



The Internet of Things (IoT) in Catalonia

October 2019

Technological report

ACCIÓ



**Generalitat
de Catalunya**

The Internet of Things (IoT) in Catalonia: Technological report

ACCIÓ

Regional Government of Catalonia (Generalitat de Catalunya)



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Execution

Strategy and Competitive Intelligence Unit of ACCIÓ and
Sowlers Technologies SL

Barcelona, October 2019

Table of contents

1. The Internet of Things (IoT): definition and importance for industry	4
2. Main global figures	10
World IoT market	
World leading companies in IoT	
Main global investors	
3. Trends and applications	22
Main fields or sectors of application	
The Internet of Things and the Sustainable Development Goals	
Recent and prospective applications	
4. The Internet of Things in Catalonia	30
Main mapping conclusions	
The IoT ecosystem in Catalonia	
TECNIO centres specialising in the field of the Internet of Things	
Successful application cases of the IoT in Catalonia	

1. The Internet of Things (IoT): definition and importance for industry



What is the Internet of Things (IoT)?

It is the **digital interconnection** of objects in different areas – home, industry, city, etc. – that allows us to **integrally monitor the state of objects** based on the collected data analysis.



It involves **enriching different devices with integrated computing** and connecting them using standard technologies. This allows different devices to **communicate and interact**, both between them and with centralised controllers. **Analysing the data** collected by these objects allows them to make decisions and act or **modulate their behaviour**.

The Internet of Things (IoT) is a **key driver for innovation**, focused on consumers, data-based business opportunities, industrial transformation, new applications and even new business models, as well as revenue flows in all sectors of the digital transformation economy.

The IoT concept, depending on its field of application, may adopt different names: «**smart cities**» in the case of urban applications, «**industrial IoT**» (IIoT) for industrial applications, «**smart homes**» for household applications, «**connected vehicle**» in the case of vehicles, etc.

The IoT is not a technological revolution, but a technology-leveraged **business revolution**. It is about the **services** offered, not the devices themselves.

Source: IDC, World Bank and our own data.

How does the Internet of Things (IoT) work?

COMPONENTS



Sensors

The sensors collect data from physical or mechanical systems and transfer it to the cloud using networks and connectivity technologies.



Networks

Connections are established through short-range wireless technologies, such as WPAN (Wireless Personal Area Network), WAN (Wide Area Network), Wi-Fi or mobile technology (5G).



Big data/analytics

Smart analytics are applied to extract useful information.



Actuators

They allow changes to be made to the internal state of the device or use it to perform an external task.



IoT KEYS FOR COMPANIES

Reducing expenses

Increasing productivity while maintaining production times.

Reducing costs.

Reducing waste.

Increasing profits

Better understanding the sales patterns and improving the demand forecast.

Improving user experience while increasing retention.

Achieving a better time-to-market.

Source: IDC, World Bank and our own data.

Challenges and threats linked to the IoT

CHALLENGES

Electric power and consumption

IoT applications rely on devices operating on electrical energy. Therefore, it is very important that they are low-power devices with compact, longer-lasting batteries, in order to facilitate continuous operation of these devices.

5G: bandwidth and coverage

The networks must provide stable and reliable coverage and connectivity, despite the great demand generated by the large number of devices and connections. Limited coverage causes a reduction in profits of IoT applications.

Technology

Due to the large number of elements to be deployed and the different features to be developed in IoT systems, better and more compact sensors are needed to promote integration and functionality, without increasing manufacturing costs.

Interoperability and standards

The wireless standards currently available are limited in terms of interoperability, so as to be able to face the connectivity of the large number of existing elements. This can lead to an unreliable data exchange between devices.

Big data/analytics

IoT devices produce a massive data volume of different kinds. This data is transmitted unprocessed and unorganised, which poses new challenges for current analytical techniques in order to process and interpret data.

Market readiness

Some of the IoT application industries require governmental regulation. Despite the availability of innovative technologies, the lack of policies keeps the market in a developmental state, due to the risk of impacting future business lines.

THREATS

Reliability

The current life cycle of consumer electronic devices (2 to 4 years) is not feasible for large-scale IoT deployments. Due to device replacement costs, applications do not obtain the desirable value throughout their useful life.

Privacy

The personal and confidential nature of useful data generated makes system privacy and integrity protection necessary. It must be ensured that only authorised users can access device data.

Security

Many IoT devices show vulnerabilities, due to the high computational costs of cybersecurity solutions. Unwanted players must be prevented from accessing devices, especially as to IoT systems that have an impact on the physical world.

Source: IDC, World Bank and our own data.

IoT application segments

The IoT can serve two large user groups:

a) Business environment:

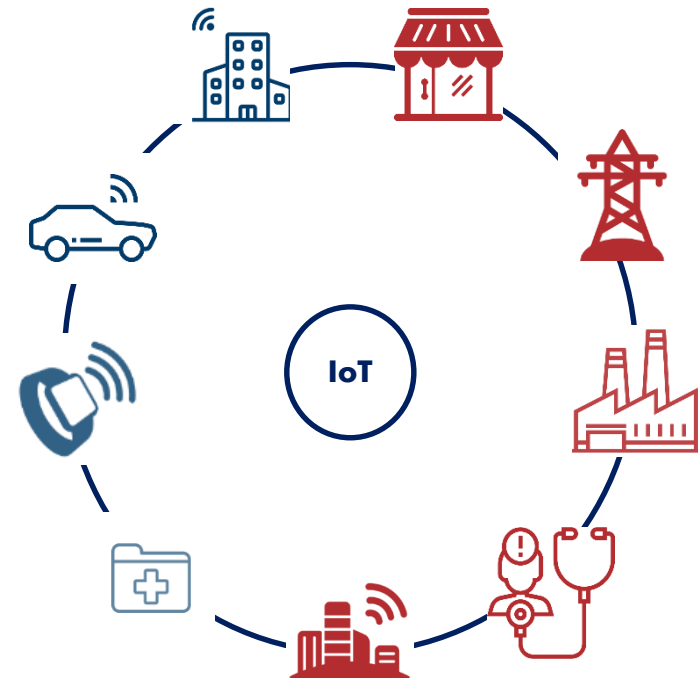
- Industrial IoT (IIoT)
- Trade
- Facilities and energy
- Health system
- Smart cities

b) End users/consumption:

- Connected households
- Wearables
- Connected vehicle
- Personal health

The motivation of the business segment investing in IoT is based on reducing the risk of business discontinuity through sensorisation and predictive analysis, increasing workforce productivity and new opportunities for product development.

The mass market segment is increasingly using the IoT to save time and money, as well as to increase personal comfort through the use of smart home automation. Moreover, they are equipped with health monitoring devices to improve their well-being and lifestyle.



Source: IoT Analytics 2018, GrowthEnabler & Gartner.

Practical examples of IoT ecosystems

The ecosystem in which the Internet of Things occurs allows the user to remotely connect and control their devices. By using a remote control device (smartphone, tablet) you can access information generated by different sensors or send the order to start a process.

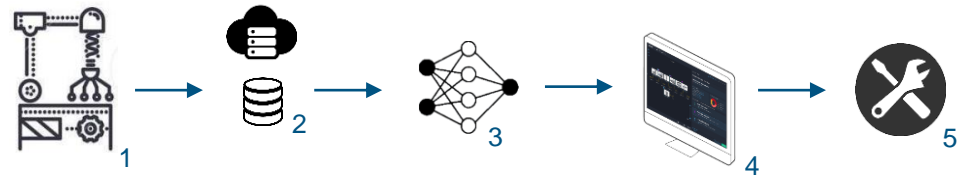
The device processes the received order and executes the action or sends the requested information through the network, for it to be analysed and shown on the remote control device (smartphone, tablet).

- In the example of a connected home, the user monitors the state of the different devices (lighting, temperature, operation) and is able to start or stop it.



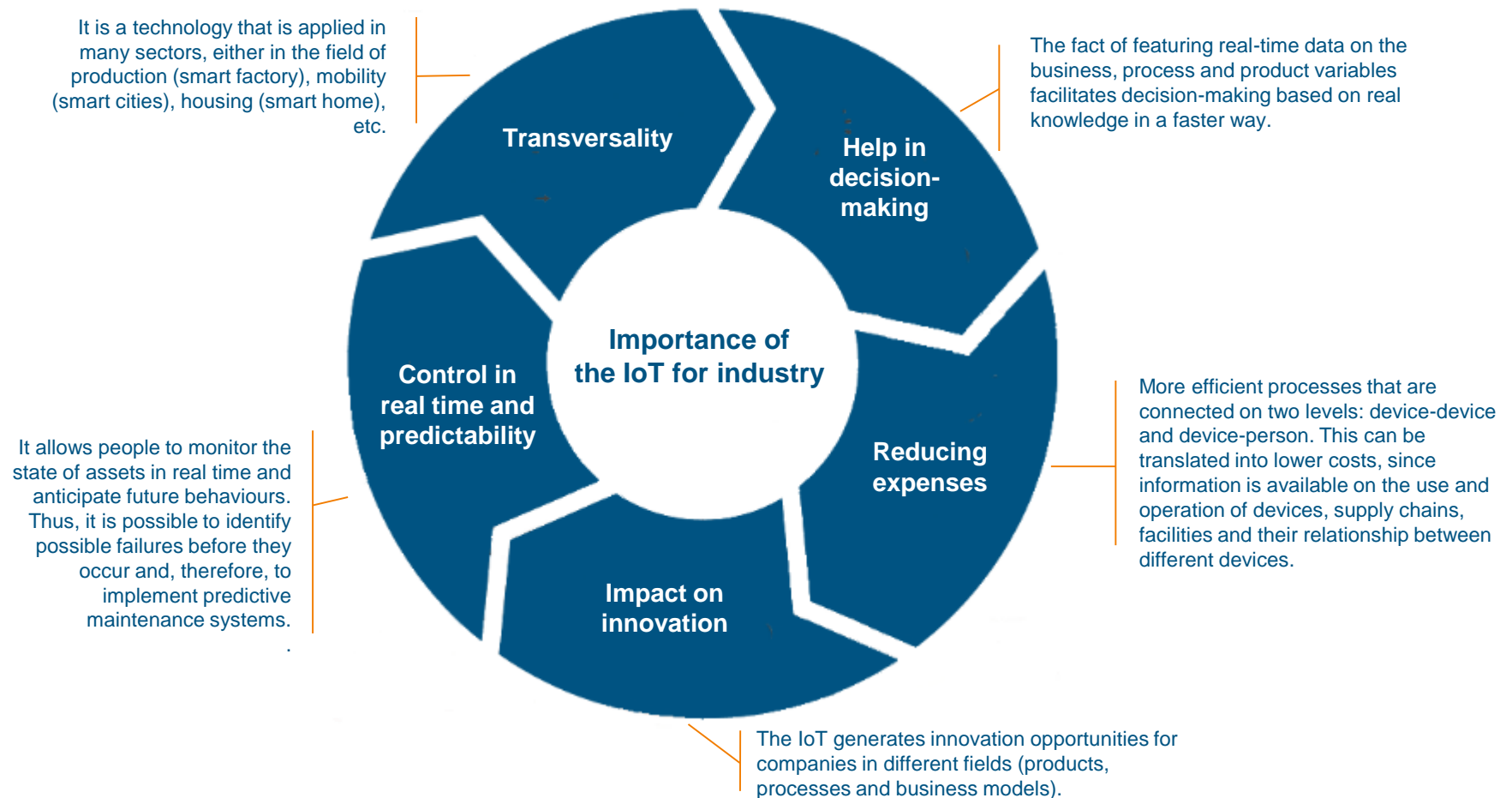
1. Switching on or off the air conditioning.
2. Switching on the lighting.
3. Programming cleaning devices.
4. Switching on or off the TV set and channel control.
5. Monitoring food quantity and state.

- With regard to industry, the IoT allows us to monitor production processes and carry out predictive maintenance by sensorising and monitoring the maintenance needs of robots throughout the chain and prepares repairs before the components are damaged.



1. Sensorised production chain.
2. Operation data is collected and stored for processing.
3. A predictive analysis of future failures is made by means of machine-learning algorithms.
4. Viewing state information and possible alerts on the monitoring and control dashboard.
5. In the case of breakdown forecasts, an automatic maintenance ticket is generated.

IoT importance for industry

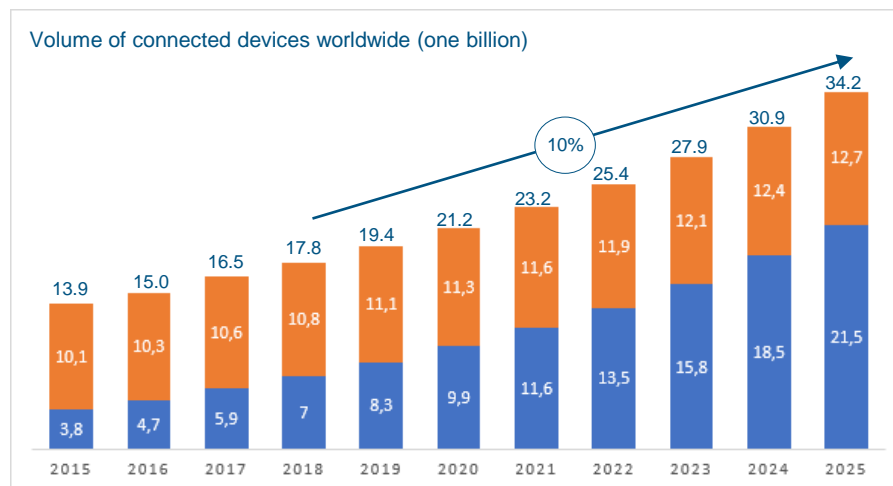


2. Main global figures



Number of connected devices

- The volume of connected devices worldwide in 2018 exceeds **17 billion**.
- The volume of connected devices in 2018, excluding smartphones, tablets and laptops, amounts to **7 billion**.
- Growth is expected to place connected devices at **9.95 billion** by 2020 and at **21.5 billion** by 2025. These values take into account active connections and exclude devices that were previously acquired and are no longer used.
- Regarding the ratio between IoT devices and population, there has been a significant growth in recent years, which is expected to continue. Whereas in 2013 this ratio stood at 0.07 devices per person, it is expected that this figure will reach 2.72 devices per person by 2020 and that it will exceed four devices by the year 2025.



Smartphones, tablets and laptops

IoT devices, excluding smartphones, tablets and laptops

Year	Population	IoT devices	Ratio
2013	7.16	0.5	0.07
2015	7.38	13.9	1.88
2020	7.79	21.2	2.72
2025	8.18	34.2	4.18

Source: IoT Analytics 2018.

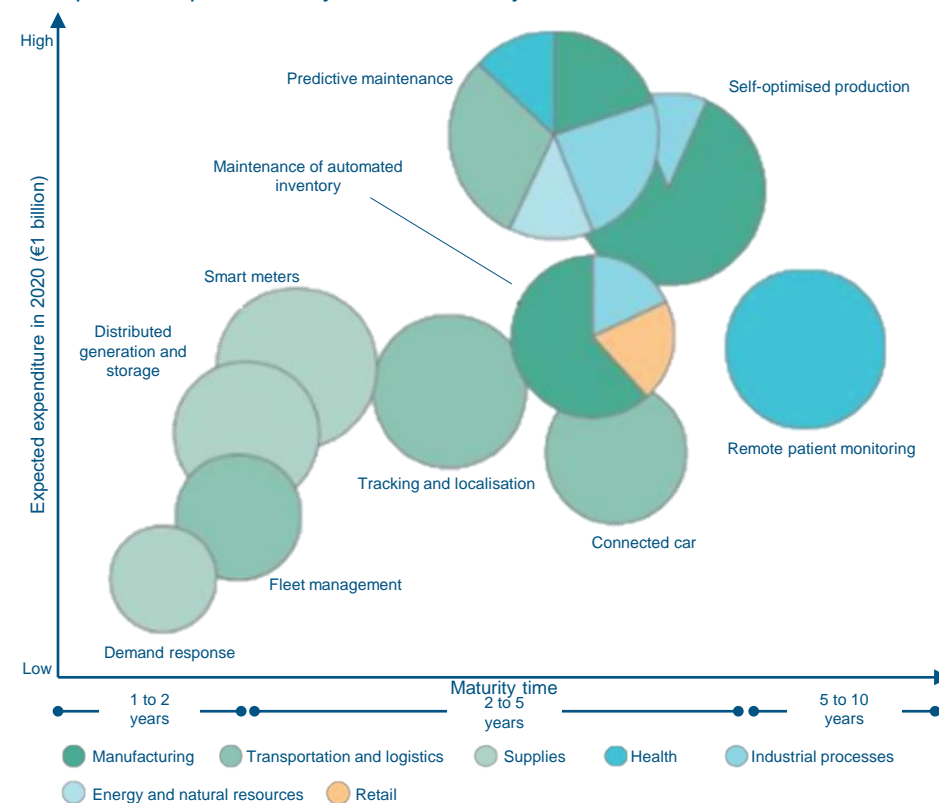
Current and prospective data (I)

Predictive maintenance, self-optimised production and automated inventory management are the three main cases of use that drive the growth of the IoT market until 2020.

With the aim of increasing customer satisfaction, improving quality, supporting new business models and reducing costs, the following cases of use are considered the most valuable:

- The use of sensors to predict when the machinery will be repaired.
- Self-optimised production.
- Automated inventory management.
- Remote patient control.
- Smart meters.
- Tracking and localisation.
- Connected cards.
- Distributed generation and storage.
- Fleet management.
- Demand response.

The following chart compares the ten cases of use with the level of expected expenditure by time to maturity.



Source: Boston Consulting Group, IDC.

Current and prospective data (II)



By 2020, **more than 65% of companies** (at present, 30%) will have adopted IoT products.

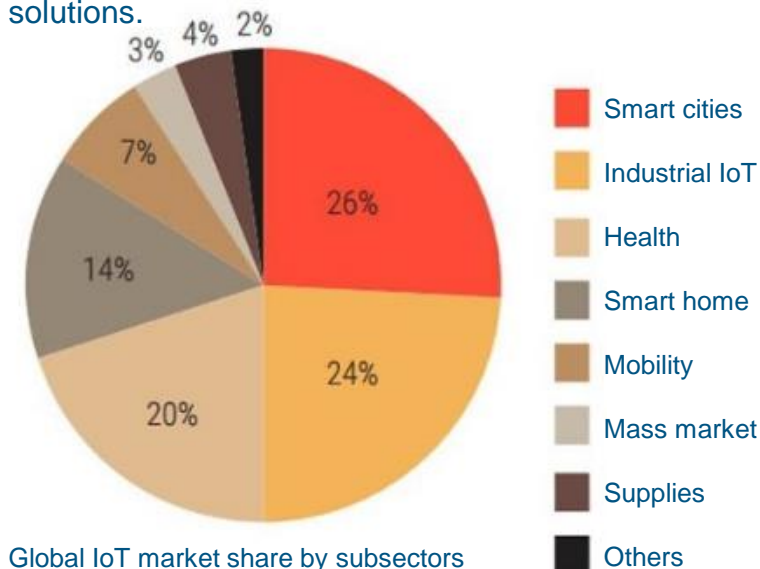
Investment and return:

Global IoT financing levels reached 4.5 billion US dollars in 2016, with a growth forecast of 5% year-on-year.

In 2020, the global IoT market share will be dominated by three subsectors: smart cities (26%), industrial IoT (24%) and health (20%).

It is expected that the IoT will have the most transformative effect on industries that are currently not based on technology.

The most critical success factor of all these cases of use depends on secure, scalable and reliable integrated solutions.



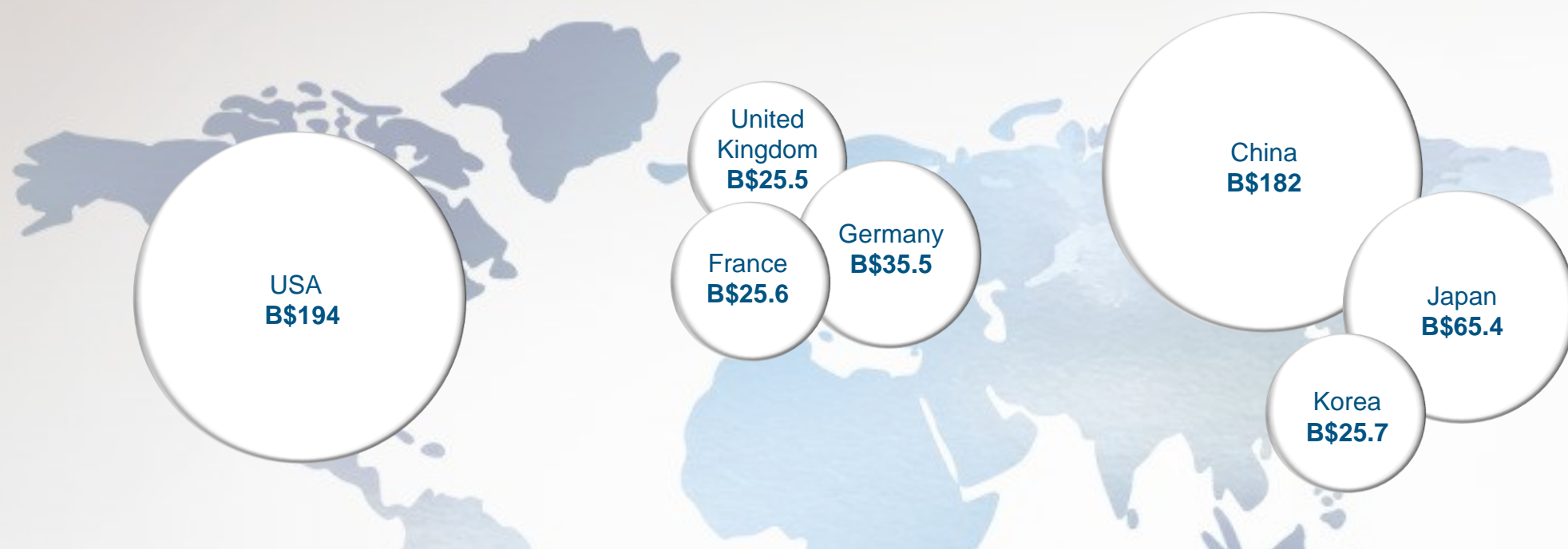
Global IoT market share by subsectors

Source: GrowthEnabler, Boston Consulting Group, Gartner.

Main regions and relevant hubs (I)

Worldwide spending on the Internet of Things (IoT) is projected to reach **745 billion** US dollars by the end of 2019. This represents an **increase of 15.4%** over the 646 billion invested in 2018.

IoT market in 2019 (billions of USD – B\$)



It is expected that it will maintain the annual two-digit growth during the 2017-2022 period and exceed **the milestone of 1 billion** in 2022.

Source: IDC 2019.

Main regions and relevant hubs (II)

In the case of industrial IoT, the five countries with more companies represented in the sector are the United States (51), Germany (10), Japan (7), United Kingdom (7) and Switzerland (3).

63% of all supplier headquarters are located in these five countries.



Source: Accenture 2018, IoT One.

World-leading IoT companies (I)

The **top 20 companies** in the IoT field are:

Top 5



ORACLE®



amazon



BlackBerry



Honeywell



SmartThings

fitbit.



FUJITSU



T-Mobile



Control4



Source: IoT Analytics.

World-leading IoT companies (II)

The **top 5 companies** in the IoT field worldwide are:



Watson IoT Platform. From web applications to mobile backends and DevOps, IBM Cloud offers them support for virtually any application or workload. A fully managed and cloud-hosted service with device recording features, connectivity, control, fast viewing and data storage.



Cloud IOT Core is a fully managed service, with which you can safely and easily connect, manage and enter data from millions of devices spread across the globe. A complete solution is available to collect, process, analyse and view IoT data in real time, which translates into an improvement in operational efficiency.



Focused on the power of mass exploitation of data generated by sensors. Intel processors provide information processed in real time to help businesses make better decisions in an efficient way.



Azure IoT. The connection of resources and assets with the IoT allows us to draw conclusions in real time that help to improve decision-making, promote experience, expand the capacity of collaborators and create a better experience for clients.



Focused on industrial solutions (IIoT). Industrial IoT platforms, which are highly scalable, flexible, safe and easy to deploy, help to improve the time of activity, reduce operating costs and make investments for the future.

Source: IoT Analytics.

Main global investors (I)

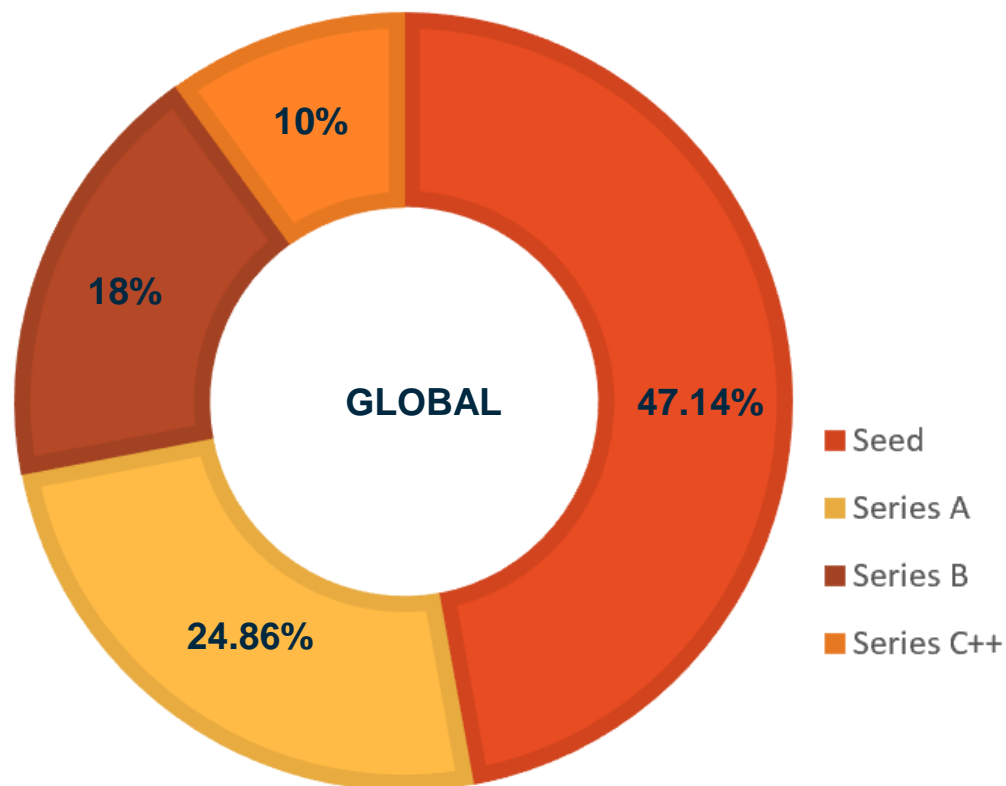
The **world's most active investors** in the IoT field during the 2012-2018 period have been the following:



Source: CB Insights.

Main global investors (II)

- During 2018, globally negotiated agreements have tended towards early-stage investments (seed stage) and Series, which accounted for 71% of the agreements.
- Investments in start-ups at an intermediate stage have meant 22% of the agreements, while only 7% were established at an advanced stage.



Seed (M€0.25 - < M€1)
A series (M€1 - < M€5)
B series (M€5 - < M€20)
C++ series (more than M€20)

Source: GrowthEnabler.

Main fairs and congresses

The **IoT Solutions World Congress** is the leading international event, linking the IoT to industry, and is considered one of the major events worldwide.



Source: Accenture 2018, IoT One.

3. Trends and applications



Main fields or sectors of application

The IoT is currently being applied to sectors with a **great potential for interconnected applications**.

Main fields of application:



Smart cities



Smart homes



Mobility



Industrial IoT (IIoT)



Mass market



Health



Supplies

Main technologies:

- IoT security
- IoT analytics
- IoT device (thing) management
- Low-power, short-range IoT networks

- Low-power, wide-area networks
- IoT processors
- IoT operating systems
- Event stream processing

- IoT platforms
- IoT standards and ecosystems

Recent and prospective applications (I)

CURRENT APPLICATIONS

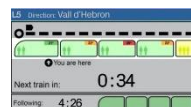
FUTURE APPLICATIONS

Available technology

Underdeveloped technology

Developing technology

SMART CITIES



Occupancy control
in public
transportation



**Real-time
parking
information**



**Dynamic road
markings**



**Traffic light and
lighting control**



**Acoustic pollution
mapping**



**Comprehensive
traffic and parking
management**

SMART HOMES



Smart thermostat



**Comprehensive
home security**



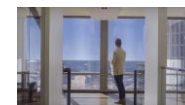
**Integration of security,
power supply and
heating systems**



**Media – audio and
video reproduction
control**



**Caring for the
elderly and
disabled**



**Smart windows
adapted to outdoor
conditions**

Recent and prospective applications (II)

CURRENT APPLICATIONS

FUTURE APPLICATIONS

Available technology

Underdeveloped technology

Developing technology

MOBILITY



Navigation aids and route optimisation



Connected vehicle (smart vehicle)



Predictive maintenance of roads, tracks and ports



Information on the state of tracks in real time



Customs queue management system



Fuel monitoring and predictive vehicle and fleet maintenance

INDUSTRIAL IOT (IIOT)



Temperature control to maintain quality



Control of usage capacity and equipment loading management



Satellite network for wildlife monitoring



Process control and stock monitoring



Logistics in the cold chain



Agricultural sensorisation analytics

Recent and prospective applications (III)

CURRENT APPLICATIONS

FUTURE APPLICATIONS

Available technology

Underdeveloped technology

Developing technology

MASS MARKET/ RETAIL



Sensorisation of biodegradable and biocompatible food



Retail
Individual information in real time



Retail
Integration of sales services into tourism – e.g. shopping day trips



Prevention of bicycle thefts



Reducing paper forms
through the use of mobile devices + sensors + QR codes + cloud services



Retail
Smart shelves

HEALTH



Smart watch



Monitoring disease risk



Remote health monitoring and treatment of chronic diseases



Smart scales

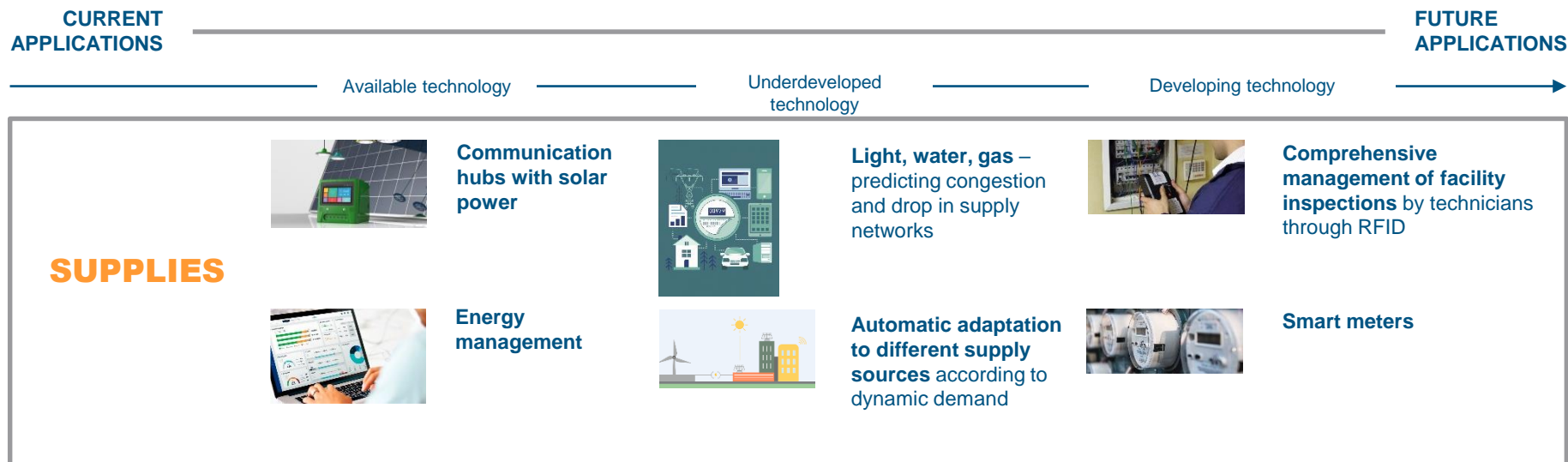


Providing updated and real-time information to the nearest clinic



Smart beds at hospitals

Recent and prospective applications (IV)



The Internet of Things and the **OBJECTIUS** DE DESENVOLUPAMENT SOSTENIBLE

(I)

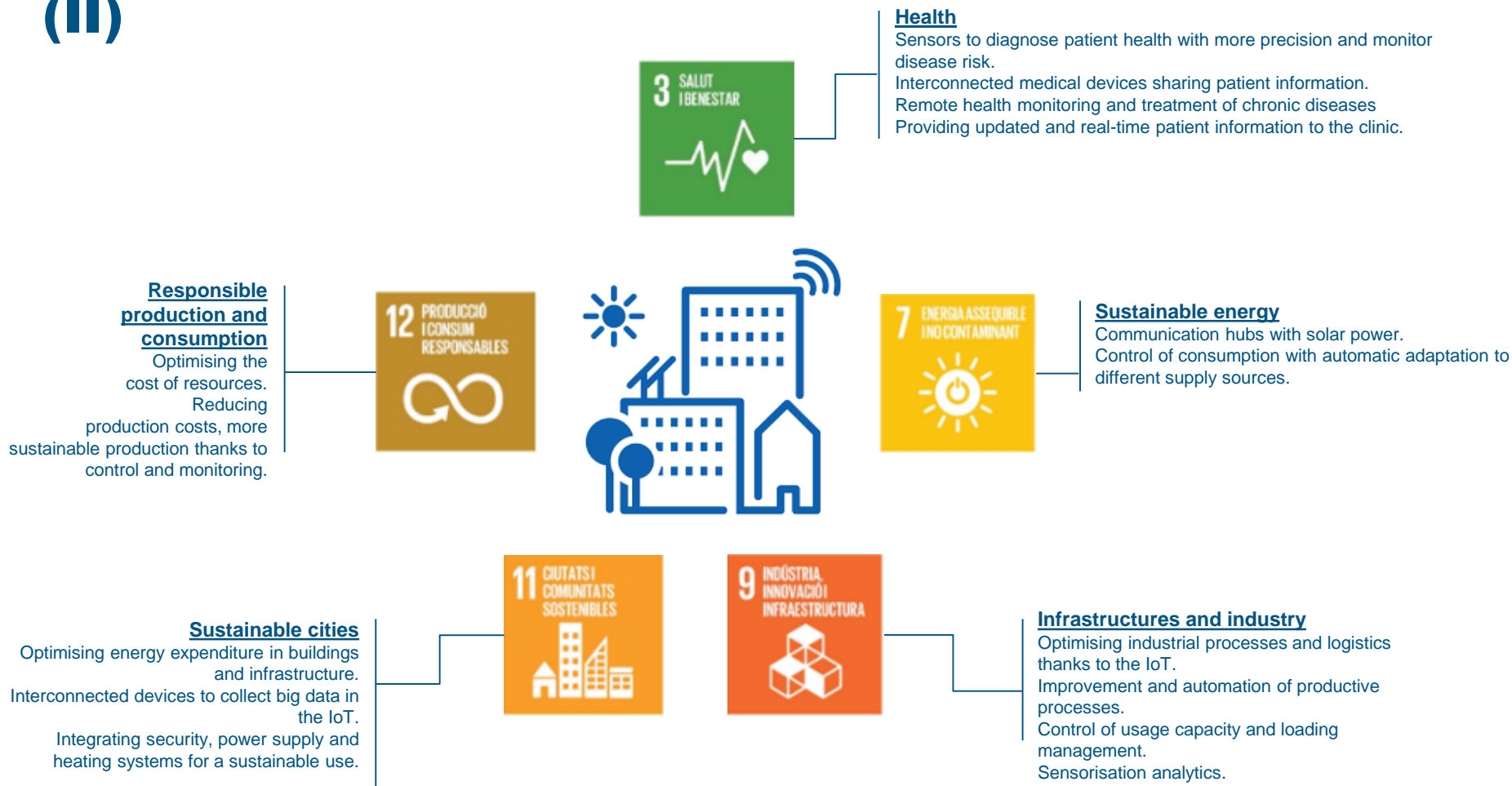
The **Sustainable Development Goals (SDGs)** are the master plan to achieve a sustainable future for everybody. They interrelate with each other and incorporate the global challenges we face every day, such as poverty, inequality, climate, environmental degradation, prosperity, peace and justice. The SDGs integrate into the 2030 Sustainable Development Agenda of the United Nations, which aims to improve the quality of life and social welfare of all inhabitants on the planet, hence guaranteeing progress and economic development in a sustainable and environmentally-friendly way. **As a disruptive technology with multiple applications in virtually every field, the Internet of Things (IoT) will help in achieving these goals.**



Source: EIC (DGI-ACCIÓ) based on United Nations data.

The Internet of Things and the **OBJECTIUS** DE DESENVOLUPAMENT SOSTENIBLE

(II)



Source: World Economic Forum, SmartCity Expo World Congress, ITU, CISCO, ERICSSON.

4. The Internet of Things in Catalonia



Main mapping conclusions

The Internet of Things in Catalonia



251 companies have been detected in Catalonia that are dedicated to offering IoT solutions for businesses

A turnover of M€519.9 directly linked to the Internet of Things

3,188 employees linked to the Internet of Things

Types of companies considered:

- Platforms and software (31.3%)
- Integration (30.5%)
- Consulting and services (24.1%)
- Sensors (10%)
- Network (4%)

An ecosystem formed by both start-ups and mature businesses with a business line in the IoT

63.8% of companies are less than ten years old

53.6% of companies are SMEs

32.5% of companies with a turnover of more than one million euros

Highly internationalised sector:

38.6% of companies are exporters

10% of companies have branches abroad

The IoT ecosystem in Catalonia (I)

Within the IoT market in Catalonia, we can identify the following types of companies in the value chain:



Sensors and automation

A company that develops components and IoT-enabling sensors



Network and cloud

A company that manages and offers IoT network and infrastructure



Platforms and software

A company that develops management platforms, software and IoT applications



Integration

A company that integrates sensors and components into devices to provide them with IoT and market them



Consulting and services

A company that offers consulting and other services around the IoT



Application sectors

Smart cities

Smart homes

Mobility

Industrial IoT (IIoT)

Mass consumer

sector/retail

Health

Supplies

The IoT ecosystem in Catalonia (II)

Partially illustrative



Source: EIC (DGI-ACCIÓ) from various sources, among which the companies directory of the IoT Catalan Alliance.

Centres specialising in the field of the Internet of Things (I)



Centre for Sensors, Instruments and Systems Development
UNIVERSITAT POLITÈCNICA DE CATALUNYA
Shaping light to your needs

Technological innovation centre developing its activity in the field of **optical engineering**. Its activities focus on developing real applications of light, especially in the fields of health sciences, optical sensors (real-time information acquisition, vision in remote areas of the visible spectrum), lighting, displays and energy, incorporation of optical devices to control and measure the production processes as well as the manufacture of optical systems and components.



Research of new principles and properties of materials for microsystems, new manufacturing and assembly modes, new algorithms for integrating information processing, new applications of microsystems in micro-instrumentation and process control. Applications in: bioelectronics, medicine, environment, agriculture or food, automobile industry, robotics, instrumentation and pharmaceuticals.



A centre specialising in the construction of functional prototypes susceptible of being industrialised and marketed. Experts in energy or movement control applications. Developed technologies: electricity, control electronics, power electronics, industrial communications and digital control with processors. Applications of these technologies: from the automation of processes and machines to renewable energies and the electrical network, among many others.



CEPHIS intends to become a landmark centre in the field of flexible electronics. CEPHIS investigates technologies, methods and applications to generate flexible electronic systems both physically and functionally.

Flexible electronics allow a better adaptation, in terms of comfort and cost, to the new application environments of electronic systems (person, automobile, housing, city, Industry 4.0, etc.). Physical flexibility allows for mechanical and functional adaptation of associated computing.



The centre, located in Castelldefels, develops basic and applied research, focusing on the following lines: **systems**, networks and communication technologies as well as geomatics. Regarding Industry 4.0, there are software-defined networks and virtualisation, simulation, RFID, wireless power capture and transfer, machine-to-machine communications and Internet of Things (IoT) platforms, among others.



UAB

Cutting-edge research in the analysis of medical images, visual recognition of objects, document analysis, image, colour and texture interpretation, embedded vision, visual perception, industrial vision, indexing and multimedia recovery, image interpretation from video surveillance, interactive visualisation in 3D and augmented reality. Highly specialised technical consulting and technology transfer through the development of customised developments for companies.

Centres specialising in the field of the Internet of Things (II)



The centre specialises in information technologies and in the development of **software** focused on the management and analysis of large data volumes for companies and for public administration. **Its technological offer includes, among others, a management system of large information volumes in the form of a high-performance network or graph, or a smart cities management platform that allows you to interact with mobile applications and define the best route following customised and adaptable criteria in real time.**



The **Easy** Centre performs basic research in the field of artificial intelligence, combined with the technological transfer in many applied research projects. **It specialises in artificial intelligence and machcrowd, in smart digital technologies and their transfer to industry.**



Eurecat was born from the union of several technology centres, thus bringing together over 600 professionals in a wide range of areas of expertise, both in the industrial and digital fields. In relation to Industry 4.0, some of its research fields are: new manufacturing processes, autonomous robotics, simulation, 3D printing, big data and **IT security**.



The **GTI** focuses on the human side of technology and explores new uses and technologies, with research components in person-computer interaction, learning supported by 3D technologies and graphics.

In relation to Industry 4.0, **the centre has developed and implemented robots, as well as telematic applications. It also features a field of specialisation focused on serious gaming.**



The centre, which belongs to the CSIC and is located on the UAB Campus, is dedicated to research in artificial intelligence. It also carries out technology transfer activities in companies, aimed at improving processes through the use of artificial intelligence.

It also **develops support systems for decision making.**



The Energy Research Institute of Catalonia (IREC), established in 2008, is the leading energy research centre in Catalonia and a landmark on a national and European level in technological research and development (R&D) within the energy sector. Around the ICTs and the IoT, it develops new **control protocols and data transfer for energy networks and energy management systems. Applications in energy, industrial systems and sustainable mobility. Integration of electric vehicles. Cybersecurity and resilience of power networks.**

Centres specialising in the field of the Internet of Things (III)



IRIS is an engineering company specialising in the digitisation of processes for the transformation into Industry 4.0. With more than ten years of experience and a constant commitment to research and innovation, IRIS digitalises laboratory processes to bring them to production lines through photonic technologies – mainly NIR devices – **and develops turnkey IT solutions**, i.e. custom applications in the cloud, data mining and blockchain, among others.



The purpose of the Agrifood Research and Technology Institute (IRTA) is to contribute to the modernisation, improvement and promotion of competitiveness; to the sustainable development of the agricultural, food, agroforestry, aquaculture and fishing sectors, as well as those directly or indirectly related to the supply of healthy and quality foods to end consumers; to food safety and to the transformation of food, and, in general, to the improvement of the wellbeing and health of the population. **In the field of the IoT, it develops sensors** with different applications in the agrifood field.



inLab FIB UPC is the innovation and research laboratory of the Barcelona Faculty of Computer Science at the UPC, with a track record of over forty years of collaboration with organisations and companies. **In the ICT field, it develops modelling, simulation and optimisation in industrial processes, transportation, energy and population dynamics; data mining and big data; cybersecurity; the IoT, data processing and analysis from sensors, geoservices, applications, etc.**



It develops its research and innovation activities in the field of architectures, applications and advanced Internet services. **It features of research lines in fixed and mobile network architectures, wireless sensor networks and content-based multimedia technologies**, with the aim of developing new products, services and applications in the fields of eHealth, smart cities and smart regions, advanced manufacturing and culture/creativity. It manages the Anella Industrial (Industrial Ring).



A technological landmark in the field of smart cities and the health sector, which promotes the use of ICT. The main research lines related to Industry 4.0 are communications, **decision-making support systems, man-machine interaction and security**. In these fields, it carries out research and technology transfer to companies. The centre features cutting-edge facilities to suit the different projects.



The institute has six research and development divisions: *Advanced Materials, Environment and Biotechnologies, Device Design and Engineering, Biomedicine, Safety and Sustainability* as well as *Fast-Moving Consumer Goods*.

In the field of Industry 4.0, they develop the following advanced manufacturing lines: **collaborative robotics, print electronics, roll to roll, rapid manufacturing, 3D printing and offline programming**.

Centres specialising in the field of the Internet of Things (IV)



MCIA works in the areas of energy efficiency, electromobility and industrial systems.

With regard to Industry 4.0, it develops technologies for collecting, processing, transmitting and storing information in digital format for the development of control solutions, monitoring and decision-making support, as well as **technologies that intervene in the maintenance and control of production plants, industrial processes and machinery, in addition to integrated smart management systems.**



SARTI intends to contribute to the development of the industrial sector and the competitiveness of its companies through the **development and application of instrumentation technologies and smart sensor systems.** It designs automated control systems that are applicable to multiple situations, equipment and sectors, from automotive, fishing, agriculture or any industrial process. It specialises in the treatment of information in the marine environment, while applying its expertise in instrumentation to obtain data in the field of oceanography.



Starlab's work fields are space technology and neuroscience, two areas with the increasing availability of data as a common element.

As to Industry 4.0, it **develops lines of work related to the cloud and the Internet of Things.**

Successful application cases of the IoT in Catalonia

To present successful cases, the following application sector classification has been used:

- Smart homes: Alfred Building
- Mobility: Sensing & Control
- Supplies: Effitronix
- Industrial IoT
 - CS2AC UPC
 - Effitronix
 - Geprom
 - Maccion
 - MCSystems
 - Slashmobility
 - Tracktio
 - Wecobots
 - Agricultural application cases: Atlantis Cattle and CCTC



Successful application cases of the IoT in Catalonia: Alfred Building

- This is the application of the IoT at home with the aim of making the surface and energy efficiency more profitable.
- In addition to the use of the IoT, other technologies such as big data, data analytics, cloud computing or cybersecurity apply.
- Through sensorisation and an existing building, without the need for any works or additional facilities, central and transversal management of the building and its housing is achieved.
- This results in an efficient management of the lighting, climate, safety and access lines. The building decides whether it is necessary or not to turn on lighting or air conditioning according to the marked savings guidelines.

Supplier:

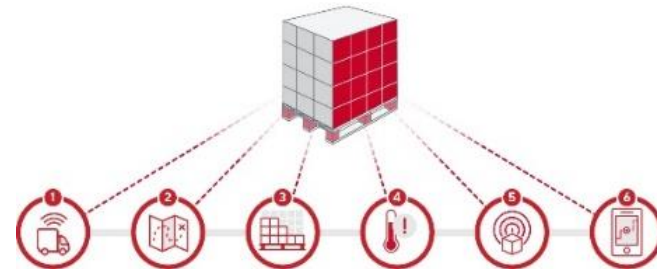


Client:



Successful application cases of the IoT in Catalonia: Sensing & Control

- The main challenge of this case is the monitoring and follow-up of pallets.
- Smart Pallet is a solution that allows you to track accuracy by combining it with smart containers, an ideal solution for logistics management. Such high accuracy is crucial for products that need real-time control.
- This results in a 4% reduction in fuel costs, a 3% reduction of pollution, a 100% reduction of lost units and thefts, and a 10% reduction in the use of wood for new units. At the same time, the quality of goods is guaranteed and the fleet expenses are reduced.



Successful application cases of the IoT in Catalonia: Effitronix

Since 2016, the Osona County Council applies the MICO24 predictive maintenance control system to the Taradell treatment plant in order to avoid any possible environmental spills and impacts, as well as to reduce the costs of corrective and preventative maintenance.

The MICO24 system analyses the data of some sensors that are installed at the key points of those elements to be controlled, processes the data in real time and sends the information to the responsible people indicating the incidence and corrective measure to be applied.

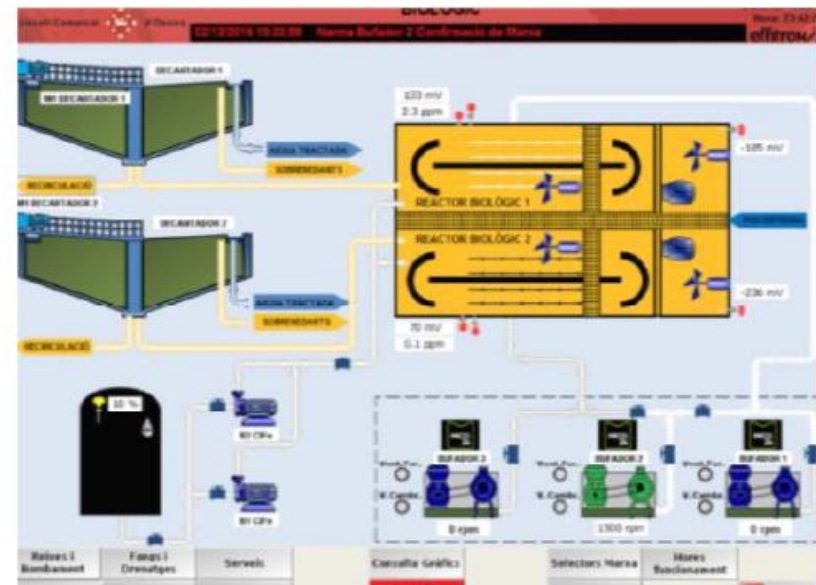
This results in a 10% reduction of energy consumption and 20% of maintenance hours, as well as the elimination of unplanned downtimes. On the other hand, the peace of mind and safety of plant personnel is reinforced with the control of the critical elements 24 hours a day.

effitronix
Innovation in efficiency
and mechatronics

Consell Comarcal



d'Osona



Successful application cases of the IoT in Catalonia: CS2AC UPC

- The specific CS2AC UPC research centre has participated in EnReMilk, a European project to minimise water and energy consumption within a multiproduct dairy process.
- The dairy industry features a high energy and water consumption: 60 m³ of water per ton of processed milk. 98% of the freshwater used is drinking water and 80% of energy is consumed in the heating, pasteurisation, sterilisation, drying and cleaning operations.
- To reduce it, first consumption patterns are identified in the processing chain. At a second stage, through monitoring and management techniques in real time to minimise the consumption of water and energy, these processes were modelled and microbial stabilisation, heating, texturing and drying techniques were applied.
- This results in 20% savings in energy consumption and 30% in water consumption.



Successful application cases of the IoT in Catalonia: Effitronix

The main aim of this case is to ensure the product and production process quality, as well as reducing the incidents and downtimes of the process through its monitoring.

The MICO24 Nano monitors the process (for production), product (for the quality) and machine (for predictive maintenance). It captures the sensor data and sends it to the MICO24 platform, which analyses and manages it directly in the cloud. From any PC or mobile device, you can check and receive historical alarms and incidents.

This results in the disappearance of unforeseen stoppages, a 15% increase in production, a 10% reduction of manufacturing costs and 8% of energy consumption.

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mimcord
Paper Cord & Yarn Manufacturer



Successful application cases of the IoT in Catalonia: Geprom

SEAT's challenge was to acquire data directly from robots, machines, PLCs, servers and other systems automatically to connect them with the manual operator data; with the aim of monitoring and controlling production so that users could make decisions in real time and thus increase their productivity and efficiency.

To achieve this, Geprom applied the SCADA/MES Legato Sapient system, developed a "digital twin" application for optimising logistics flows and created an application for digitising maintenance plans.

In addition, they began to monitor AGVs in real time, while promoting the traceability of the production of liquid filling systems, and managed to acquire information directly from machines and devices.



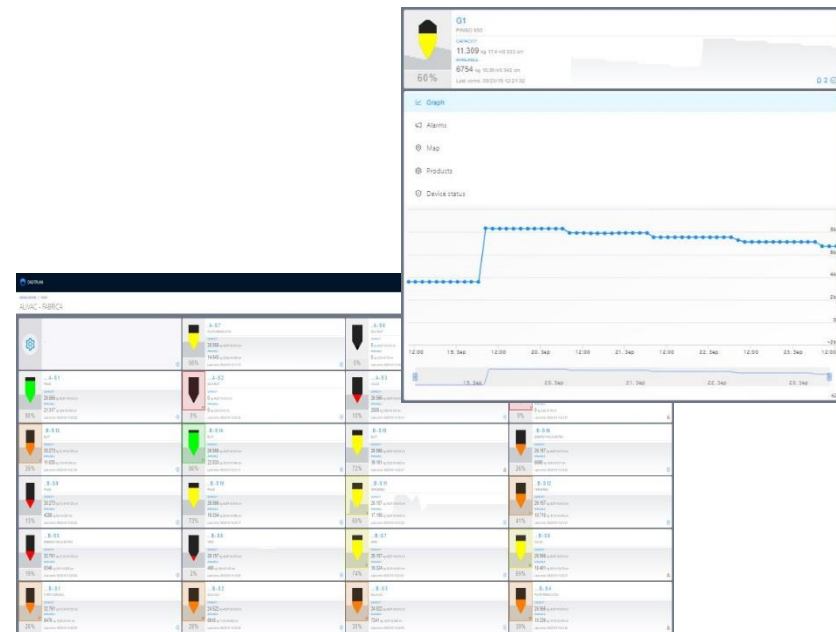
Successful application cases of the IoT in Catalonia: Maccion

- The main challenge in this case is the automatic and integrated management of the logistics of factories.
- Installation of IoT sensors with a life of ten years that detect the needs of material movements. The most advanced monitoring technologies ensure the traceability and inventory of assets and products in warehouses.
- The platform integrates and manages all the logistics based on rules and warnings to operators and people in charge.
- This results in a 50% reduction of shipping time, 40% stocks at the line and the removal of the human factor.



4.4. Successful application cases of the IoT in Catalonia: MCSystems

- This case consists in monitoring and controlling the supply of raw materials.
- Technological solutions that allow automating stock management control processes through own design and manufacturing products, while adapting to the demands and needs of the different sectors which we work with.
- Monitoring the product level in real time through sensors that are remotely connected with own management software or existing programs.
- This results in a 40% reduction of the monthly supply movements, a reduction in maintenance costs of the logistics fleet, a reduction in waiting times for the product supply and an increase in labour safety.



Successful application cases of the IoT in Catalonia: Slashmobility

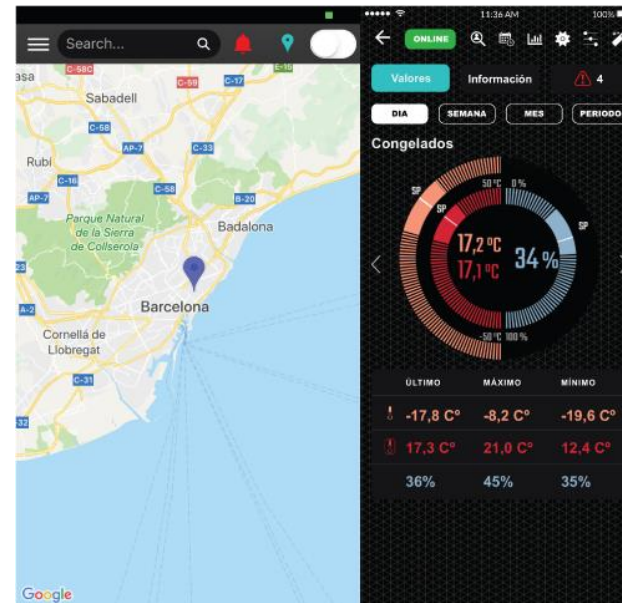
AKO specialises in regulation and control solutions for the industrial and commercial cooling market. A landmark in its sector with more than 40 years in the market and with innovation as its main asset: it allocates 10% of sales to R&D&I.

Development of an application for iOS and Android that allows users to remotely monitor the activity of the cooling chambers and be regularly notified, in case of an incident, to activate the action protocol.

In addition, a BLE communication is also established with the cooling chambers that allows an AKO expert to manage it and set it up remotely.

This results in an increase in productivity, the cost reduction and customer loyalty.

Slashmobility **AKO**



Successful application cases of the IoT in Catalonia: Tracktio

WireCo is the world's leading manufacturer of synthetic and steel cables for marine applications. Each cable is used in critical applications in remote places throughout the world, has an expiry date and a necessary certificate. Cable users need accurate information on each product, whereas the manufacturer wants to get feedback on the use and location of their products.

Tracktio has implemented the asset tracking solution based on the IoT, automatic identification with RFID-NFC, mobile applications and cloud computing.

This results in full traceability of each product, from the factory until it is used by customers, the control of manufactured products and their use. Furthermore, feedback is obtained from the product users through a contact mechanism between the manufacturer with their distributors and users.

tracktio



Successful application cases of the IoT in Catalonia: Wecobots

This case consists in the introduction of collaborative robotics in the process of applying an anagram on vehicles that are moving on a car assembly line.

The process automation involves tracking the identification of models, types and position of each vehicle.

Through an artificial vision system, a quality control of the label and its correct positioning in the car is carried out.

The process automation involves obtaining an efficiency close to 100%. Thus, the pressure quality of the anagram for its fastening is improved, which is not guaranteed in a manual process.

In addition, total process traceability is achieved.

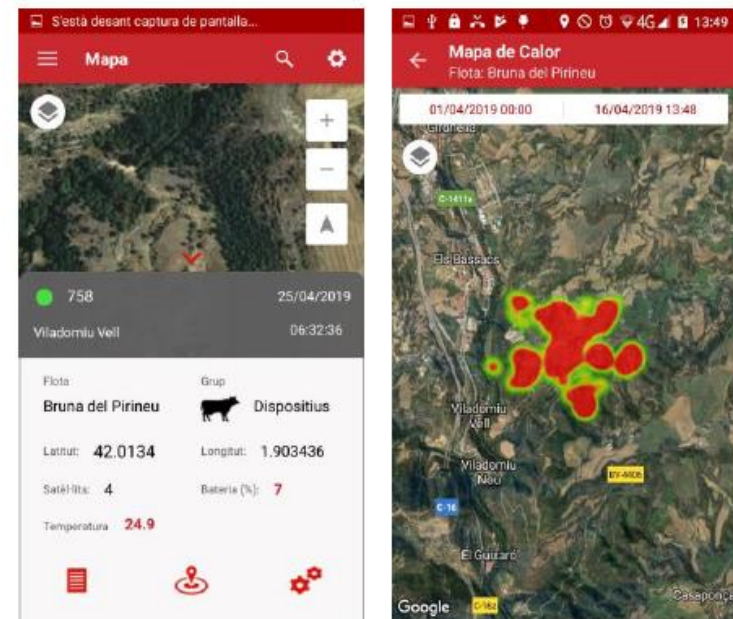


Successful application cases of the IoT in Catalonia: Atlantis Cattle



Atlantis Cattle is an innovative solution that allows you to geolocate and monitor cattle that is freely grazing on the mountain from an application.

It consists of an IoT device and an application (Android). The IoT device is portable and is integrated into the animal's collar. This device features several sensors, geolocation and a battery that provides it with a long life. The application allows you to geolocate livestock in real time and control the temperature and exit from territorial boundaries; it also features heat maps to monitor pasture patterns.



Successful application cases of the IoT in Catalonia: CTTC

- The aim in this case is to monitor the flock in real time: the location, identification, behavioural estimation and the state of animal health.
- For this reason, low-consumption devices are installed in animals and a cloud platform is used for the data analysis, storage and visualisation.
- Thus, the farmer can improve management decision-making. In addition, the number of births per year is increased, animal health is improved and meat is produced at a lower price.



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Take a look at the full report:

<http://catalonia.com/export/sites/catalonia/.content/documents/iot-technological-report.pdf>



More information about the sector, news and opportunities:

<http://catalonia.com/trade-with-catalonia/iot.jsp>

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