allow a unified management of federated clouds. The project integrates Network-as-a-Service, application deployment, service access management as well as end-to-end security solutions. The integration will be validated in diverse application areas, such as bioinformatics, high-energy physics, and cloud application service provisioning.

**PRISTINE** The Internet as the global communications infrastructure has been successful in shaping the modern world by the way we access and exchange

information. The Internet architecture designed in the 1960's has been supporting a variety of applications and offering a number of services till now but emerging applications demand better quality, programmability, resilience and protection.

**T-NOVA** This EU FP7 project has the aim of promoting the NFV concept, T-NOVA introduces a novel enabling framework, allowing operators not only to deploy virtualized Network Functions (NFs) for their own needs, but also to offer them to their customers, as value-added services.

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## OUTSTANDING ACHIEVEMENTS

- RINA technologies in i2CAT have evolved during 2015 through the implementation of a Software Development Kit (SDK) for the RINA prototype that eases its programmability, improves the robustness of the prototype and enhances its security, routing and congestion control mechanisms. Also, the RINA architecture standardisation process has been initiated in the ISO, Special Committee 6, Working Group 7.
- The release of a novel cloud network service platform able to provide on demand network services such as virtual firewalls, dynamic VPNs and virtual load balancers for distributed multi-cloud applications is an early result of the H2020 CYCLONE project, an Innovation Action with market potential that will continue in 2016 trying to productize its developments.
- Within the FP7 T-NOVA project, IAS has designed an open source service orchestrator system following the ETSI NFV specifications. This orchestrator has extensible functionalities that will be extended in H2020 projects as a robust alternative to other mainstream NFV orchestrators.
- Collaboration as a key partner of a US startup (Volta) for the development of a micro-services based cloud networking solution using technologies such as Apache Mesos, Broadcom chipset configuration and recursive networking concepts similar to RINA.
- Partnership with Nokia Spain for the development of the SDPN project (Software Defined Private Networks) in which a platform for dynamically configuring overlay private networks is used to connect on demand distributed offices with their required remote enterprise's services and headquarters in a secure and flexible way.
- A Big Data research line has been consolidated to investigate on Big Data technologies and solutions. As a first funded initiative, the H2020 Cybersecurity SHIELD project has been granted, including technologies such as NFV and Big Data analytics.

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## MAIN PARTNERS



## Research Areas



### Mobile Wireless Internet - MWI



TEAM: Marisa Catalán, August Betzler, Marc Combalia, Laura Herrea, Jacint Castells, Miquel Catalán. DIRECTOR: Daniel Camps.

Internet is increasingly ubiquitous. The wireless technology allows the connection of everything to Internet: buildings, cities, parks, factories and forests, creating an infrastructure for a smart world.

The Mobile Wireless Internet Area is a tight partnership between i2CAT and the UPC Barcelona Tech that has developed more than 50 projects in the area of wireless communications since 2003. Its main areas of expertise are Wireless Sensor Networks (WSN) and high capacity wireless access

technologies that are key enablers for the future Internet of Things and future 5G systems.

MWI's expertise spans from the physical design of embedded systems, to the design of scalable platforms for data collection, and algorithms for radio resource management. Among the main market sectors impacted by the technology of the Mobile Wireless Internet Area we find: Smart Cities, Smart Building, Smart factories and Mobile networks.

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## RESEARCH CHALLENGES

### 1. Internet of Things

The goal of the IoT research line is to Integrate internet capabilities into devices constrained in terms of energy, compute, storage, and communications, in order to provide connectivity for the next billion devices.

**Technologies:** WSN / Radio wake-up System / 6LowPAN, CoAP / WiFi, BLE, Zibbee, Sigfox / LoRa / VLC & LiFi / V2X communications (ETSI-G5, 802.11p)

**Applications:** Delay-tolerant networks / Mesh Networks / Modular Sensor Platforms / Ultra-low Power Embedded Systems / Data Collection Platforms / Energy Harvesting Systems / Low Power / High precision indoor location based on VLC

### 2. Software Defined Wireless Networks (SDWN)

The goal of this research line is to design algorithms and protocols that will lay the foundation of future 5G networks, allowing to provide the wireless capacity required to cope with the forecasted increase of demand on mobile connectivity.

**Technologies:** LTE / Small Cells / Openflow (with wireless extensions) / mmWave backhaul / Hotspot 2.0 / Wi-Fi / Cloud RAN / Linuxwireless (mac80211 stack) / Opendaylight / Software switches

**Applications:** Algorithms and Architectures for High Capacity Wireless Access) / Backhaul Solutions for Dense Small Cell Deployments) / Protocols for Software Defined Wireless Networks

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## OUTSTANDING PROJECTS

**Grow Smarter** ([www.grow-smarter.eu](http://www.grow-smarter.eu)) is a flagship European H2020 project demonstrating a set of measures that illustrate the capabilities of future Smart Cities. In Grow Smarter, the MWI group is developing a technology that will allow to equip

electrical vehicles used for micro distribution purposes with pollution sensors. This technology will be used to evaluate the effectiveness of several pollution reduction measures that the project will implement in the city of Barcelona.

**5G-XHaul** ([www.5g-xhaul-project.eu](http://www.5g-xhaul-project.eu)) is a European H2020 project within the framework of the 5G-PPP initiative that is defining the future 5G technology. In particular, 5G-XHaul is developing a new software controlled transport network that will unify the current backhaul and fronthaul network segments over a single network infrastructure. Within 5G-XHaul the MWI is defining a control plane stack and algorithms for hybrid mmWave and Sub6 wireless backhaul networks.

**DINUBE** Together with DINUBE ([www.dinube.com](http://www.dinube.com)) the MWI group developed during 2015 a point of sale technology that can be used to receive payments from any smartphone devices, without requiring support for NFC. This technology has already been applied to vending machines.

**VLC** The MWI group developed during 2015 a point of sale technology that can be used to receive payments from any smartphone devices, without requiring support for NFC. This technology has already been applied to vending machines.

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## OUTSTANDING ACHIEVEMENTS

The following are the technological highlights of the MWI group during 2015:

- MWI demonstrated in MWC'15 a system based on Visible Light Communications (VLC) able to deliver short of 1 Kbps of data at a range of up to 3 meters, between a commercial LED and a smartphone. The developed system can enable innovative location based services, such as seamless delivery of context information when a user points its smartphone towards a display window, or a piece of art in a museum. This type technology is currently being standardized in the IEEE 802.15.7r1 group.
- MWI deployed a Smart City pilot in the city of Sant Vicenç dels Horts comprising a plurality of environmental sensors, within the framework of the FP7 TRESKIMO project. The pilot demonstrated for the first time in operational conditions the concept of infrastructure-less or Delay Tolerant Networking (DTN) based Smart Cities proposed by i2CAT. At the core of the DTN Smart City concept lies a proprietary Wake Up radio technology developed by the MWI group, which allows Smart City sensors to be sleeping in order to save battery life, and to wake up only when a mobile gateway, which can be mounted

on a vehicle, approaches the sensor location. This technology has the potential to disrupt the Smart City space by drastically reducing the CAPEX and OPEX costs involved in deploying Smart City solutions.

- MWI has been awarded two H2020 projects belonging to the 5G-PPP initiative, which is in charge of developing the technology enablers for the future 5G networks. In particular, the MWI group will contribute to the 5G-XHaul project (<http://www.5g-xhaul-project.eu/>), where MWI holds the technical coordination of the project, and to the SESAME project (<http://www.sesame-h2020-5g-ppp.eu/>). In these projects MWI is developing a control plane layer based on Software Defined Networking that enables centralized control and virtualization of a wireless small cell backhaul. For this purpose the MWI group has developed proprietary wireless extensions to the openswitch and.opendaylight frameworks, allowing for example to have wireless backhaul devices report wireless port statistics to the SDN controller for enhanced traffic engineering, or to support mobile specific actions such as matching flows based on GTP identifiers.

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## MAIN PARTNERS



simon



ALSTOM

Telefonica



cellnex  
diving telecom connectivity



## Research Areas



### Media Internet - MI



TEAM: Joan Llobera, David Cassany, Pau Pamplona, Juan Antonio Nuñez, Ibai Jurado, Einar Meyerson, Isaac Fraile, Juan Gordo. DIRECTOR: Sergi Fernández

The Media and Internet Area focuses its work in two main fields: Media Networks and Interactive and Immersive Media.

The Media Networks Line works on the development and application of new ways of distributing audiovisual content through the Internet. We have wide experience in the design, prototyping and development of distribution architectures and

systems for streaming, videoconferencing, content delivery, synchronization and virtualization.

The Immersive and Interactive Media Line works on the development and application of new ways of creating and consuming audiovisual content through the Internet. We have extensive experience in virtual and augmented reality as well as in immersive video

## RESEARCH CHALLENGES

### 1. Media Networks

The main goal of this research line is to study and develop efficient software systems to manipulate digital media over the network by using and aggregating industry standards. Modular server-side services are gaining relevance as the Cloud Computing paradigm is accepted in the broadcast industry. The Media Internet Area implements core services which are easy to orchestrate and appropriate for a cloud-based virtualized environment, where scalability and orchestration is a major requirement.

**Technologies:** Video & Audio coding / Real time network protocols (RTP, RTSP...) / Adaptive streaming (MPEG-DASH) / Hybrid Broadcast-Broadband TV (HbbTV)

**Applications:** Connected TV Services / Ultra-HD media delivery / Low-latency video communication / Cloud operations (transcoding, mixing) / Content Delivery Networks

### 2. Immersive & Interactive Media

This research line works towards the creation of new interactive services, in mobile devices and head mounted displays, with a major focus on location-based and personalized services. In particular, we focus mostly on augmented reality and second screen applications and target the cultural and the broadcast sectors. Our objective is to offer new and richer content experiences, immersive and interactive, and the tools to create them.

**Technologies:** immersive virtual reality / omnidirectional video/ AI, machine learning, statistics / mixed reality /HCI design

**Applications:** novel content formats / multiplatform content (HMD, TV, tablet, mobile) /cultural heritage / e-learning

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## OUTSTANDING PROJECTS

**ImmersiaTV.** This project is creating a new content creation workflow and the associated tools to generate multi-device and synchronized immersive and interactive experiences.

**TV-Ring.** This project explores the great potential of next generation networks and mobile devices in the Connected TV market, which is a strong focus of interest for the media industry.

**CreatiFI.** This project is an acceleration initiative from the European Commission which offers

opportunities (e.g., funding, support services, cloud infrastructure and middleware) to SME's, web entrepreneurs and individuals working in the Creative Industry sector to shift innovative ideas into new applications and services.

**Vintage.** This project aims at creating and testing a new encoding algorithm known as Logarithmical Hopping Encoding (LHE). I2Cat's role is to integrate, validate and compare this codec with current codecs widely used in the industry like H264 or MPEG-4.

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## OUTSTANDING ACHIEVEMENTS

In 2015 the Media Internet Area has achieved relevant goals in terms of project execution and technical development.

- Completion of the Specifi project. We concluded successfully the Specifi project, where we have executed more than 10 distributed performances and developed an important part of our Live Media Streaming platform.
- Completion of the I AM project. We concluded the I AM project, where we have developed an augmented reality guide for the archeological site of empuries, including the 3D reconstruction of the key elements of the site.
- Completion of the FiContent2 project. We concluded the FiContent2 project, where we coordinated the implementation of a user lab in the City of Barcelona.
- Approval of the ImmersiaTV project. During 2015 we submitted and got the approval from the EC to run the ImmersiaTV project during 30 months, where i2CAT plays a coordinating role.
- Recently we have released an open-source module capable to play any media inside a texture using the power of GStreamer (<http://u3d.as/r7u>) contributing with the Unity and Gstreamer communities of developers.
- Execution of the open pilots of the TV-Ring project. 2015 concentrated the piloting phase of the TV-ring project. We designed and evaluated an HbbTV app that has been tested in Catalonia by more than 15.000 people.
- Promotion of CreatiFI open calls 1 and 2. During 2015 we managed the open calls of the CreatiFI project, funding a number of local and international creative ICT start ups and providing technical advice and support to use FIWARE enablers.
- Part of the work carried out in this field was open-sourced via the live media streamer framework. (<http://livemediastreamer.i2cat.net/>).
- Thanks to the experience in different AR applications for museums and cultural entities and the know-how resulting from the ImmersiaTV project as coordinators ([www.immersiaTV.eu](http://immersiaTV.eu)), recently it has been open-sourced a Unity3D module to play any media inside a texture using the power of GStreamer (<http://u3d.as/r7u>).

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## MAIN PARTNERS



# 3. INNOVATION BUSINESS UNITS

Strengthen know-how generation towards market and society needs.

Leveraging our internet research and innovation into advanced technologies and solutions focused on these sectors:



Smart Cities & Regions



eHealth & eSocial Care



Industry 4.0



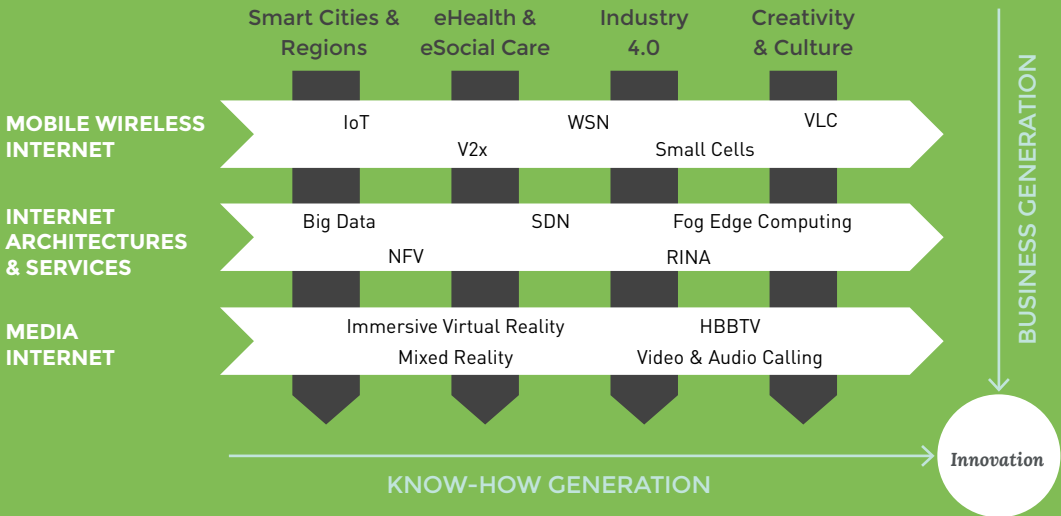
Creativity & Culture

## i2CAT innovation engine

The i2CAT organization structure is composed by Research Areas (know-how generators) and Innovation Business Units (Business generators).

The convergence of both, areas and units, is the i2CAT innovation engine.

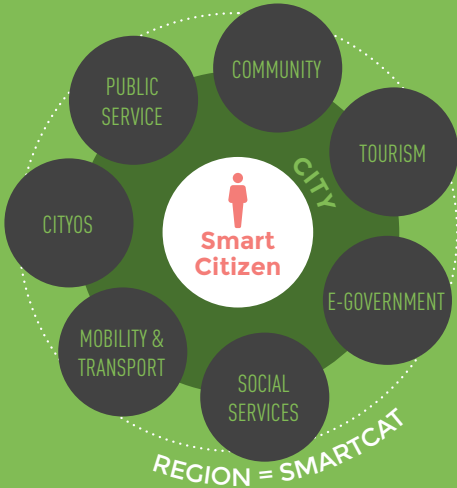
This structure allows to strengthen the focus of i2CAT activities in order to boost innovation capabilities and increase its impact.



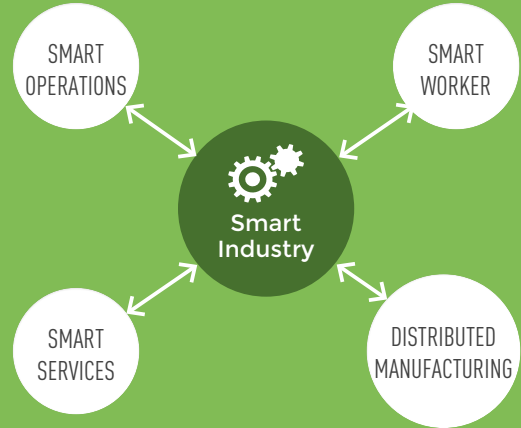
i2CAT has three horizontal Research Areas led by senior and PhD researchers with a strong background in their topics. These research areas, composed of different research lines, are aligned with the 5G convergence and ICT strategy defined by the European Commission within the H2020 research program. These areas are complementary and can provide end-to-end solutions, from the service to the infrastructure. This complementarity brings synergies and differentiation value on the completed research, and is therefore easier to cover user demands.

The Innovation Business Units are transversal to the different research areas and are the bridge between market needs and the i2CAT capabilities. The aim of these innovation units is to identify the needs that different organizations from different sectors have, mapping our expertise, know-how and capabilities to provide new, innovative solutions to those organizational needs, which may come from the market or social challenges. The four i2CAT Business Units focus on four different sectors: Smart Cities/Regions and SDN/NFV, Industry 4.0, e-Health, and Culture and Creativity.

**Smarts Cities & Regions** unit is devoted to identify needs within the Smart City ecosystems and IoT implementations and deployments, while also strongly supporting the SmartCat region strategy of the Catalan Government.



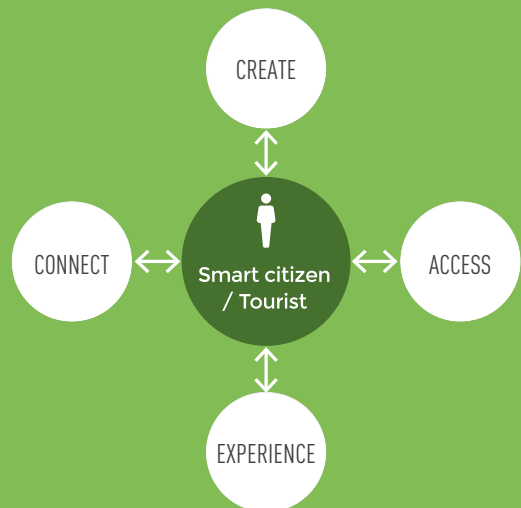
**Industry 4.0** identifies the needs of the Industry 4.0 roadmap, and how ICT will become the driver of the ICT revolution within the industry legacy.



**eHealth & eSocial Care** focuses on foreseeable sociohealth needs in the near future, and how ICT will reduce current barriers. Telemedicine and remote monitoring have a direct impact on the e-health and social system, these improve the citizens quality life and optimize the e-Health services.



**Culture & Creativity** deals with museums, artists and the new creative ecosystem. It is focused on identifying how ICT will help those new communities to emerge as a new economy sector. This unit also has expertise in Living Labs and user-driven methodologies.





## Smart Cities & Regions

### Smart technologies and services for smart citizens and region

Intelligent regions will be composed of smart citizens and will support new technologies like open big data, software defined networks, augmented reality, new M2M communications networks and wireless sensor networks all organized around a city operating system with distributed intelligence. Cities will be understood as software defined infrastructure, with resilient services, that have to support the needs and citizens social problems.

Thus, a new Innovation Business Unit has been created to identify needs of the sector and align i2CAT IoT developments. This unit is also providing full support to the deployment of the SmartCAT strategy of the Catalan Government while impacting different strategic areas:

- **Community:** Design innovative ecosystems models where value can be created by both, the citizen that participates in the definition of the city, and for the private or public entities who will use this data in order to deliver novel services and applications to the citizens.
- **Public Services:** identify needs and novel technologies that help on transforming the city services making them more efficient and sustainable
- **Mobility and transport:** Design low cost mechanisms to estimate traffic flow and improve parking spaces availability while developing real-time solutions using low cost devices for warehousing operations, freight transportation or last-mile delivery.
- **Tourism:** Identify how technologies like big data analytics or virtual reality can offer new services and personalized packages to generate added value experiences, while improving the tourism impact in cities and citizens.
- **Social services:** analyse how technology can serve as a means, and not as goal, to improve quality of life of people while improving the support towards social needs and decreasing the risk of exclusion and to obtain a social return.

### IoT CATALAN ALLIANCE (IoT CAT)

A strategy that aims at fostering the innovation in IoT while identifying this sector demand and offering of the region. IoT CAT is promoted by the Government of Catalonia as part of the SmartCAT strategy, to boost the IoT Sector (public and

private) in Catalonia. Its main goals are: identify key stakeholders, define the value chain, create a Who is Who website of the sector and develop innovation activities with all the IoT community.

### MORE OUTSTANDING INITIATIVES

- **Smart Region Platform:** technological study about how to develop a smart region platform. This initiative is part of the SmartCAT strategy of the Government of Catalonia and provided a review analysis of different available technologies and examples of implementation in different cities.
- **CityOS:** participation in the definition of the City OS implementation invited by the Barcelona City Council.

### MAIN PARTNERS







## eHealth & eSocial Care

### New generation of smart technologies to empower a new service model services for the citizens and the professionals.

Internet is helping users to play a more active role in their own health and social processes. Is it possible to find a huge number of projects and success stories providing technology on the professional side. From i2CAT point of view, now is time to empower the citizen by intensifying the use of technology on the citizen side.

Internet, together with the emergence of digital technologies, is helping users to play a more active role in their own health and social processes. It is possible to find a huge number of projects and success stories providing technology on the professional side. However, now is the right time to empower the citizen by intensifying the usage of state of the art technology. eHealth and eSocial Care Business Unit strategy aims at:

• **Breaking citizen barriers:** Creating new sustainable communication channels between health and social professionals and citizen, breaking with the physical spaces, communications and time constraints.

• **Fostering new applications:** Empowering citizen's self service capabilities by the usage of new systems and mobile APPs with added value services that promote personal autonomy.

• **Reinforcing digital transformation:** Rethinking assistance models towards proactivity and efficiency through the exploitation of all the capabilities that technology offers: massive amounts of information processing, creation of early detection policies, ehealth service customization.

The Innovation Unit is working in the following use cases and applications: Patient empowerment, Social & Care inclusion and Professional Support

## METGE A CASA (DOCTOR AT HOME)

A project conceived to create a telemedicine platform aimed to support the remote primary care of patients

with mobility constrains. This pilot has engaged three Primary Care Centres (GP) and around 60 users.

## MORE OUTSTANDING ACTIVITIES AND PROJECTS

• **RIS3CAT:** In collaboration with the Hospital Sant Joan de Déu two proposals have approved under the RIS3CAT programme, the research and innovation for the smart specialization strategy of the Government of Catalonia.

• **eOftalmoDiagnosis:** A web-based tool that enables professionals to share medical cases, including images, patient data and observations for the early detection of visual disorders.

• **Telecremats:** A web-based tool that enables professionals to share medical images for the treatment, and remote diagnosis support, in case of burnt patients' emergency. The project has deployed

a pilot in eight hospitals of the Health Catalan Institute (ICS).

• **iSpace:** Big Data services for the data integration, analysis and visualization of genomics, life style and health information.

• **O4Citizens:** The main goal of O4C is to contribute to the social sustainability of urban services empowering citizens to make meaningful use of open data.

• **Innovationa and commercial Partnership:** A strategic agreement with Everis for the exploitation of image-based telemedicine services Technologies.

## MAIN PARTNERS





## Industry 4.0

### Internet-enabled services and technologies for the Smart Industry.

Big data, advanced analytics, human-machine interaction as touch interfaces or augmented-reality systems, advanced robotics and technologies that transform digital-to-physical such as 3D printing are transforming manufacturing processes and setting-up the basis of the new industry 4.0 strategy. Meanwhile, different programmes such Industrial Internet in the US, or Industry 4.0 in Germany, are transforming factories into smart systems, to reduce costs, improve efficiency and develop new businesses.

The technologies behind Industry 4.0 converge to pursue a disruptive transformation within companies. i2CAT has set up a new Industry 4.0 Innovation Business Unit aiming at:

- Matching of Industrial fabric technologies with ICT tools & services.

- Creating an open and intersectoral collaboratory to enhance competitiveness.
- Fostering innovation processes that allow developing advanced added-value products

### INDUSTRIAL RING 4.0

The Industrial Ring 4.0 is an open innovation Market Place of industrial services for the Catalan Smart Industry. The initiative is promoted by i2CAT & Eurecat with the support of the Government of Catalonia as part of the SmartCAT and innovation industry strategies.

This Platform will facilitate the digitalization of the industry, and accelerate the convergence of industrial sectors and the ICTs. It offers a

Marketplace where third party providers will offer their services. This platform is also integrated into an advance network infrastructure supporting users and service providers, covering large industries and SMEs. In addition it offers a novel orchestration service that allows building more complex services using applications available on the Marketplace. This platform will become a key player within the RIS3CAT industry 4.0 strategy.

### MORE OUTSTANDING ACTIVITIES AND PROJECTS

The following are main activities and projects executed during 2015:

- **STIMULUS** a project under the I4MS initiative. It has the aim of defining an Ecosystem Hub for promoting the High Performance computing cloud-based modelling and simulation services. Main partners are EURECAT (leader) and the BSC, the Spanish supercomputing facility.
- As part of the strategy of developing an open innovation platform, this innovation Business Unit has also increased its **International and National activities**:

- Represent the Industry4.0 platform in different events: Government mission to Bade-Württemberg, support the Catalan leadership of the Smart Regions strategy within the framework of the Four Motors of Europe, participate in the IoT World Congress, and in the Workshop on Future Platform.Road2CPS (an strategic action for future CPS through roadmaps, impact multiplication and constituency building).
- Moreover, this innovation unit has led the governance of the industrial ring association, composed of 60 members.

### MAIN PARTNERS





## Creativity & Culture

**The democratization of new technologies allows users to play an active role as consumers and producers.**

Barcelona and Catalonia can be transformed in a global Living Lab of creativity and culture.

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### BARCELONA LABORATORY (BARCELONALAB)

Barcelona Lab is a project based on Living Lab methodologies to turn the city of Barcelona into an open citizen laboratory for the fields of culture, knowledge, creativity and innovation. This vision is captured in the concept of the city-laboratory, a city that allows its citizens to develop their creative skills with the innovative use of new technologies. Thus, the main goal is to encourage civic innovation through fostering the

collaboration between the world of arts, science and technology. In this sense, Barcelona Lab is an initiative that aims to bring together the academy, businesses and civil society to promote a model of cultural innovation centered on the citizen to make Barcelona a leader of the new culture of the XXI century. In 2015, Barcelona Lab activities have reached more than 550 participants, empowering 47 creative projects with digital technologies.

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### MORE OUTSTANDING ACTIVITIES AND PROJECTS

The following are main activities and projects executed during 2015:

- The **FiContent**: The FiContent 2 initiative aims at developing cutting edge ICT platforms for the FI-WARE ecosystem, offering application and service developers a set of technological enablers in the areas of social connected TV, smart city services, and pervasive games. A core part of the project is the creation of a community of SMEs, developers and experts active in areas close to the platforms, that will validate technologies, experiment with the enablers, be engaged through competitions. Aligned with this objective, the i2CAT Foundation has participated with a relevant role in testing and validating technologic enablers in the Barcelona experimentation site. In 2015, i2cat has run combined field trials with test users in the smart city and gaming areas. Also, it has organised the MediaFI open days, a hugely successful 3-day event of workshops, trainings

and conferences on the project's outcomes with more than 250 participants, and a related hack-at-home competition.

- The **CreatiFI**: The CreatiFI project aims to introduce FI-PPP technologies to all corners of the Creative Industries, by supporting and accelerating between 60 and 90 entrepreneurs into developing innovative tools and services for the Creative Industries, and by creating at least 18 viable new players in this area. To this end, it addresses key challenges for ICT creative entrepreneurs in Europe in a decentralised way, integrating 4 Hubs located in Europe's most creative regions: Brussels, Barcelona, Helsinki, and Trento. I2CAT participates in the project by managing the activities of the Barcelona hub, in cooperation with the Barcelona City Council. In 2015, CreatiFI hubs have provided business acumed, technical guidance and project development assistance to a range of regional SMEs, including digital creative companies, web developers and IoT entrepreneurs.

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### MAIN PARTNERS



## 4. LIVING LABS & DIGITAL SOCIAL INNOVATION GROUP

Empowering everyone to innovate:  
Towards new innovation systems

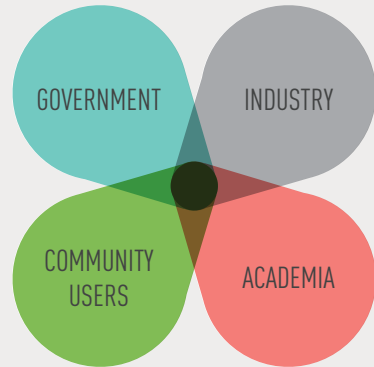
More than 10.700 Users involved in:

**5** USERS TRIALS

**7** WORKSHOPS

**1** HACKATHONS

**1** OPEN CALLS



i2CAT is a pioneer research institution in the adoption of the “quadruple helix” as a model of innovation, creating spaces for research with users, companies, universities and government, ensuring that technology transfer goes into the social network to improve quality of life and to help people to learn and develop knowledge and their creative skills.

In 2006 it was recognized as the first “open living lab” in Spain and one of the first in Europe. According to the European Network of Living Labs, these are ecosystems based on open innovation and on a systemic approach to co-creation with users. These open-innovation ecosystems integrate research and innovation in real environments.

Thus, are expressions of quadruple helix models where the set of actors (governments, universities, civil society organizations and citizens) are actively involved in co-creation and appropriation of open and collaborative innovation, validating various solutions in contexts actual use, using ICT as a catalyst. If the Internet is the infrastructure of the knowledge society, Living Labs intend to set up the new structures of knowledge societies, understood as open and collaborative systems to all citizens innovation.

i2CAT is committed with this innovative model and in this sense during 2015 has created a Living Lab and Digital Social Innovation Group within the foundation that pursues these research activities in synergy with other research areas and innovation business units of the centre.

The tasks carried out by the Living Labs and Digital Social Innovation Group focus on the research and design of these open and collaborative innovation environments (in areas as cities, health systems, education, creative sector or industry, nature) using the most advanced digital technologies (IOT , visualization and immersive environments, mobile technologies, open data, ...). Thus, it aims to design new systems of possible innovation and progress in the construction, following a methodology of “design science”, term coined by H. Simon.

The Group develops its own methods of “social high tech” for building quadruple helix systems with the involvement of the various stakeholders in construction: future research ethnography, participatory strategic planning, learning by projects. The i2CAT Living Labs and Digital Social Innovation Group has pioneered the construction of the European Network of Living Labs (ENOLL), the organization that brings together more than 170 Living Labs in Europe and worldwide and which is setting a new horizon for the years to come. i2CAT currently coordinates the Catalan Network of Living Labs institutions recognized as Citilab, Guifi.net, BCNLab and others. Actively involved in the construction of the SmartCAT strategy.

Moreover, Prof. Artur Serra, in 2015 has been appointed as Vice-President of the ENOLL (<http://www.openlivinglabs.eu/>)

Following the activities carried out during 2015 aimed at making users active players in co-creation processes:

WORKSHOPS	PROJECT	USERS	NUMBER OF USERS
User-centered design for TV apps workshop in Zaragoza	TVRING	Media professionals	40
User-centered design methodology for cultural heritage workshop in Riga	AthenaPlus	Cultural heritage professionals	60
User-centered design for TV apps workshop in Valencia	TVRING	Media professionals	20
FIWARE Knowledge Transfer Session	FI-Content 2	ICT professionals, students & enthusiasts	120
User-centered evaluation of distributed performances workshop in Ankara	RICHES	Cultural heritage professionals	20
Open data for cultural heritage workshop for Diputació de Barcelona	AthenaPlus	Cultural heritage professionals	30
User-centered design methodology for cultural heritage workshop in Barcelona	AthenaPlus	Cultural heritage professionals	60

USERS TRIALS	PROJECT	PROFILE OF USERS	NUMBER OF USERS
User panel pilot of HbbTV TVC application	TVRING	End users	80
ULTRAORBISM Distributed Performance evaluation	Specifi / RICHES	Distributed performance attendees & performing arts professionals	120
Empúries+ augmented reality app field trials	I AM	End users	90
User evaluation of Specifi Open Call projects	Specifi	End users	20
Open large-scale pilot of HbbTV TVC application	TVRING	End users	10000+

HACKATHONS	PROJECT	PROFILE OF USERS	NUMBER OF USERS
Apps & Cultura FIWARE hack-at-home competition	FI-Content 2/RICHES	ICT professionals, students & enthusiasts	24

OPEN CALLS	PROJECT	PROFILE OF USERS	NUMBER OF USERS
Specifi performing arts Open Call	Specifi AM	Performing arts & ICT professionals	20

# 5. i2CAT AT A GLANCE

## Cutting-edge internet technologies to foster business innovation and generating a new digital society and economy

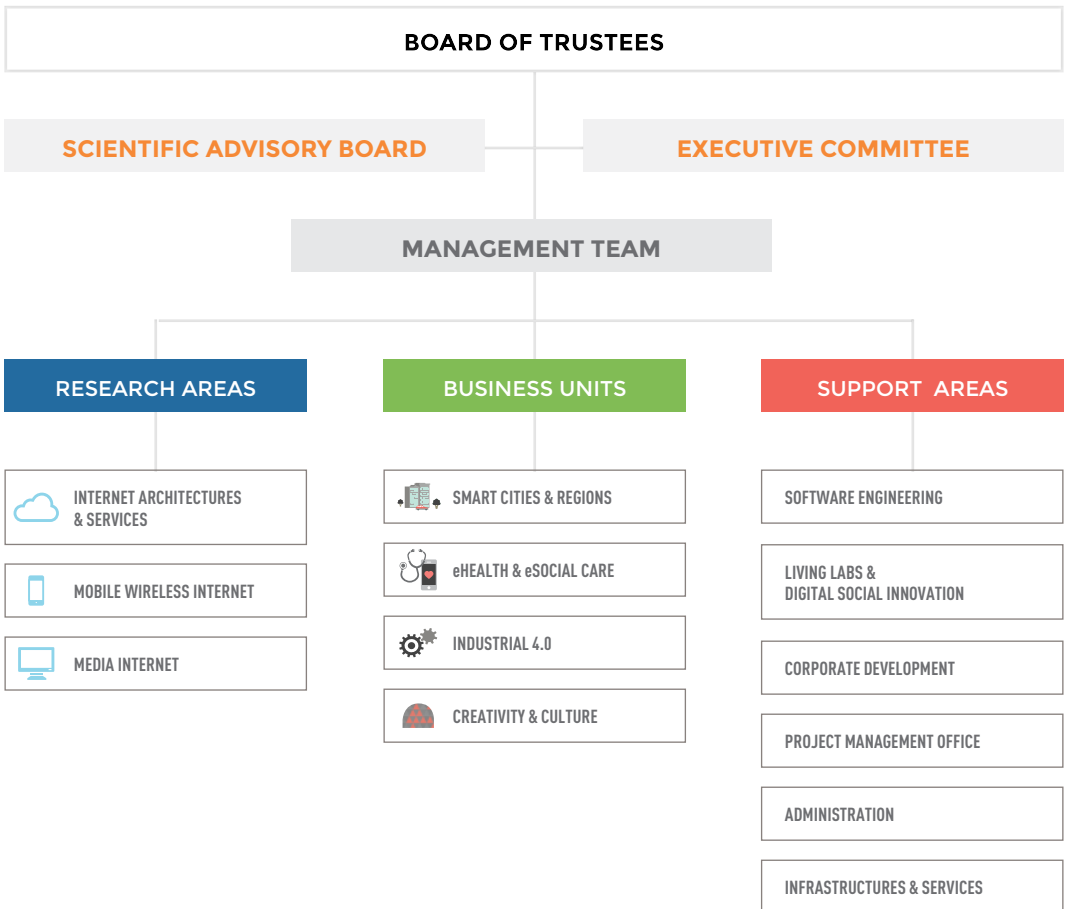
i2CAT Foundation is a non-profit research and innovation centre which promotes mission-oriented R+D+i activities on advanced Internet architectures, applications and services. The centre stands up for a new open innovation framework, fostering the collaboration between companies, public administration, the academic environment and end-users.

Internet has produced a superabundance of data, information and networks. The next step is to advance in the research and innovation of an

Internet based on intelligent systems and smart technologies.

The Internet of knowledge and creativity is the new challenge to face.

The i2CAT vision for the next 10 years is a networked smart world, a collaboratory based in a new generation of networked intelligent technologies and systems, a co-creating platform between machines, people and the environment for a sustainable and smart future.



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## BOARD OF TRUSTEES

The members' representatives are:

- Mr. Jordi Puigneró i Ferrer, President, Directorate General of Telecommunications and Information Society (DGTSI), Government of Catalonia.
- Mr. Enric Fossas Colet, Vice-President I, Rector of the Universitat Politècnica de Catalunya (UPC).
- Mrs. Núria Betriu Sánchez, Vice-President II, CEO at ACCIÓ.
- Mr. Josep Maria Martorell i Rodon, General Manager of Research, Government of Catalonia.
- Mr. Carles Salvadó Usach, Secretary of the Board, Head of Telecommunications Service at DGTSI.
- Mr. Gonçal Bonhomme i Altable, Deputy Secretary of the Board, Manager of Innovation at Orange.
- Mrs. Esther Real Saladrigas, Vice-Rector for Knowledge transfer at Universitat Politècnica de Catalunya (UPC).
- Mr. Fernando Orejas, Research Vice-Chancellor at Universitat Politècnica de Catalunya (UPC).
- Mr. Javier Ruiz Fernandez, R+D+i Manager at Alcatel-Lucent.
- Mr. Jordi Escalé i Castelló, Managing Director at Centre de Telecomunicacions i Tecnologies de la Informació (CTITI).
- Mr. Jordi Troté Escribano, Head of Institutional Relations at ACCIÓ.
- Mr. Antoni Elias Fusté, Professor at Universitat Politècnica de Catalunya.
- Mrs. Joana Sánchez Morillo, Sales Manager of Government and Public Services at Vodafone.
- Mr. Xavier Buxeda Lladó, General Manager at Fujitsu Technology Solutions in Catalonia.
- Mr. Francesc Bert i Llosa, Key Account Manager, Public Sector & Utilities at Cisco Systems Spain.
- Mr. Amadeu Gassó Gimeno, Technical Manager at CCMA.
- Mr. Francisco Javier Marcos, R+D+i Manager at Abertis Telecom.
- Mr. Francesc García Cuyàs, Director at TICSalut Foundation.
- Mr. Joan Bennassar, Technical Manager at Media Pro.
- Mr. Ángel Lozano, Research Vice-Chancellor at Universitat Pompeu Fabra.
- Mr. Lluís Comellas i Riera, Research Vice-Chancellor at Universitat Ramon Llull.
- Mr. Diego Matas Morillo, General Manager at Interoute Iberia.
- Mr. Eduard Martin, Innovation Director at IMI (Barcelona City Council).
- Mr. David Noguer i Bau, Regional Manager at Juniper Networks.
- Mr. Mateo Valero, Director at Barcelona Supercomputing Center.
- Mr. Felip Fenollosa, General Manager at Fundació CIM.
- Mr. Ernest Quingles, Managing Director at Epson Ibérica.

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## SCIENTIFIC ADVISORY BOARD

The Board, created in 2012, is composed of the following members:

- Prof. Dimitra Simeonidou, University of Bristol, United Kingdom Head of the University of Bristol's High Performance Networks Group. BScand MSc in Physics from the Aristotle University of Thessaloniki (Greece), PhD from the University of Essex.
- Prof. Dae-Young Kim, Chungnam National University, South Korea Professor of the Department of Information Communications Engineering at Chungnam National University.
- Bill St Arnaud, Independent R&E Network and Green IT consultant, Canada. Independent Consultant specialising in advanced networks and Green IT.
- Prof. Carsten Bormann, Universität Bremen (University of Bremen), Germany. Professor of Internet Technology at the University of Bremen and member of the board of directors of the Centre for Computing and Communications Technology (TZI).

## EXECUTIVE COMMITTEE



In December 31st the 2015 members representatives were:

- Mr. Antoni Elias Fuster, President, Professor at Universitat Politècnica de Catalunya.
- Mr. Carles Salvadó Usach, Vice-President of Delegate Committee, Head of Telecommunications Service at DGTSL.
- Mr. Gonçal Bonhomme i Altable, Deputy Secretary of the Board, Manager of Innovation at Orange.
- Mr. Jordi Escalé i Castelló, Managing Director at Centre de Telecomunicacions i Tecnologies de la Informació (CTITI).
- Mr. Jordi Troté Escribano, Head of Institutional Relations at Acció.
- Mr. Lluís Comellas i Riera, Research Vice-Rector at Universitat Ramon Llull.
- Mr. Javier Ruiz Fernández, R&D Coordinator at Alcatel-Lucent.
- Mr. Ángel Lozano, Research Vice-Rector at Universitat Pompeu Fabra.
- Mr. Amadeu Gassó Gimeno, vocal, Technical Manager of CCMA.
- Mr. Joan Bennassar, Technical Manager at Media Pro.
- Mr. Francisco Javier Marcos, R+D+i Manager at Abertis Telecom.
- Mr. Jordi Martínez, Innovation Director at TICSalut Foundation.
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- Mr. David Noguer i Bau, Regional Director at Juniper Networks.
- Mrs. Esther Real, Vice-Rector for Knowledge Transfer at Universitat Politècnica de Catalunya (UPC).
- Mr. Francesc Subirada, Deputy Director at Barcelona Supercomputing Center.
- Mr. Felip Fenollosa, Director at Fundació CIM.
- Mr. David Moure, Business Manager at Epson Ibérica.
- Mr. Joan Manel Martín Almansa, Managing Director at i2CAT Foundation.
- Prof. Josep Paradells, Director at i2CAT Foundation.
- Mr. Sergi Figuerola, Chief Technology and Innovation Officer at i2CAT Foundation.
- Mr. Artur Serra, Deputy Director at i2CAT Foundation.



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## MANAGEMENT

**Mr. Sebastià Sallent i Ribes,**  
Director until June 2015.

**Josep Paradells,** Director since  
June 2015.

**Mr. Artur Serra,** Deputy Director.

**Mr. Joan Manel Martín Almansa,**  
Managing Director.

**Mr. Sergi Figuerola,** Chief  
Technology and Innovation  
Officer.



---

## SUPPORT AREAS

**Project Management Office:**  
Flaminio Minerva, Sandrine  
Schwartz, Andrea Barquet,  
Monica Fernández, Vanessa  
Llobet

### Administration

Rocío Segura, Sonia Beltrán.

### Infrastructures and Services

Daniel Lirio

### Corporate Development

Susana Otero

### Living Labs and Digital Social Innovation Group

Marc Aguilar, Pau Adelantado,  
Víctor Jiménez

### Software Engineering Group

Javier Fernández, Josep Pons,  
Julio Carlos Barrera, Isart  
Canyameres, Adrian Roselló,  
Lino Valdivia, Oscar Moya,  
Athanasios Chalas, Carlos Morell,  
Ferran Quer



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## BUSINESS UNITS

### eHealth & eSocial Care

Yolanda Lupiáñez, Soraya  
Estévez, Andrea Cervera

### Industry 4.0

Silvia Castellví, Marc Vicente

### Smart Cities & Regions

Rosa Paradell, Miquel de la Mano



## ASSOCIATIONS, NETWORKS AND PLATFORMS



## OUTREACH ACTIVITIES

### JANUARY

- 17 “Internet has penetrated the cinema and music but not the industry”, Sebastià Sallent  
*El Puntcat*
- 18 “Catalonia wants to be a technological laboratory”, Artur Serra  
*Ara*
- 19 “Catalonia will have a SmartGlasses Apps development centre”  
*La Vanguardia*

### FEBRUARY

- 11 “Barcelona leads the European project GrowSmarter aimed at implementing 12 Smart City solutions”  
*Barcelona City Council / www.8tv.cat*
- 15 “In search of a new sense for the Industrial Ring”  
*Ara*

### MARCH

- 2 “First day of the Mobile World Congress in Barcelona”  
*8TV / www.cma.cat*
- 3 “The boom of the Health Apps”  
*TV3 / www.economista.es*
- 3 “SmartGlasses apps and Visible Light Communications, the i2CAT solutions at the MWC”  
*www.lavanguardia.com*

### APRIL

- 15 “The EU praises the Smart Region Strategy of Catalonia”  
*La Vanguardia / www.btv.cat*

### MAY

- 17 “The doctor’s consultation via videoconference”  
*BTV / www.ara.cat*
- 17 “Barcelona trials a videoconference solution for the patient care”  
*Ara / www.lavanguardia.com*
- 18 “Visiting the doctor’s through the computer”  
*La Vanguardia / www.ccma.cat*
- 18 MORE Project at the Telenotícies nws bulletin, 38’12”  
*TV3 / comunicacio21.cat*
- 20 “New connected TV trials in Gurb during the TV3 electoral spots”  
*www.ara.cat/*

### JUNE

- 6 “The doctor from his office and the patient from home”  
*Ara / www.lavanguardia.com*

### JULY

- 17 “i2CAT activity reoriented and open to Europe”  
*La Vanguardia / www.i2cat.net*

### SEPTEMBER

- 13 “The fourth industrial revolution in Catalonia”  
*La Vanguardia*

### NOVEMBER

- 17 “i2CAT presents a new sensor”  
*Tecnnews*

### DECEMBER

- 10 “i2CAT creates an initiative aimed at fostering the Internet of Things”  
*La Vanguardia*





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