

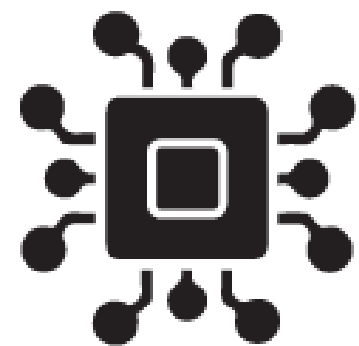


cubit
innovation labs

Cubit – Innovation Labs

Cubit – Consortium Ubiquitous Technologies s.c.a r.l. is a public-private research and innovation centre specialised in the **design and realisation of custom and low-power electronic devices**, measurement, monitoring and control systems, wireless communication solutions, and **Internet of Things (IoT) systems and services** for sectors such as industrial automation, smart energy, smart city, environmental monitoring, wearable devices, tracking.

Cubit is a **computational fluid dynamic** (CFD) competence centre, offering consultancies for the evaluation of experimental and numerical aerodynamics. Cubit's fluid dynamics division defines and implements innovative procedures in the fields of fluid dynamics design, CFD, numerical simulations, optimisation, fluid-structure interactions, and FEM, using a **proprietary cluster** of 9216 cores.



Silicon and software engineering



M2M Connectivity and Integration



IoT and Cloud solutions



Applied Fluid Dynamics and CFD



A cluster of innovative organisations

Cubit's shareholders includes both public and private organisations, with deep technological expertise and international breath.



UNIVERSITÀ DI PISA



Polo Tecnologico



WiTech
Simplify the wireless networks



NetResults
Building the digital society



Who we are

We are an **agile** team of experienced **professionals**, with diversified skills in **hardware**, **firmware**, and **software** development technologies.

We are a reliable **technological partner** that can guide and support the customer through its **digital transformation and innovation** process.

We are a registered research and technology transfer laboratory of the Tuscany Region.

We are member of national and **international associations** (ALL DIGITAL, NextIN, AIOTI).



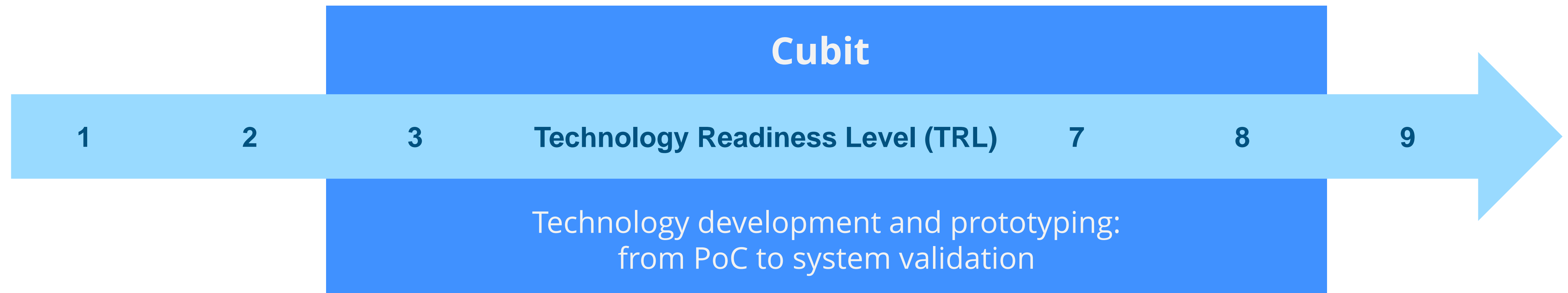
What we do

We design and implement **electronic devices** and **digital services** to create innovative products and solutions that realise the customer vision.

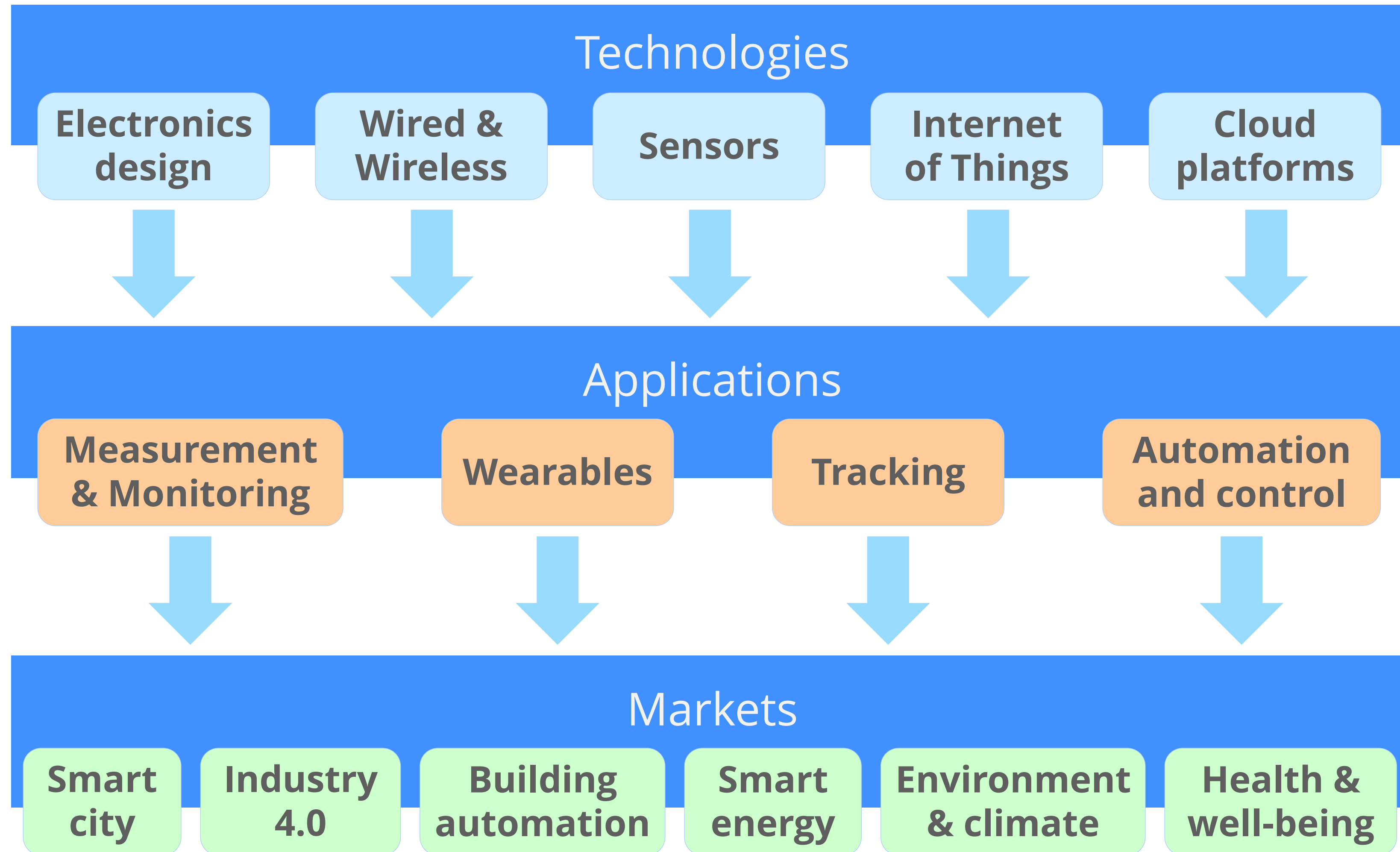
We support the customer in assessing the project **feasibility** and in the definition of the **specifications**.

We take care of the **prototyping, testing, certification**, and **industrialisation** phases.

We select the **components** and **technologies** that satisfy the requirements while minimising the **production costs**.



What we do



Start up acceleration

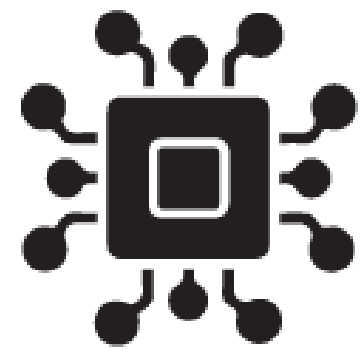
We have nurtured the creation and accelerated the growth of digital start-up companies:

RFID identification and tracking (SensorID)

smart mobility and smart city (Kiunsys)

environmental monitoring (Nuvap)





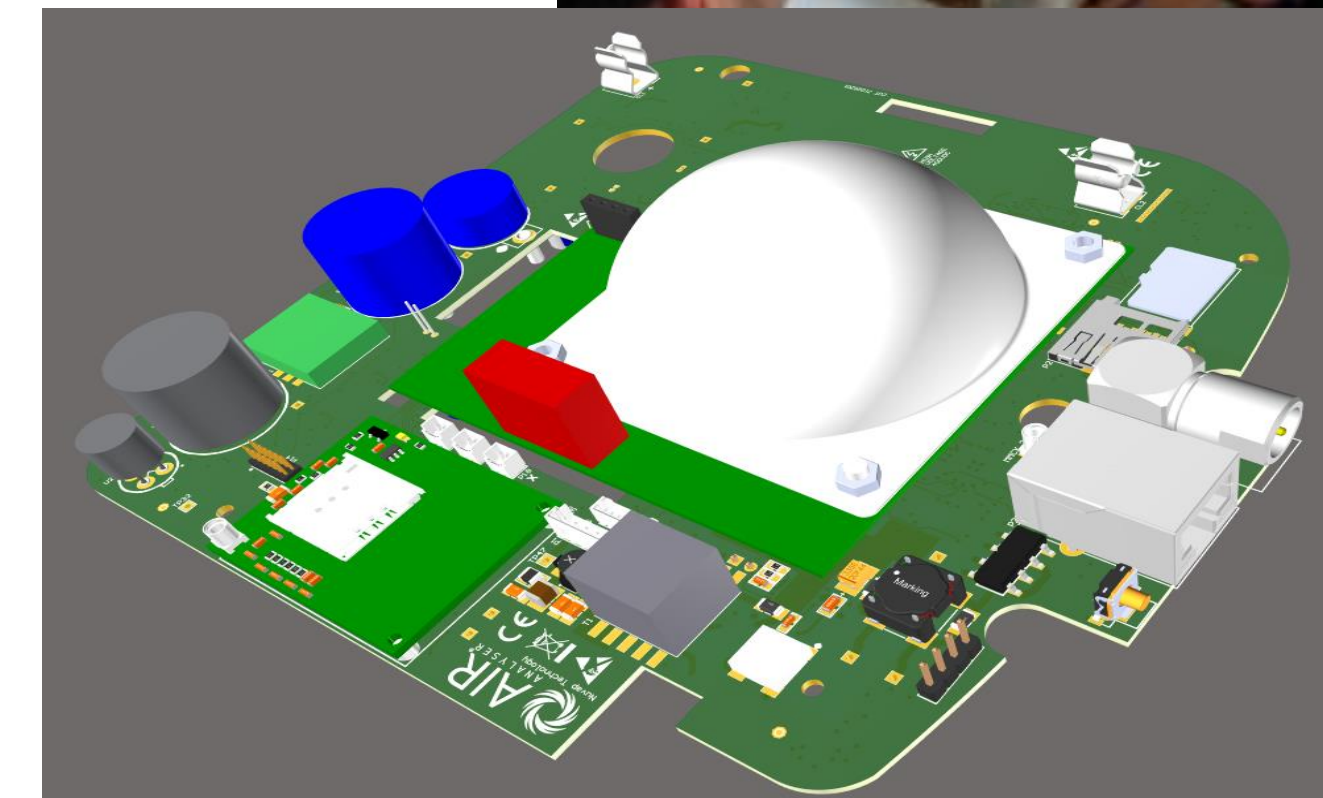
Silicon and Software Engineering

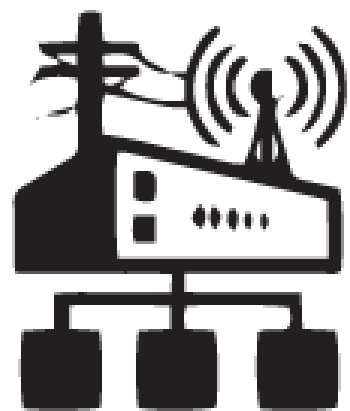
Cubit develops modular solutions from the design of electronic diagrams and PCBs to the creation of the firmware.

We take care of the preliminary study, the feasibility checks and the search for suitable components, taking into account their incidence on **production costs**. We follow PCB design rules that allow to avoid **electromagnetic compatibility** problems.

The **prototyping** phase includes the testing of the board, the verification of electromagnetic emissions and, where required, the **CE and FCC certifications**.

Cubit manages the integration of different types of **sensors**, e.g. gas (metal oxide, electrochemical), dust, radon (including realization and piloting), geiger (including realization and piloting), HF and LF (Hall effect magnetic sensors), current (measurement), flow sensors (air / water / gas), proximity (ultrasound), together with the development of the related **software** for calibration, compensation, signal processing (FFT, others), analysis.

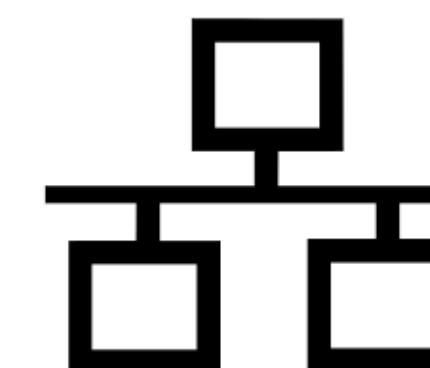




M2M Connectivity and Integration

What is the best connectivity solution? It depends...

Cubit's expertise in this area includes numerous **wireless and wired communication** technologies for personal, local and geographic networks in **residential** and **industrial** environments (e.g. ZigBee, Bluetooth / BLE, Z-Wave, Sub-GHz, UWB, Wi-Fi, 3G / LTE, NB-IoT, DALI, Modbus, ModBus TCP / IP, CAN bus, CANopen, EtherCAT, IO-Link), including the design and implementation of **proprietary** wireless protocols and networks.

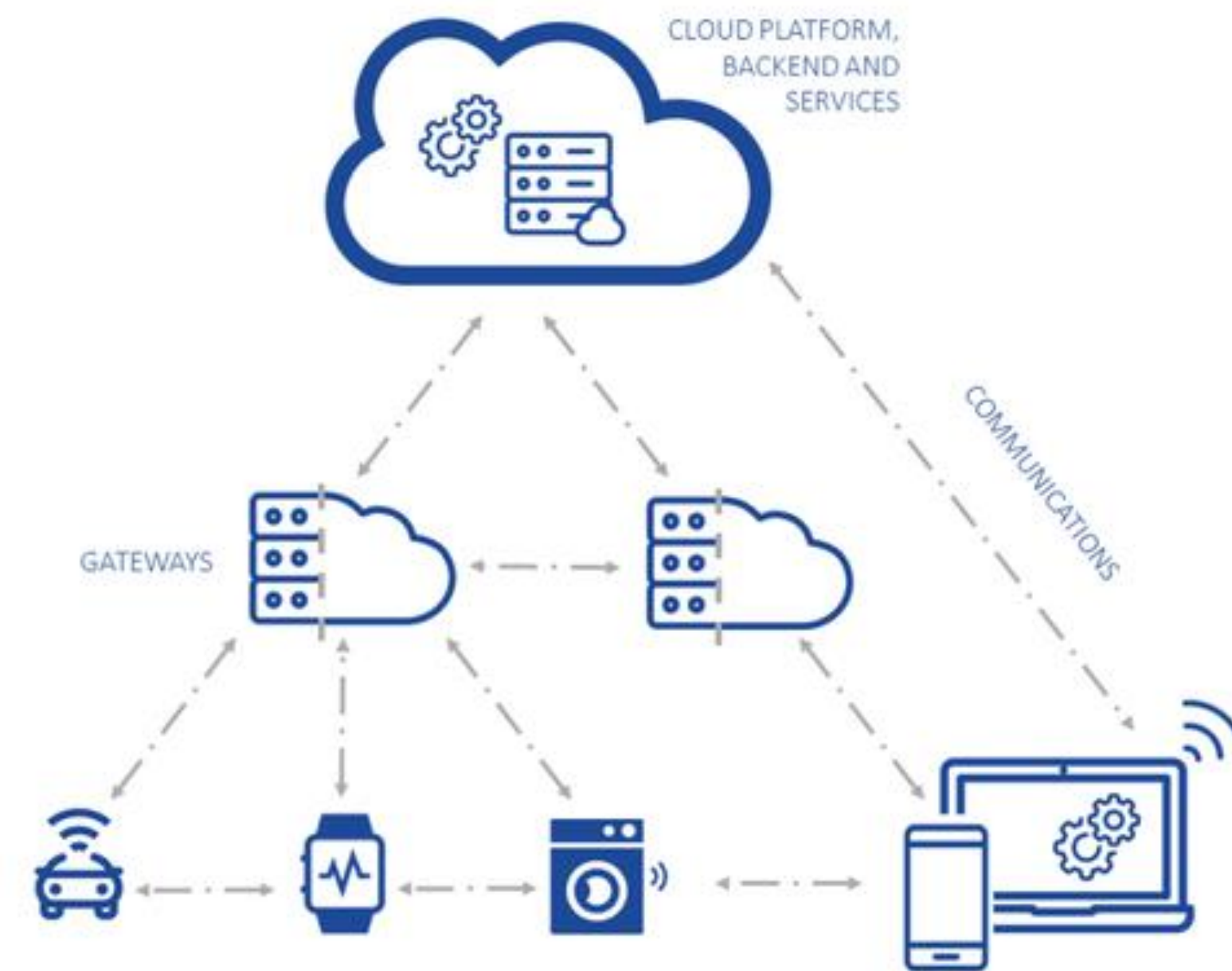




IoT and Cloud solutions

Cubit can complete its technological offer with the creation of **customised cloud platforms**, based on FIWARE, AWS, or Azure IoT architectures for storage, visualization, management and analysis of the data collected from field devices.

Cubit has also the skills for **integrating** the realised devices in public and private cloud platforms by means of **standard protocols** (such as MQTT, WebSockets, HTTP) or via cloud-to-cloud API.



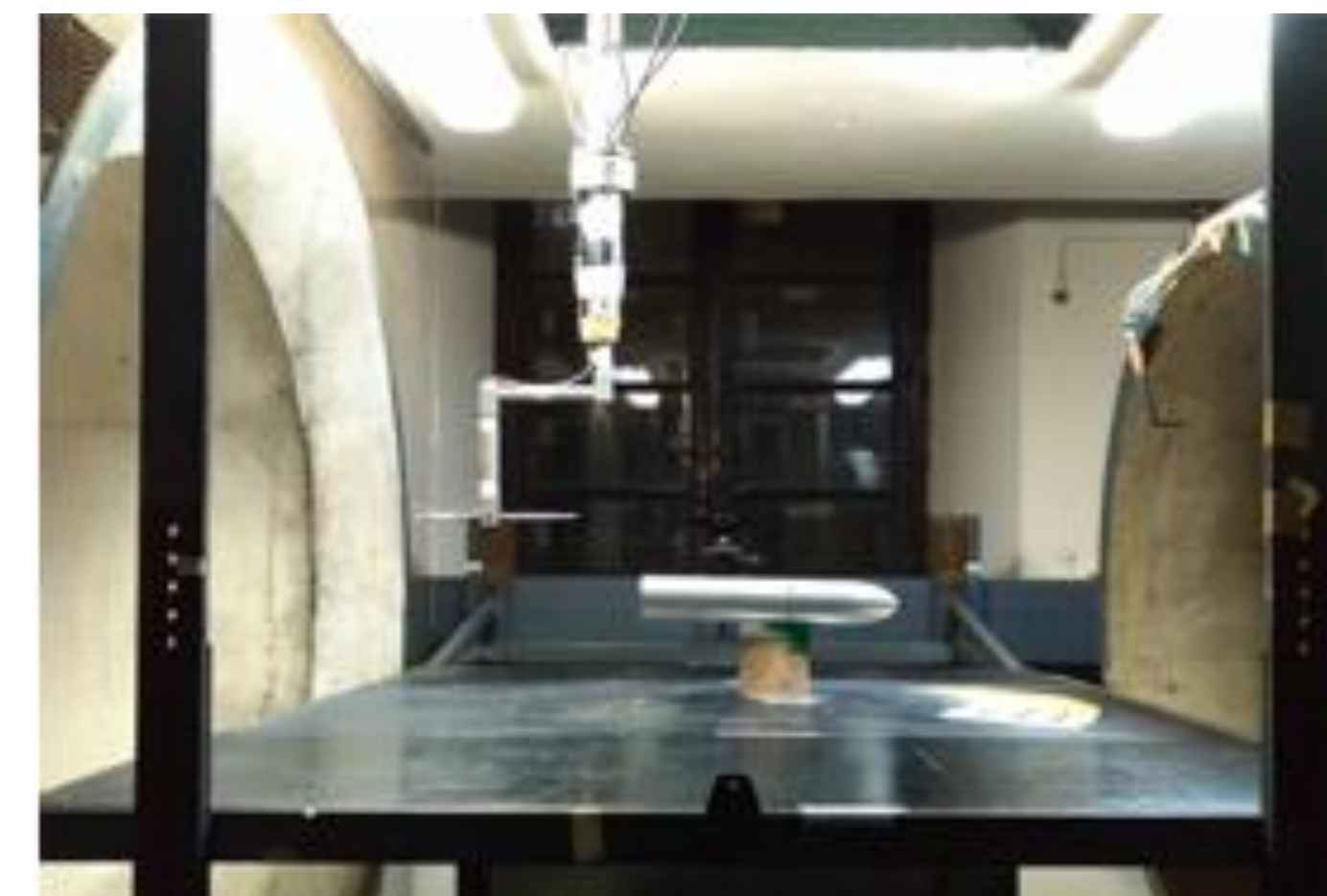
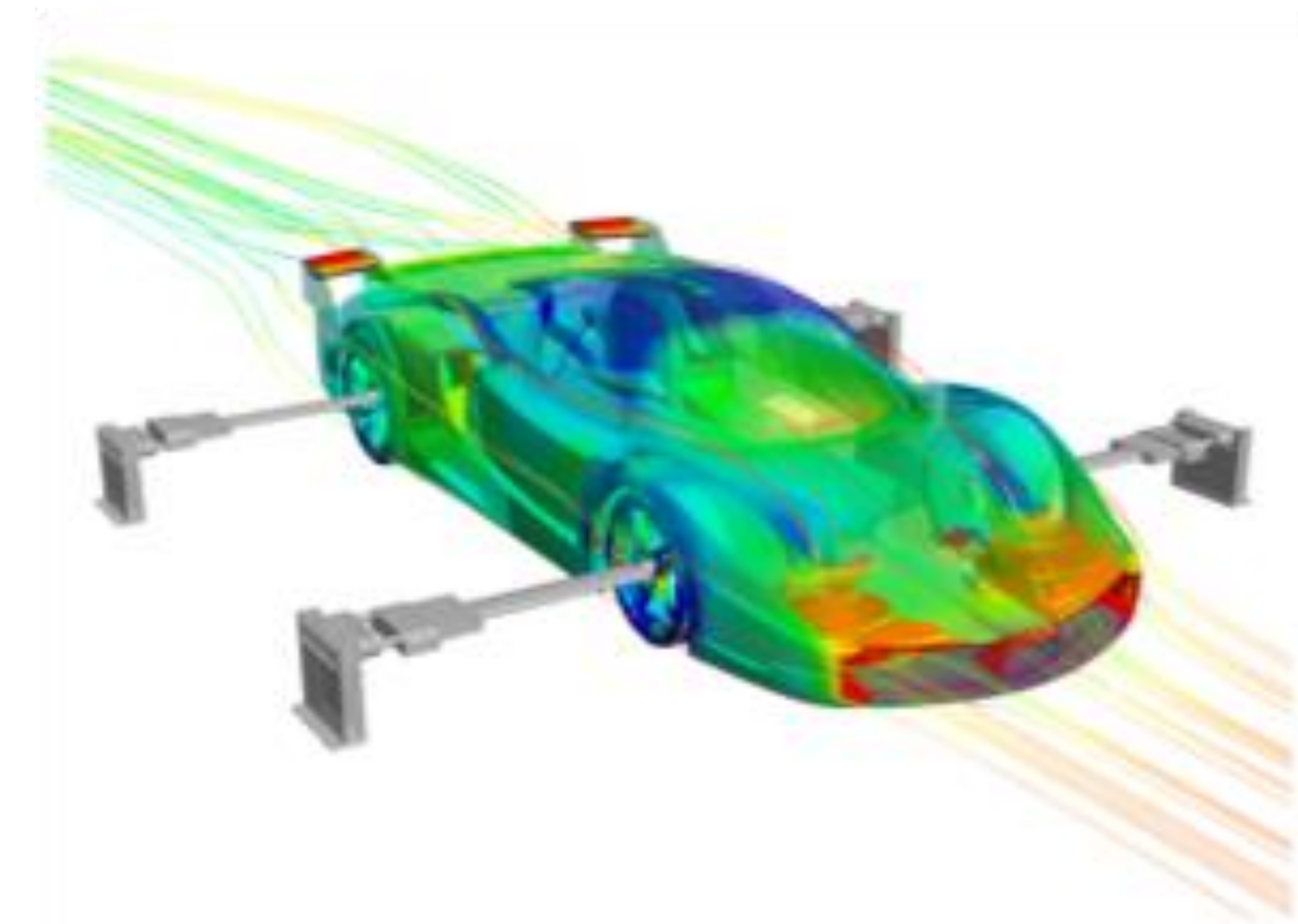


Applied Fluid Dynamics and CFD

Our **Applied Fluid Dynamics** centre works in close collaboration with the Aerodynamics group of the Department of Civil and Industrial Engineering of the **University of Pisa** and offers advice and evaluation of:

- **experimental aerodynamics** (wind tunnels and naval tanks): choice of tunnel, model design, definition of test procedures and analysis of results;
- **numerical aerodynamics** (CFD) for external and internal flows (e.g. air conditioning), in various sectors: Aeronautics, Automotive, Naval, Civil and Renewable Energy, Sports.

CFD can integrate testing and experimentation activities, offering design advantages in many sectors, with a significant reduction in development time and cost, avoiding prototyping, reworking and delays.



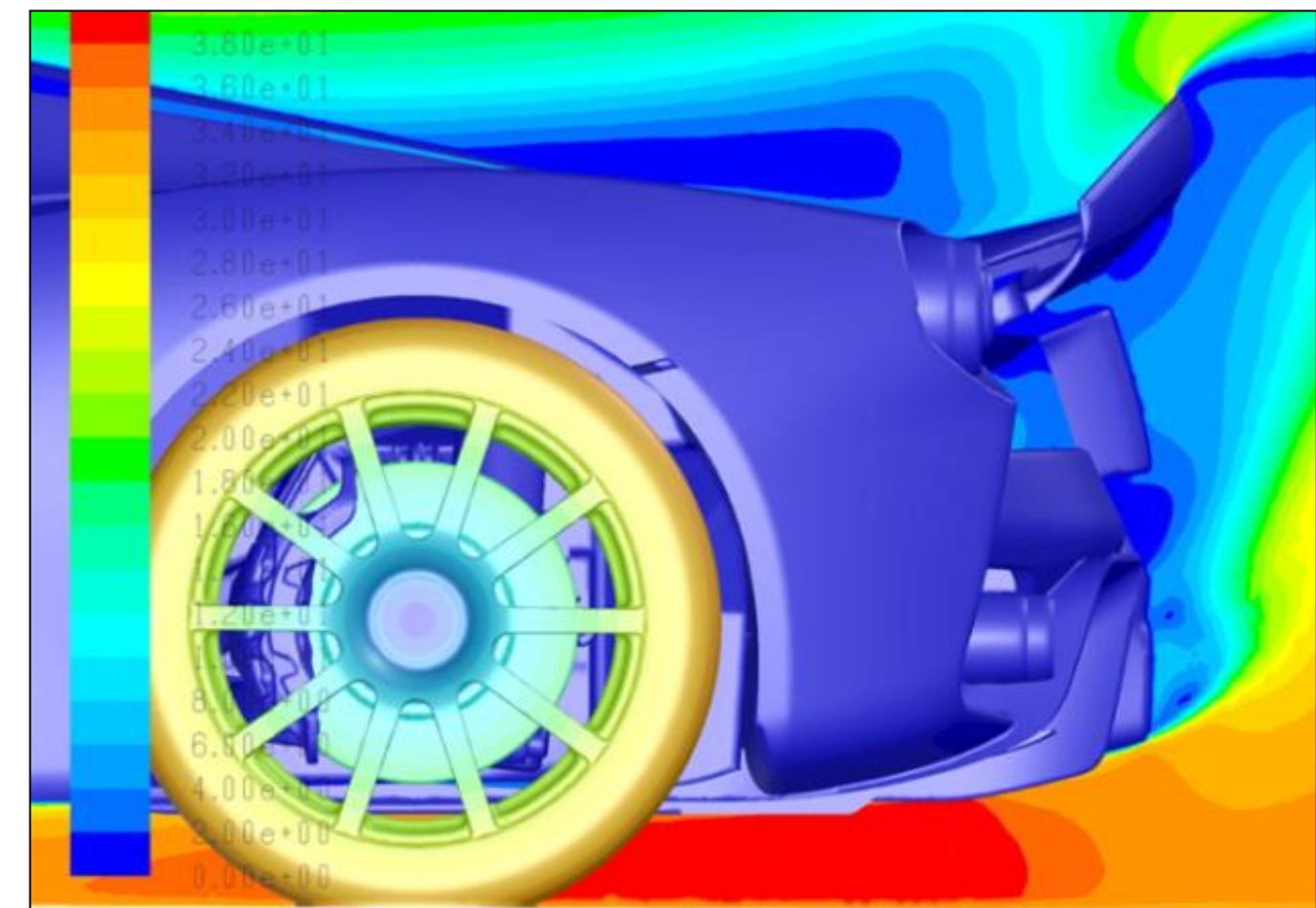
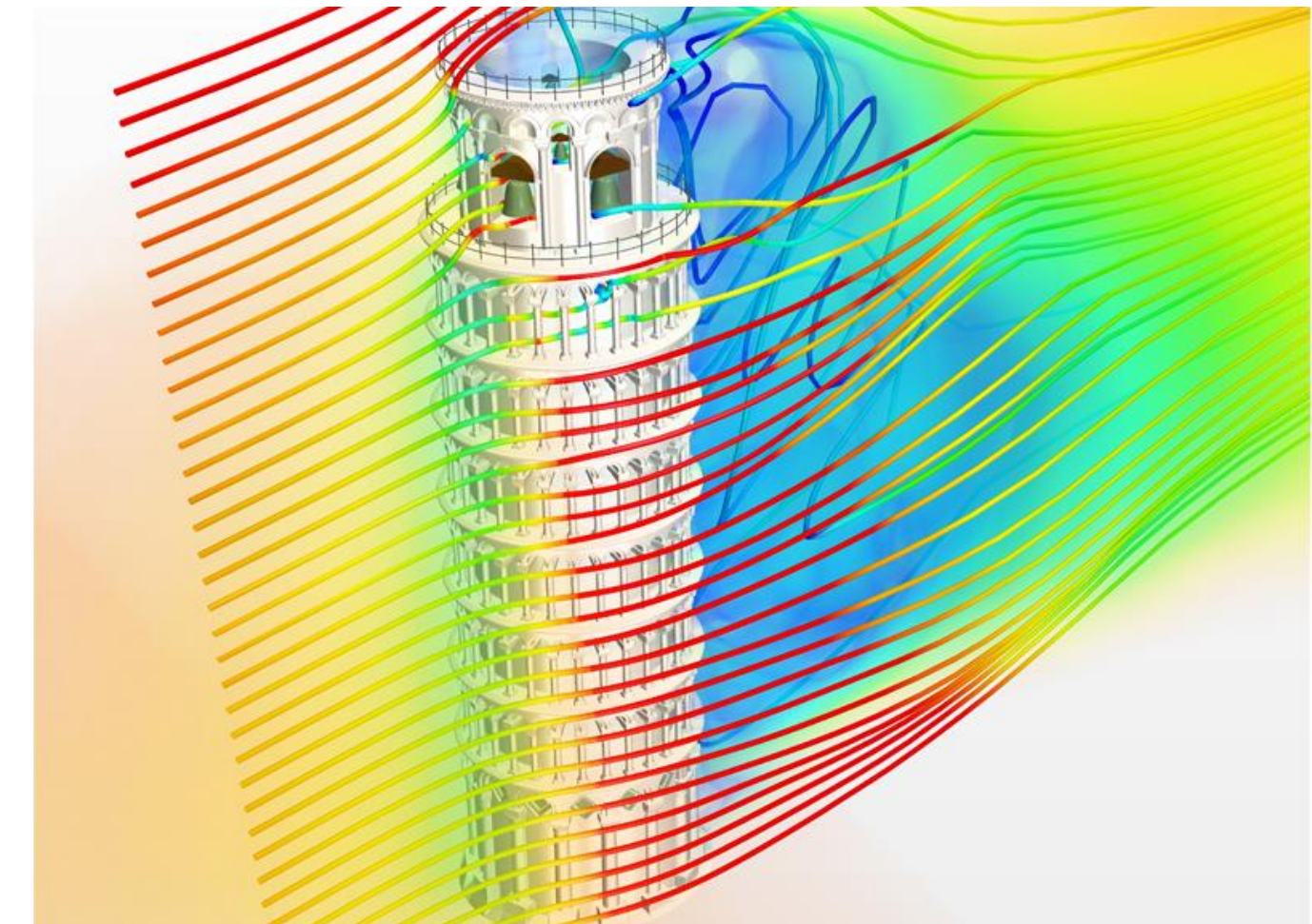


HPC and utility computing

The applied fluid dynamics groups takes advantage of a proprietary **high-performance computing (HPC) cluster** hosted at the INFN Data Center - Pisa section.

The cluster ensures the best available technologies, thanks to fast and low latency interconnection networks (InfiniBand DDR and QDR).

Cubit also offers advanced **Utility Computing services** increasingly requested by companies, capable of supporting Grid Computing, maximizing resource efficiency and minimizing associated costs.



Further activities and competences

In order to remain at the technological forefront of its business domain, Cubit is growing its competences in the following areas:



Intelligent Automation

Definition and integration of Artificial Intelligence algorithms, such as **Machine Learning**, in applications for **resource constrained edge devices**, typically based on microcontrollers, with specific focus on condition-based and **predictive maintenance**, sound and keyword recognition, **quality assurance**, anomaly detection, **occupational safety and health**;

Design and usage of **RISC-V** and **FPGA** systems, especially to support and run Machine Learning algorithms at the edge;

Radar sensors, mostly in the 24 and 60 GHz bands, for applications such as gesture recognition (e.g. for touchless interfaces) and vital sign recognition;

Design and realisation of devices and systems to integrate **industrial** assets into **cyber-secure** infrastructures.



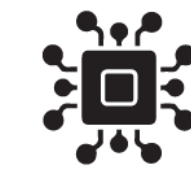
Industrial Cyber Security



Business Cases



Industrial IoT



Silicon and software engineering



IoT and Cloud solutions



M2M Connectivity and Integration

Customer:



Year: 2020

Electronic design, prototyping, engineering, firmware development and final certification of Easy Edge-Clea, a small boxed module for a wide range of IoT and industrial applications, for both to low-power sensor networks and more complex tasks.

The board is based on an Espressif ESP32-WROVER module (WiFi-BT-BLE MCU) and is equipped with a GSM / GPRS module, SIM868, or Multi-Ban CAT-M and NB-IoT 4G Module, SIM7080G, for data communication to the cloud, in the absence of WiFi. It also offers GNSS (GPS) functionality. The internal memory consists of 520 kB SRAM + 16 kB SRAM in RTC. The module is equipped with a built-in 2000 mAh LiPo battery and an IPEX antenna.



<https://www.seco.com/it/products/easy-edge>



Industrial IoT



Silicon and software engineering



IoT and Cloud solutions



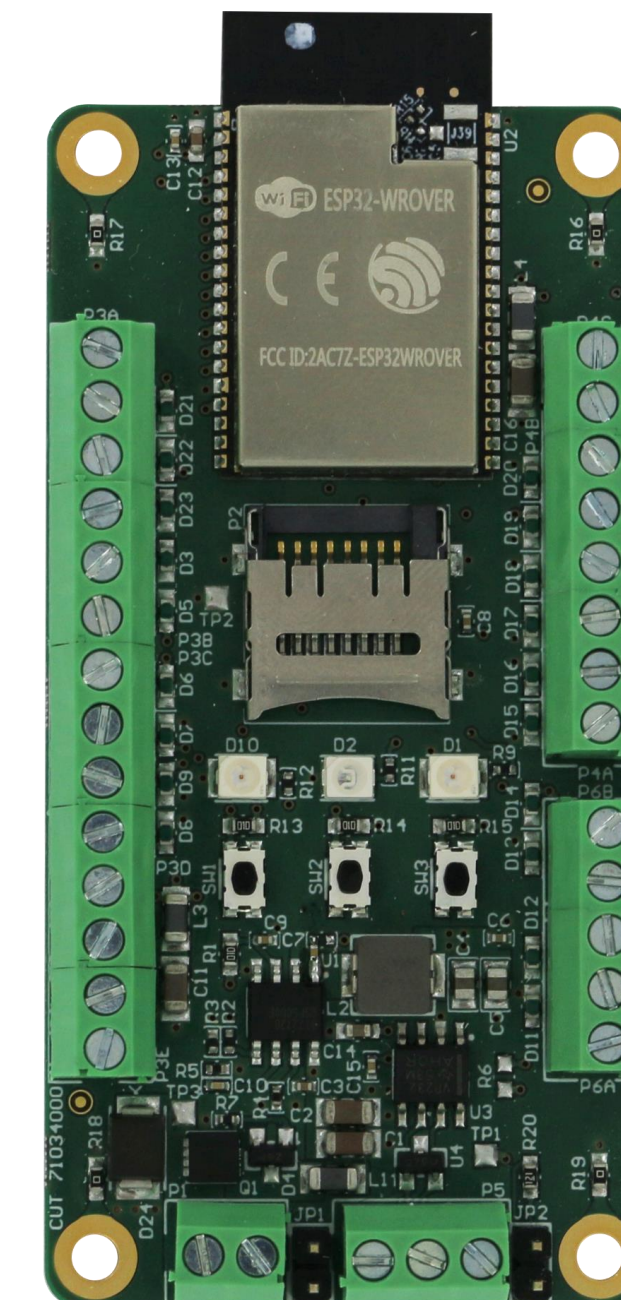
M2M Connectivity and Integration

Customer:



Year: 2020

Electronic design, prototyping, engineering, firmware development, and final certification of Sense-D01, a WiFi-BT-BLE MCU module for a wide variety of IoT and industrial applications. The board is based on the Espressif ESP32-WROVER module and is supplied in two versions: with PCB antenna or with IPEX antenna. The heart of this module is the ESP32-D0WDQ6 chip. The module is equipped with an external 4 MB SPI flash and an additional 8 MB SPI pseudo-static RAM (PSRAM). Its features and the integration of a rich set of peripherals (capacitive touch sensors, Hall sensors, interface for SD card, Ethernet, high speed SPI, UART, I²S and I²C) allow to offer the best performances for electronic integration, range, energy consumption and connectivity.



<https://www.seco.com/it/products/sense-d01>



Smart lighting



Silicon and software engineering



IoT and Cloud solutions



M2M Connectivity and Integration

Customer:  **intellienergy**^{tech}

Year: 2018-2020

Hardware and firmware design, prototyping, engineering and certification of 5 different wireless remote control modules for public street lighting. The real time data transmission allows remote maintenance, programming and parameterization operations.

The modules can communicate directly or through other nodes, via an 868 MHz purposely designed wireless mesh network, with a Gateway for monitoring and managing the lighting body to which they are connected.



Wireless Lumawise node



Wireless Nema - Socket node



Wireless - Retrofitting node



Gateway - Network Coordinator



Wireless-Retrofitting node - Post



<http://www.intellienergy.it/cat/catalogo>



IoT for Health and Safety



Silicon and software engineering



IoT and Cloud solutions

Customer: **Nuvap**   | **jenIoT**

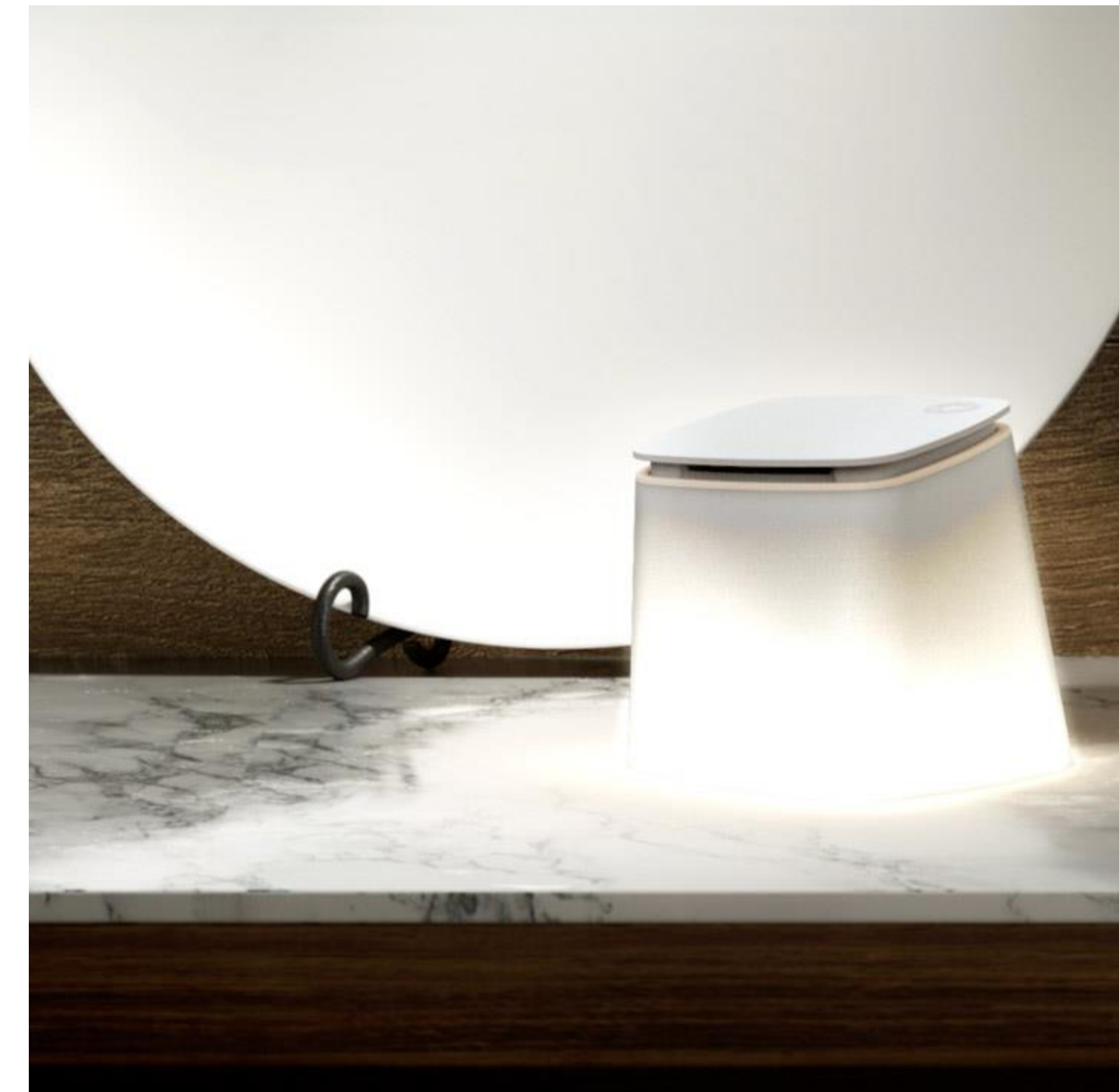
Year: 2019

Development and design of jeniot home | AirSafe, a device for monitoring air quality in domestic environments, capable of alerting in situations of potential danger, such as gas leaks or fires, through acoustic and visual alarms, push notifications and the innovative proactive assistance service available through operations centre active 24/7. It also integrates a smart light that can change colour and gradient to make indoor spaces comfortable.

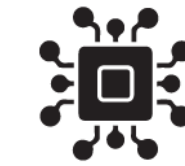
Presented at CES in Las Vegas 2020 by Generali Jeniot.

<https://www.nuvap.com/it/support/acquista/>

<https://www.youtube.com/watch?v=ZnqTMBmFfnM>



Condition-based maintenance



Silicon and software engineering



M2M Connectivity and Integration



Intelligent Automation

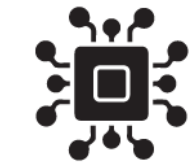
Customer: **scm**group **HITECO**
The specialists in the wood industry
HIGH TECHNOLOGY COMPONENTS

Year: 2019

Hardware and firmware design of an innovative sensor, with RS485 interface, for checking the functional status through the control of vibrations in numerical control machines for wood and steel processing, analysing the operating parameters in real time and informing in advance about the risk of breakage and need for replacement.



Industrial control



Silicon and software engineering



IoT and Cloud solutions



M2M Connectivity and Integration

Customer: **TECNOFERRARI**

Year: 2018

Electronic hardware and firmware design of a wireless / USB device for remote control of industrial goods lifts.

Cubit followed all phases, from design to prototyping, engineering, testing and product testing.



IoT for Health and Safety



Silicon and software engineering



Numerical simulation and CFD



IoT and Cloud solutions

Cliente: **Nuvap**

Anno: 2016-2017

Development and electronic design, hardware and firmware of the first IoT solution for monitoring 26 environmental parameters to measure the healthiness of homes and offices and detect potential threats to health.

<https://www.nuvap.com/it/support/acquista/>



Energy efficiency



Silicon and software engineering



IoT and Cloud solutions



M2M Connectivity and Integration

Customer:  

Year: 2016-2017

Electronic design and firmware development of a device for measuring and transmitting electricity consumption data for households.

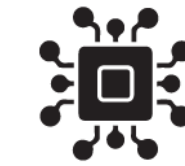
The clamp meter transmits data to a home gateway, via a Z-Wave interface. It measures the total accumulated active energy (Wh), the instantaneous active power (W), the RMS voltage (V) and the RMS current (A).

Cubit also took care of the compliance with all the electrical safety standards of the device, as well as the activities aimed at obtaining the Z-Wave Plus mark. The device is registered on the official website of the Z-Wave Alliance:

<https://products.z-wavealliance.org/products/2143>



Smart home



Silicon and software engineering



IoT and Cloud solutions



M2M Connectivity and Integration

Customer:



Year: 2015-2016

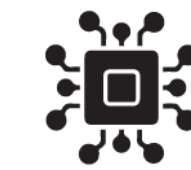
Electronic hardware and firmware design of a smart gateway with Ethernet, RS485, Zigbee, WiFi, 3G communication (with the possibility of remote software update) and of a smart meter for a system for monitoring electricity consumption, in private and industrial, for the acquisition and transmission in real time via radio to a central unit of data relating to voltage, current, gas and water flow (detection of active power (W), voltage (V), current (A), reactive power (VAr), Power Factor (PF), THD%).



Smart Gateway – Sistema Enerbuddy



Smart parking



Silicon and software engineering



IoT and Cloud solutions



M2M Connectivity and Integration

Customer:



Year: 2015

Electronic design of the hardware and firmware components of the Parking Spot Sensor system for detecting the presence of vehicles inside the parking stalls. The two hardware components are the parking sensor and the DCU (Data Collector Unit).

The wireless ultrasound sensor is patented, available in the surface version, to be glued or screwed onto the recessed stall or in the ground. The DCU manages an average of 25-35 sensors and transmits the data to the cloud.

Kyunsys was acquired in 2019 by Municipia spa - a subsidiary of Engineering



Funded Research



Funded Research

Since its foundation, Cubit has taken part in several **co-financed research and innovation projects**, both at regional, national, and **European** level, positively collaborating with international research institutions and companies, and thus creating its own network of partner organisations.

Cubit has thus gained experience in all phases of the project lifecycle:

- identification and analysis of calls for grants;
- preparation and drafting of project proposals;
- creation of qualified partnerships;
- management of the implementation and reporting activities.



European Union

European Regional
Development Fund

**REGIONE
TOSCANA**



Funded Projects: UMI-Sci-Ed

Exploiting **U**biquitous Computing, **M**obile Computing and the **I**nternet of Things to promote **Science Education**

Call H2020-SEAC-2015-1

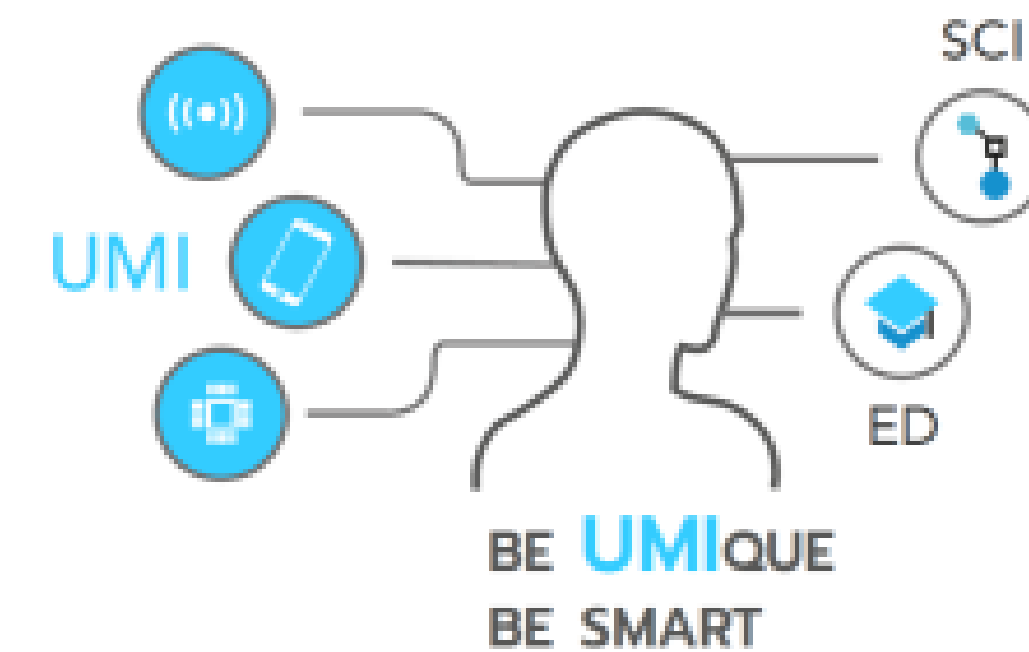
Duration: 06.01.2016 – 05.31.2019

Total Budget: € 1,794,187.50

UMI-Sci-Ed project investigated the introduction of UMI technologies (Ubiquitous Computing, Mobile Computing, and the Internet of Things) in education, by putting them in practice in order **to enhance the level of science, technology, engineering and mathematics (STEM) education** young girls and boys are receiving, and at the same time to make a career in domains pervaded by UMI more attractive to them.

UMI-Sci-Ed partners: Instituto Tecnologias Ypologistonkai Ekdoseon Diofantos – Coordinator (Greece), Cork Institute of Technology (Ireland), Consortium Ubiquitous Technologies – Cubit Scarl (Italy), Helsingin Yliopisto (Finland), University of Pisa (Italy), Telecentre-Europe AISBL (All Digital) (Belgium).

umi-sci-ed.eu/



Funded Projects: POWER

Political and sOcial awareness on W ater E nviR onmental challenges

Call H2020-ICT-2015

Cubit Role: Partner

Duration: 12.01.2015-11.30.2019

Total Budget: € 3,747,937.50

The Project set up a **user-driven Digital Social Platform (DSP)** for the expansion and governance of existing water networks, pioneering the DSP approach **to share the knowledge and experience of water scarcity, security, quality and water consumption-related issues** in different EU local authorities, thus creating an important tool for EU water policy.

POWER project is **supported by over 50 "EIP Water - City Blueprint" and "Netwerc H2O" follower cities.**

Consortium De Montfort University - Coordinator (United Kingdom), Consortium Ubiquitous Technologies - Cubit Scarl (Italy), Fundacio CTM Centre Tecnològic CTM (Spain), KWR Water B.V. (The Netherlands), European Institute for Participatory Media EV (Germany), Climate Alliance – Klima Buendnis – Alianza del Clima EV (Germany), Universiteit Utrecht (The Netherlands), Leicester City Council (United Kingdom), Aggregate Formula Lda - Baseform (Portugal), Hagihon Company Ltd - Jerusalem Region Water Utility (Israel), Milton Keynes Council (United Kingdom), Companyia d'aigues de Sabadell SA (Spain).

power-h2020.eu/

Cubit / 2022

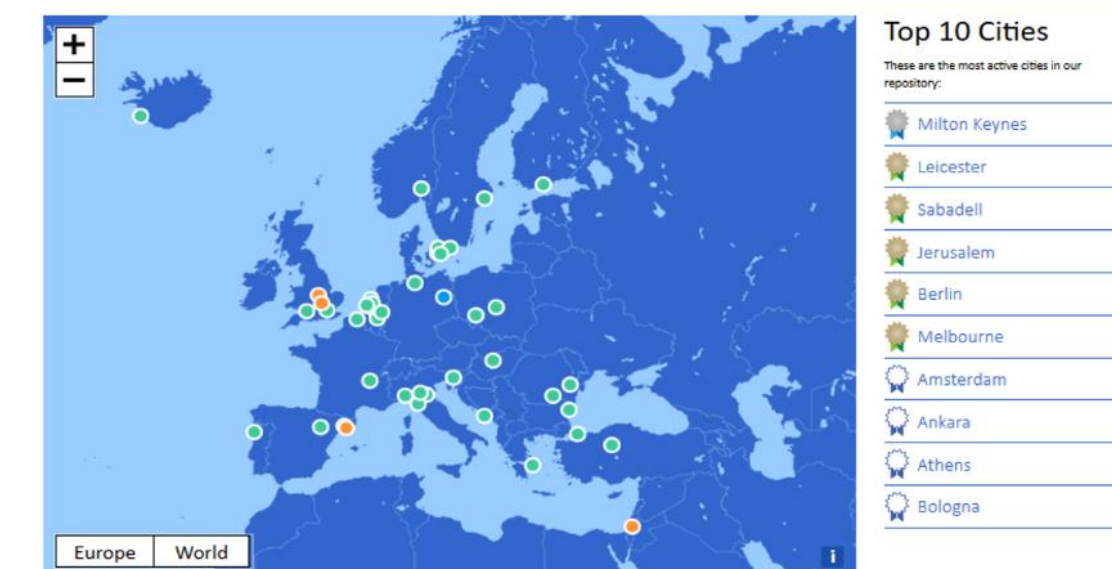


The POWER best practice repository serves as an umbrella providing an overall view to the outside world and a central entry point to the POWER water communities with its instances in the pilot cities. It's accessible to all stakeholders beyond the Key Demonstration Cities and connects and disseminates discussion, exchange and sharing within key demonstration cities communities to the outside world.

POWER Cities

Explore the wide network of POWER Cities to learn about and discuss their answers to water-related challenges as well as to share your experiences

[Learn more...](#)



You can access the POWER best practice repository [here](#).

The 4 municipalities involved as **Key Demonstration Cities** are already active in water-related issues. Extensive data is therefore available on each of these cities, and here best practices from our partners will be shared.

POWER tweets

POWER project
@powerh2020

Sharing another very interesting submission to our Best Practice Award:
VISCA: Vineyards' Integrated Smart Climate Application buff.ly/2Nfgsqj You can support the submission by adding a comment!



Funded Projects: EMERGENT

ChiplEss MultisEnsor RFid for GrEen NeTworks

Call H2020-MSCA-RISE-2015

Duration: 01.01.2015-12.31.2017

Total Budget: € 913,500

EMERGENT activities focused on **the intersectoral mobility dimension, based on the exchange of staff between academia and SMEs**. EMERGENT project realized **a new class of chipless RFID tags and sensors** moving from conventional sensors towards next generation pervasive interconnected systems by employing environmental-friendly substrates such as paper and low-cost printing process.

EMERGENT partners: University of Pisa - Department of Information Engineering (Pisa, Italy) – Coordinator, Universitat Rovira i Virgili (Spain), Grenoble Institute of Technology – LCIS Lab (France), Consortium Ubiquitous Technologies-Cubit Scarl (Italy), Generation RFID SL (Spain), ARDEJE Sarl (France).

emergent-rise.eu/

