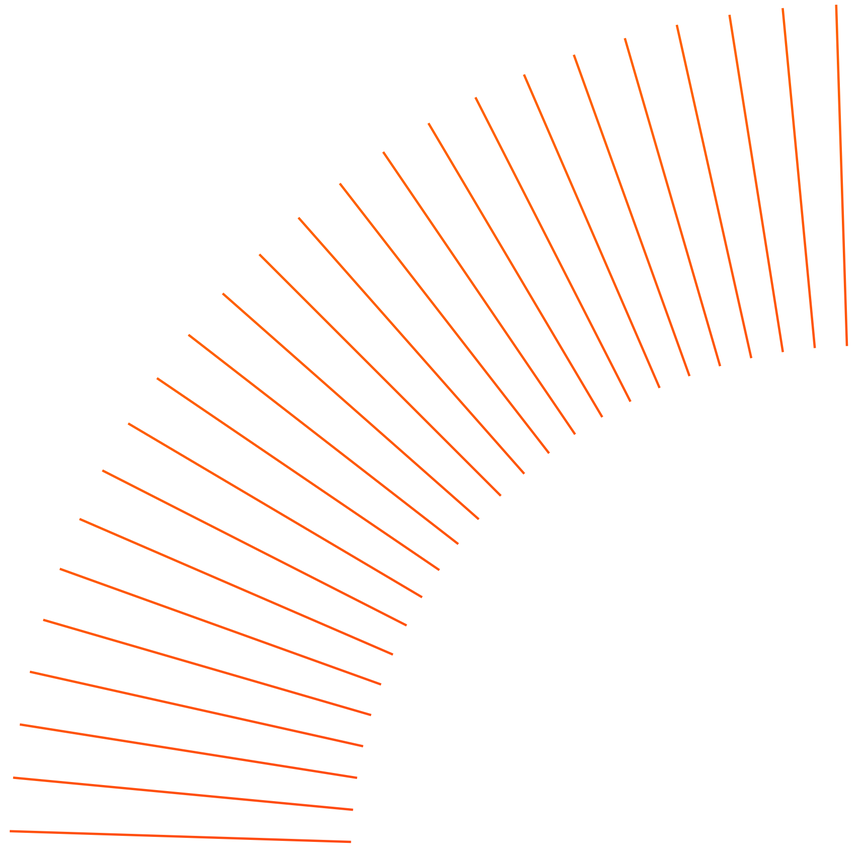
i2cat

The Internet
Research Centre

2024
Annual Report

CERCA Research Centres

ACCIÓ Catalonia Trade & Investment
Generalitat de Catalunya
tecnio catalonia
Vigència: 29/12/2028



Innovation and research as the engine for digital transformation in Catalonia

At the Government of Catalonia, we want to ensure digital transformation as a real source of well-being, equity and progress for society. We have a clear objective: to fully integrate new technologies into the economic and social development of the country. To do this, it is essential to count on centres like i2CAT, where research and innovation go hand in hand with the premise of leaving no one behind in this shared future.

Catalonia must consolidate as a European innovation hub, advancing with ambition in the digital and technological sphere. i2CAT, with its leadership in the European Commission's funding programs and its clear commitment to deploying experimental research infrastructures throughout the territory, helps us drive innovation and research. Being at the forefront of the future will guarantee that the benefits of the digital society will impact Catalan people, companies, and organisations.

The competitiveness of companies will also be key to achieving an economy that generates shared prosperity. For this reason, we value i2CAT's efforts to advance business R&D&I with strategic alliances with the private sector, promoting the co-creation and co-development of technological solutions in priority areas, such as autonomous and connected mobility and the space sector. Through the Catalan Foundation for Research and Innovation (FCRI), this indispensable work has been recognised by the Government with the National Prize for Public-Private Partnership in R&I 2024 for the collaboration between i2CAT and the startup Sateliot.

Innovation must reach every corner of the country to improve people's quality of life. i2CAT is a key partner of the Government to turn Catalonia into a hub of advanced digital technology. The research centre coordinates public proposals and projects such as the Digital Catalonia Alliance (DCA), which brings together 600 Catalan companies and entities specialised in technologies such as AI or the space sector; or the Àrees Digitals, which promote collaboration between actors and communities from across the territory, from Barcelona to the Alt Pirineu, passing through Aran, Penedès or Terres de l'Ebre. Also, the GovTech programme promotes innovation in the Administration through advanced digital technologies. We work side by side to generate new projects and investments in research and development that benefit companies and citizens.

For all this and, especially, for the talent of the people who make up the centre, i2CAT is a visionary space in constant transformation and an essential entity for promoting knowledge transfer in Catalonia. Knowledge that must serve as the basis to guarantee that innovation is a tool for progress, equity and social justice.

We count on i2CAT to drive progress, together, for everyone's Catalonia.

Albert Dalmau,
Minister of the Presidency

Generalitat de Catalunya

We see a promising future, and i2CAT is actively working to create a future where everyone thrives.

The year 2024 has been pivotal for the i2CAT Foundation. Building on our 20th anniversary in 2023, we have strategically positioned ourselves to become a leading digital research centre. This has involved a strengthened commitment to pioneering research and innovation within key digital research areas. Moving forward, our work will continue to prioritise tangible regional impact, citizen empowerment, and the robust growth of Catalonia's digital ecosystem.

The relentless advancement of technology is transforming our society, economy, and daily lives at an unprecedented rate. At i2CAT, we understand the profound responsibility that accompanies this evolution. Our core mission is to cultivate a more connected, safe, and digitally equitable society. Through our rigorous research, we equip companies and public administrations with the essential tools to navigate the digital economy and leverage technological innovation for digital sovereignty. This commitment drives us towards a future where research and innovation, where digital knowledge sovereignty, will become a powerful engine for both economic competitiveness and enhanced social well-being.

2024 was a year dedicated to reinforcing i2CAT's position as a leading reference in digital research. We strategically deepened our involvement in vital sectors like mobility and the space economy, concurrently strengthening our capabilities in transformative technologies such as advanced connectivity, artificial intelligence, and cybersecurity. By cultivating strong partnerships across academia, industry, and government, we keep pushing to position Catalonia as an innovation hub, providing the groundwork for continued impactful contributions to the public and private sectors.

With a clear vision for the future, we remain steadfast in our ambition to drive digital technological transformation. We will continue to pioneer impactful research, explore transformative technologies, and shape a better digital future for society. Our focus is to anticipate and lead change, ensuring digital technological progress generates tangible benefits for businesses, institutions, and, most importantly, citizens.

Guided by the unwavering trust of our Board and the strong support of the Presidency Department and CERCA institution, we step confidently into the future with bold determination and a shared vision. The heart of i2CAT lies in our people—their passion, talent, and collaborative spirit in pursuing innovation. Together, we embrace challenges as opportunities to push boundaries and translate ideas into real-world impact. As a unified and committed team, we will continue to build a resilient, forward-thinking organisation grounded in sustainability, inclusion, and research excellence. Our collective efforts will shape a future where innovation thrives and success is shared.

We see a promising future, and i2CAT is actively working to create a future where everyone thrives.

Sergi Figuerola, PhD
Director of i2CAT

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Facts & Figures

The most relevant figures from 2024. From funding to project execution, new agreements with private companies and staff numbers.

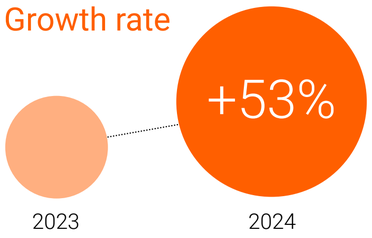
Funding

TOTAL INCOME

26.05 M€

TOTAL PUBLIC COMPETITIVE FUNDING	65%
European Comission	22%
Government of Catalonia	6%
Government of Spain	72%
GOVERNMENT OF CATALONIA CORE FUNDING	11%
PUBLIC & PRIVATE CONTRIBUTIONS	16%
R&D SERVICES	5%
CAPITAL GRANTS	2%
OTHER INCOME	1%

Growth rate



Research

R&D PROJECTS

TOTAL
119

R&D On-demand services	26
Competitive projects	71
Projects and initiatives with public administration	22

COMPETITIVE PROJECTS

TOTAL
71

European projects	28
Spanish projects	31
Catalan projects	12

NEW PROJECTS

COMPETITIVE PROJECT PROPOSALS SUBMITTED
92

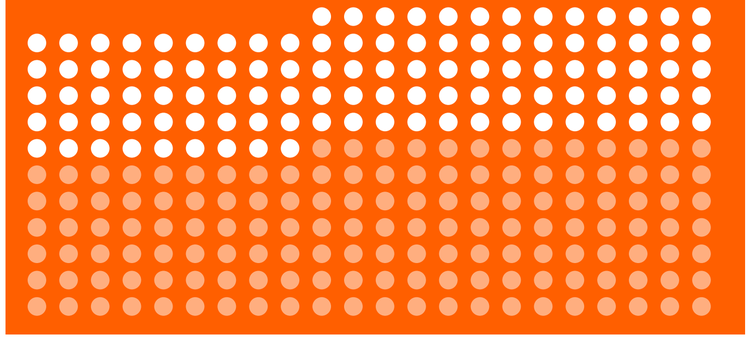
NEW COMPETITIVE PROJECTS
7

Our organisation

STAFF

Total 244 | Research 57% | PhD Staff 17%

42 doctors
32 pre-docs

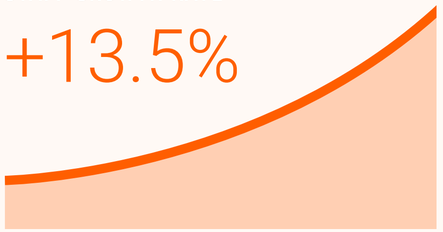


NATIONALITIES

Total
24

STAFF GROWTH RATE

+13.5%



WOMEN RATE

32%

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Highlights

In 2024, our team continued to drive innovation with outstanding research results, significantly contributing to the digital transformation of society. By supporting public digital innovation strategies and delivering impactful pilot projects, i2CAT demonstrated how advanced technologies can improve quality of life, promote competitiveness, and empower communities.

INSTITUTIONAL HIGHLIGHTS ↘

Institutional Updates

Mr Albert Dalmau
Minister of the Presidency at the Government of Catalonia, entered i2CAT's Board of Trustees as its new president.

THE BOARD ALSO INCORPORATED ↘

Mrs Eva Giménez
Secretary General of the Presidency, Government of Catalonia

Mr Albert Tort
Secretary of Telecommunications and Digital Transformation, Government of Catalonia

Mrs Maria Galindo
Secretary of Digital Policies, Government of Catalonia

Mr Xavier Massó
General Subdirector for Research, Government of Catalonia

Mr Demetri Rico Aguila
Managing Director for the Centre of Telecommunication and Information Technologies, Government of Catalonia

Mrs Laura Caballero
Director of the Cybersecurity Agency of Catalonia, Government of Catalonia

Mr Josep Antoni Rom Rodríguez
Rector, Universitat Ramon Llull

Mr Jaume Baró
Chief Executive Officer, ACCIÓ

CORPORATE HIGHLIGHTS ↘

i2CAT's Strategic Plan 2024-2027 focuses on increasing the impact of the centre's research and digital innovation activities on the local ecosystem and directing activities toward specific sectors and technologies. Following this plan, the first two prioritised sectors in 2024 were **mobility** and **space**.

i2CAT Mobility Event: "What will the future of mobility look like?" at the Movistar Centre in Barcelona

New Space Economy Congress 2024

Mobility Sector: Driving the Future of Mobility Through Innovation and Research

In 2024, i2CAT took a decisive step in consolidating its **strategic positioning in the mobility sector**, establishing itself as a leading technological partner in **connected, intelligent, and autonomous mobility**. Our work focused on developing applied research projects and strategic collaborations that connect research with market needs.

We signed strategic agreements with key industrial players like **Autopistas and Applus+ IDIADA**. We participated in forming European initiatives with local public administrations, such as ATM in the European Mobility Data Space. We reinforced our presence in the public sphere by organising a high-level event, "What Will the Mobility of the Future Look Like?", with participation from major public and private stakeholders.

We actively participated in the **Tomorrow Mobility congress (SCEWC)**, presenting research outcomes through our exhibition stand, multiple expert talks, and real-world use cases involving digital twins, data spaces, V2X, Software Defined Vehicles and urban/interurban safety solutions.

KEY HIGHLIGHTS 2024

- Participation in key industry events or media articles presenting our mobility initiatives as moderators and speakers: eMobility Expo World Congress, Mobile World Congress and 4YFN 2024, IESE Business School, Barcelona New Economy Week 2024, Metadata.cat.
- International presence at leading congresses in Dubai, Washington, and Singapore
- Long-term strategic partnerships with Autopistas and Applus+ IDIADA, unlocking private investment to drive future R&D&I initiatives.
- Awarded "Best Innovation Strategy Award" from CIAC, industry recognition of our impact and collaborative work in future mobility.
- Organisation of i2CAT's first flagship event with over 100 industry participants.
- Participation at Tomorrow.Mobility (SCEWC) with a dedicated stand and over ten presentations delivered in collaboration with our key partners including Acisa, Aimsun, Applus+ IDIADA, ATM, Autopistas, FICOSA, and others.
- Final demonstrations in real and controlled environments as part of 5GMED, SAVE-V2X, and 6GTwinRoad.
- Actively supported actively the growing local ecosystem through cooperation with Atlantis IT, FlashPark, Urbiotica and Factual.
- Execution of five R&D projects and approval of a strategic new EU-funded initiative.

Space Sector: Applied Research to Connect Everyone, Everywhere

In 2024, boosting i2CAT's activities in the space sector was one of our priorities. We focused our efforts in crafting a **strategy that enables us to push the boundaries of research while simultaneously supporting public administrations and private entities** as they navigate the new possibilities unlocked by the convergence of terrestrial and non-terrestrial networks - enabling connectivity anytime, anywhere.

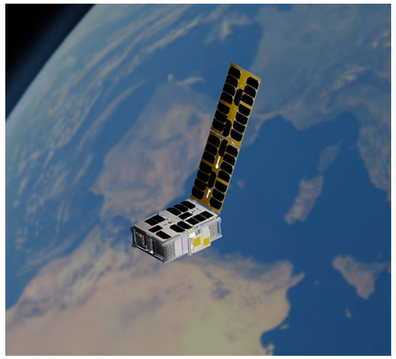
At the heart of our strategy are the advancements being made by our research groups in communication technologies, investigating the **integration of space-based communications with wireless and mobile technologies**. On one hand, we explore architectures and technologies that enable interoperability between ground and space systems. On the other, we tackle the challenges that will arise when deploying and operating these hybrid networks.

Our vision extends beyond research —it seeks to drive transformation across various economic sectors and society at large. We are pioneering innovations through **proofs of concept that demonstrate how satellite communications can serve as a catalyst for transformative change**. By providing connectivity to rural, remote, and low-density areas, we're not only advancing this universal goal, but also unlocking services and applications across sectors such as mobility, agriculture, livestock, and emergency services.

KEY HIGHLIGHTS 2024

- Participation in key industry events as moderators and speakers: New Space Economy Congress 2024, Barcelona New Economy Week 2024 and Barcelona Deep Tech Summit.
- Secured over EUR 400.000 in private funding and started participation in new European and national research projects.
- Establishment of new strategic collaborations with local and international partners: Rivada Space Networks, Telespazio Ibérica, Airbus GeoTech.
- Actively supported the growing local ecosystem through cooperation with Osmium Solutions, MWSE, Kreios Space and Cactus IoT.
- Key partners in public initiatives:
- New Space Strategy of Catalonia, promoted by the Catalan Government.
- Phi-LabNET Spain, promoted by the European Space Agency.
- Awarded National Research Prize for Public-Private Partnership for our long-standing collaboration with Sateliot.
- International presence at leading congresses in the sector: International Astronautical Congress, Small Satellites & Services International Forum, Space Tech Expo Europe.

RESEARCH EXCELLENCE ↘



Investment in Experimental Infrastructure through UNICO I+D 6G

In 2024, i2CAT advanced its unified experimental infrastructure deployment for 6G research with support from Spain's UNICO I+D 6G programme, funded by the Recovery, Transformation and Resilience Plan through NextGenerationEU. Nearly €10 million was awarded to i2CAT through two calls of the Infraestructuras y Equipamiento Científico-Técnico subprogramme. Within this framework, over **€3 million in tenders** were launched: more than €1.3 million under the **6GEN** initiative for the acquisition of advanced equipment and services, and €1.65 million for **6GStarLab**—the first Low-Earth Orbit (LEO) lab in Europe dedicated to non-terrestrial networks—awarded to Open Cosmos for satellite development and integration.

i2CAT coordinates PRESENCE, a European research project aimed at enhancing hyperrealistic remote interactions in Extended Reality

In January 2024, i2CAT kicked off PRESENCE (A toolset for hyper-realistic and XR-based human-human and human-machine interactions), a Horizon Europe project oriented at **providing intuitive and hyper-realistic Extended Reality (XR) experiences** by bringing real humans into interactive virtual worlds. This three-year research project, funded by the European Commission with over € 7 million, brings together 17 European partners, including research centres, universities, and technological companies.

5GMED final results highlights the future of Cross-Border Connected Mobility

In 2024, the Horizon 2020 5GMED project, with i2CAT as Technical Coordinator, concluded with a successful demonstration of its cross-border connectivity solutions for seamless communication between Spain and France. With €16 million in funding, the project developed a **unified 5G-based architecture enabling seamless high-speed communication for road and rail transport across international borders**, eliminating disruptions caused by current roaming configurations. Key results included live demonstrations of connected mobility and railway use cases, showing how vehicles and trains can maintain continuous connectivity, enhancing road safety and rail efficiency. 5GMED is now a reference model for future European 5G corridors, aligning with the EU's 2030 digital targets and reinforcing Catalonia's position as a digital mobility hub.

PUBLIC SECTOR ↘

Enxaneta completes its mission and reenters Earth's atmosphere successfully and sustainably

Enxaneta, the nanosatellite that led the first satellite mission promoted by the Government of Catalonia under the NewSpace Strategy, completed its de-orbit phase in July 2024, **reentering the atmosphere in compliance with ESA's guidelines for space debris mitigation**. Over three years in orbit, it validated satellite-based IoT connectivity in areas with limited coverage. It demonstrated the maturity of non-terrestrial communication technologies while contributing to knowledge for operating future low Earth orbit constellations.

Following Enxaneta's success, at the end of 2024, **i2CAT worked on the commissioning of Minairo, the mission that will follow Enxaneta's path in becoming a flying lab**. Among other technologies, Minairo will be a key element in testing the new NB-IoT protocols in LEO orbits and will continue to support the use cases developed using Enxaneta.

Launch of the GovTech Catalunya programme

The GovTech Catalunya programme, promoted by the Generalitat de Catalunya through the Secretariat of Telecommunications and Digital Transformation, was officially launched in **July 2024** with the first GovTech Challenge Competition. This initiative aims to **improve the efficiency, accessibility, and quality of public services through digital innovation, transforming the administration**. With this programme, the Catalan Government seeks to create a digital ecosystem that addresses the needs of citizens and administrative challenges through innovative solutions provided by companies and innovation centres. i2CAT manages the resulting challenges and has conceptualised the necessary open innovation platform.

Catalonia launches a mobile digital office pilot to bring public services closer to rural citizens

The Government of Catalonia launched a mobile digital office in Terres de l'Ebre to **provide in-person support for accessing public services**. Starting in May, the service will be available monthly in each town, adapting to local needs. Part of the 5G Rural Advanced Digital Technologies programme, the initiative is supported by i2CAT, which has integrated mobile and satellite communication technologies to ensure reliable connectivity. This project aims to bridge the digital divide and improve access to public services in rural areas.

MARKET-ORIENTED INNOVATION ↘

i2CAT and Sateliot win the National Prize for Public-Private Partnership in R&I 2024

i2CAT and Sateliot were awarded the National Prize for Public-Private Partnership in R&I 2024 by the Government of Catalonia and the Catalan Foundation for Research and Innovation (FCRI). The award is part of the 2024 National Research Awards and it **recognises the joint work of i2CAT and Sateliot to position Catalonia in the new space economy**, leading to milestones such as the launch of the Enxaneta, Menut and Minairó nanosatellites, which have contributed to improving the global connectivity of the Internet of Things (IoT).

New API Innovation Lab by MasOrange, Telefónica, Vodafone Group and i2CAT

MasOrange, Telefónica, Vodafone Group, and i2CAT partnered to launch Europe's first multi-operator Open Gateway API lab. This developer-ready environment, coordinated by i2CAT, allows companies and creators to **explore and leverage telco capabilities through standardised APIs and accelerates the adoption of interoperable APIs**, creating joint use cases and unifying performance in an accessible and collaborative environment. For i2CAT, it was the first time that a strategic innovation project was proposed within a global and disruptive initiative such as Open Gateway, and it was done jointly with very relevant European operators that are also part of the i2CAT Board of Trustees.

03

Research Excellence

Since 2006, the centre has participated in +100 European research projects and secured +€36 million in funds from the European Commission. i2CAT is the third organisation in Catalonia that has attracted the most funding from the Commission in ICT calls within the H2020 and Horizon Europe research and innovation programmes. Additionally, in 2024, the research centre secured close to €10 million within the UNICO Infraestructuras programme promoted by the Spanish government as part of its Recovery, Transformation and Resilience Plan with NextGenerationEU funds. These funds will be used to operate open experimental laboratories.

Research groups roadmap

As a mission-driven research and innovation centre, i2CAT stands for technological sovereignty and wants to strengthen the European research arena. To this end, during 2024, the centre's research groups reinforced their R&D activities in 5G/6G, IoT, immersive and interactive technologies, cybersecurity, blockchain, artificial intelligence, space communications and digital society technologies.

PRINCIPAL PARTNERS

AI-driven Systems

HIGHLIGHTED PROJECTS

ORIGAMI | INSTINCT

- Sustainable 6G vRANs
- Gen AI for RANs
- AI/ML-driven 6G RAN Automation
- vRANs Cost/Energy-efficiency
- vRAN+Smart Surfaces
- 6G Integrated Sensing and Comms (ISAC)
- Cellular/RIS-based localisation
- Collaborative Mobile Robotics
- Wireless XR/VR
- Precision Medicine

Mobile Wireless Internet

HIGHLIGHTED PROJECTS

BEGREEN | 6GTWINROAD

- O-RAN architecture for energy efficiency beyond 5G networks
- Integration of 5G and DVB-S2X
- 5G/6G exposure capabilities to support XR, industry and vehicular verticals
- Vehicular Digital Twins to Enhance Traffic Efficiency
- Flexstack ETSI-G5 protocol stack

Software Networks

HIGHLIGHTED PROJECTS

SUNRISE-6G

- Intelligent Application/Service Orchestration for Cognitive Edge Cloud Continuum [incl. extension to NTN]
- Intent-based Networking
- Intelligent slice management
- Distributed and secure Marketplace for 5G/6G resources
- Multi-agent communications
- AI4Network & Network4AI
- AI-based system architecture of mobile networks

Space Communications

HIGHLIGHTED PROJECTS

ETHER | 6GSatNet | NewSpace

- Integration of satellite systems towards native NB-IoT NTN service
- Interoperability among TN and NTN by supportive AI-driven task scheduling
- In-orbit virtualization mechanisms towards flexible and regenerative payloads
- Space-and-time-aware NTN management and orchestration
- Hybrid Inter-Satellite Link Towards Enhanced Optical Satellite Networks
- Simulation engine to support satellite network protocols research
- Contributions towards Quantum Key Distribution Satellite Networks

Cybersecurity & DLT Blockchain

HIGHLIGHTED PROJECTS

iTrust6G | CICERO

- Holistic Security Management in Distributed Networks
- Cyber Threat Detection and Mitigation
- Data privacy and sensitive information protection
- Decentralised Cybersecurity Approaches
- Safe AI
- Quantum Safety for 6G Networks

Distributed AI

HIGHLIGHTED PROJECTS

CODECO | 6GTWINROAD | EXTREME-XP

- Human Centric AI: Explainable and GenAI
- Decentralised Collaborative AI
- Quantum AI
- Computational Vision and Scene Analysis
- NLP - Acoustic AI
- Volumetric Synthesis
- AI-based Distributed Data Architecture optimisations
- Data efficiency and privacy optimisations
- Data Spaces

Internet of Things

HIGHLIGHTED PROJECTS

WITHSENSE | CUSTODES | COGNIFOG

- Ambient Intelligence
- RINA for IoT
- Precise positioning based on Visible Light and RF

Media Technologies

HIGHLIGHTED PROJECTS

PRESENCE | HEAT

- Real-time multi-user holoportation
- Immersive video
- Volumetric video
- Scalable communications
- Point Cloud Compression
- Stream Synchronization
- Multi-camera 3D reconstruction
- Supersampling and denoising
- Quality of Experience
- Adaptive and low-latency streaming

Digital Society Technologies

HIGHLIGHTED PROJECTS

INTEGER | Living Labs Senegal | FORGING

VISION

- A society that is socially, digitally, and ecologically advanced
- Fully integrated and free from digital and social divides
- Innovation that is inclusive, sustainable, and human-centric

PURPOSE

- Design social structures, methodologies, and processes for universal innovation
- Encourage active participation from all citizens
- Ensure digital rights and responsibilities as core principles

RESEARCH LINES

Living Labs

- Create inclusive and open innovation ecosystems
- Apply the Living Lab methodology for real-world co-creation
- Involve citizens, public institutions, academia, and private actors

Assessment of the Social Impact of Digital Technologies

- Study the social, environmental, and economic impacts of digital tech
- Apply a human-centric, ethical, and sustainable innovation approach
- Use Key Value (KVI) methodology, Human-Centric Innovation, and Impact Certification

Digital Rights and Responsibilities

- Promote digital transformation that respects fundamental rights and intersectionality perspective
- Foster inclusion, democracy, well-being, and fair economic development
- Align innovation with rights-based and value-driven institutional frameworks

EU funding programmes for research and innovation

i2CAT has a leading role in numerous European research projects that set the way in cutting-edge technologies such as 5G and 6G, VR, Internet of Things, Artificial Intelligence, Cybersecurity, Blockchain, Space Communications and Digital Social Technologies. The centre has achieved great success within the Horizon Europe and Digital Europe funding programmes and has become a benchmark at a European level in mission-oriented R&D activities in advanced digital technologies.

HORIZON EUROPE FUNDING AND PROJECTS

Horizon Europe

i2CAT is actively involved in **27 Horizon Europe** projects—coordinating two and acting as Technical Coordinator in four. Eleven initiatives are part of the 6G Smart Networks and Services Joint Undertaking (SNS JU), which focuses on next-generation mobile network technologies.

According to the latest report from CDTI Innovación (Ministry of Science and Innovation of Spain), i2CAT ranks among Spain's top 15 research institutions for Horizon Europe participation (2021–2023). The Catalan centre secured 24 projects worth over €10 million in that period. i2CAT stood out in Cluster 4 'Digital, Industry & Space', leading 20 projects and attracting nearly €9 million, making it the 5th most-funded research centre in Catalonia for this cluster. In the 6G SNS JU programme, i2CAT ranked 3rd in Spain by participation, with 10 projects receiving over €4 million in funding.

In 2024, we joined the **PCP-WISE and Certain** projects corresponding to **Pillar II -Global Challenges & European Industrial Competitiveness**. This HE Pillar aims to foster breakthrough innovation and market deployment of innovative solutions. Our team also joined **Multi-X**, a project obtained within the third call of the **6G Smart Networks and Services (SNS) Joint Undertaking (JU)**, to design and facilitate technologies for the next generation of mobile networks and their advanced services. In addition, i2CAT was awarded **3 Open Calls** from different Horizon Europe projects with funding of over €200.000.

With over two decades of activity, i2CAT is a key player in the European research and innovation ecosystem for advanced digital technologies. **Since 2006, the centre has participated in 136 European projects, securing over €36 million in funding from the European Commission.**

PROJECTS ↘

PRESENCE

PRESENCE is oriented at providing intuitive and hyper-realistic Extended Reality (XR) experiences by bringing real humans into interactive virtual worlds. i2CAT coordinates this research project, which brings together 17 European partners. Focusing on a human-centred approach, the project will deliver a toolset of technologies such as holoportation, haptics, and virtual humans to enhance the feeling of presence for the end-users in virtual scenarios. All the solutions will intrinsically involve understanding the ethics of the solutions and end-users' safety and privacy.

Multi-X

Multi-X aims to revolutionise the 3GPP Radio Access Network (RAN) design and operation by developing a pioneering MultiX fusion Perceptive 6G-RAN system (MP6R) that will support an integrated multi-sensor, multi-static, multi-band, and multi-technology paradigm to enable multi-sensorial perception for future 6G sensing applications.

PCP-WISE

PCP-WISE project seeks to enhance EO-based information for better regional water management, promoting resilience across EU borders. It focuses on local dynamics in water availability and aims to anticipate extreme climate conditions through an integrated water intelligence system. The project's significance lies in its potential to mitigate water-related crises, driven by a unified water taxonomy and Earth observation-based modelling.

iTrust6G

iTrust6G will propose novel concepts and solutions for a unified and intelligent security architecture for distributed network and cloud domains, capable of addressing advanced 6G use cases and applications. i2CAT is the technical and scientific manager of this project, whose main goal is to design a network architecture implementing zero-trust principles to increase the trustworthiness of 6G networks at several levels, such as the AI/ML algorithm exploited for threat handling, asset compliance, explainable security policies and asset observability.

CERTAIN

CERTAIN aims to create a comprehensive SAF addressing CCAM development and deployment gaps, emphasising safety, trust, acceptance, and comfort for all road users. The project will tackle critical challenges in CCAM system validation. Continuous engagement with stakeholders and regulatory entities will ensure the framework's acceptance and deployment. The project's outcomes will provide a solid foundation for widespread CCAM system adoption, fostering trust among users, industry stakeholders, and regulators.

XGain

XGain will deploy, explore and assess digital connectivity options by applying various technological solutions to a wide spectrum of geographical locations and sectors. The project aims to deliver a Knowledge Facilitation Tool, facilitating business model development through the selection of an ecosystem of technologies that, ultimately, could help to increase systemic resilience and energy efficiency, contribute to climate mitigation and reduce the digital divides between different types of citizens, farms, sectors and regions.

Digital Europe

i2CAT also participates in two projects within the Digital Europe Programme. Promoted by the European Commission, this funding programme aims to bridge the gap between digital technology research and market deployment.

deployEMDS

deployEMDS will support creating and deploying an operational data space, allowing participants to make data available and accessible in a machine-readable format and to share data in a controlled, simple and secure way. The project will contribute to further developing the common European mobility data space announced in the Data Strategy and the Sustainable and Smart Mobility Strategy, built and operated in full compliance with existing EU legislation in the mobility and transport sectors.

AI4CI

AI4CI aims to support European educational institutions in creating a new joint master's degree programme focused on applying Artificial Intelligence to Connected Industries. The primary objective is to train at least 500 new experts in AI technologies for Connected Industries to reinforce the EU industry and scientific ecosystem and to graduate at least 250 among them. The joint AI4CI European master's will be deployed in 4 countries at 7 universities, integrating 5 SMEs and 3 research centres supporting training activities and student professionalisation.

Funded by the European Union

SNS Projects

In 2024, i2CAT was awarded **one new project -Multi-X- within the third call of the 6G Smart Networks and Services (SNS) Joint Undertaking (JU)**. The SNS is the European Research and Innovation initiative within the Horizon Europe R&I programme, which is directed at designing and facilitating technologies for the next generation of mobile networks and its advanced services. **This new project will expand and complement the ten projects awarded in the first and second calls of the SNS back in 2022 and 2023**. With 11 active projects in the 6G SNS, we have consolidated our role in developing 5G and 6G technologies in the European research arena, thanks to active participation in the four large research Streams that define the programme.

6G SNS

STREAM A ↘

Within Stream A, oriented at developing advanced 5G solutions, i2CAT participates in the **BeGREEN** project, which works to substantially reduce the energy consumption of new mobile communication networks to make them more sustainable. The main challenge is to achieve this despite the incessant escalation in data traffic and the emergence of increasingly advanced services with ambitious performance demands for mobile communication networks. In turn, the **NANCY** project will focus on improving network security and privacy by implementing connectivity systems based on artificial intelligence and blockchain.

BeGREEN

STREAM B ↘

In Stream B, which is focused on designing 6G technology enablers, i2CAT participates in five projects. The **ETHER** project aims to guarantee 100% network coverage by integrating terrestrial and non-terrestrial networks and using satellites to extend coverage. **INSTINCT** will deliver the waveforms, protocols, and hardware design of an innovative beyond communications system architecture, combining the benefits of Wireless Sensing, Reconfigurable Intelligent Surfaces (RIS) and Artificial Intelligence (AI). **iTrust6G** will propose novel concepts and solutions to achieve a unified and intelligent security architecture for distributed network and cloud domains, capable of addressing advanced 6G use cases and applications by integrating required architectural enablers for flexible yet cost-efficient deployment in 6G networks. **ORIGAMI** will spearhead the next-generation mobile network architecture, overcoming eight factual barriers to ensure a successful 6G future. Finally, **MultiX** aims to revolutionise the 3GPP Radio Access Network (RAN) design and operation by developing a pioneering MultiX fusion Perceptive 6G-RAN system (MP6R) that will support an integrated multi-sensor, multi-static, multi-band, and multi-technology paradigm to enable multi-sensorial perception for future 6G sensing applications.

ETHER INSTINCT iTrust6G MULTIX

STREAM C ↘

Stream C of the SNS programme aims to build experimental platforms for 6G. i2CAT participates in three projects within this Stream. The **6G-BRICKS** project will work on integrating emerging technologies into the 6G architecture by creating functional blocks, thus providing greater flexibility for networks and the ability to be configured dynamically according to needs. One of these disruptive technologies is the already mentioned Reconfigurable Intelligent Surfaces, which will make it possible to integrate communication antennas into elements of everyday life, such as walls or street furniture. In turn, the **6G-XR** project will enable new services in extended reality, validating innovative 6G applications for holography, digital twins or the broadcasting of large events. Another strategic project is **SUNRISE-6G**, where i2CAT will act as co-technical manager. It will mainly aim to federate the experimental platforms for 6G in Europe. The project's approach is inspired by the "network of networks" concept of 6G Networks, seeking to integrate all private and public infrastructures under a massively scalable internet-like architecture.

6G BRICKS 6G XR SUNRISE 6G

STREAM D ↘

Finally, within Stream D, whose main objective is to complete 5G large-scale tests, i2CAT will participate in the **TARGET-X** project, which seeks to accelerate the digital transformation of key industries at a European level, such as energy, construction, automotive and manufacturing through large-scale trials and test benches to validate the current potential of 5G and the future 6G in real environments.

TARGET-X

UNICO I+D 6G Programme

In 2024, we continued making progress across the six coordinated projects awarded under the **UNICO I+D 6G programme** with a total funding of €16.5M. Since January 2022, i2CAT has led **19 research projects, structured into six major coordinated initiatives** focused on boosting the development of advanced 5G and the future 6G technologies in Spain.

We are also actively involved in the **Plan for the Promotion of Telecommunications Studies (PPET)**, a cross-cutting action of the programme to foster interest and careers in telecommunications.

17M€ Fundings

19 Research projects

1 Plan for the Promotion of Telecommunication Studies

UNICO I+D 6G

Funded by the European Union NextGenerationEU

MINISTERIO PARA LA TRANSFORMACIÓN DIGITAL Y DE LA FUNCIÓN PÚBLICA

Plan de Recuperación, Transformación y Resiliencia

PROJECTS ↘

6GENABLERS

This project comprises three sub-projects, each achieving notable milestones in 2024. **6GENABLERS-AI** developed a Neuro-Symbolic AI model to predict CPU demands and enable proactive scaling in edge-cloud environments. Using a zero-touch control system and MLOps pipeline, the model—integrated with OpenNebula—reduced over- and under-provisioning by six times compared to existing solutions. **6GENABLERS-DLT** delivered a distributed telco marketplace platform for 6G, incorporating smart contracts, SLA monitoring, and intent-based discovery to securely automate service agreements and enhance collaboration across stakeholders. **6GENABLERS-SEC** implemented a trust- and privacy-aware security management system for 6G, featuring dynamic security enabler selection, a reputation system for trust indicators, and mechanisms to counter physical and data-plane threats, especially in O-RAN scenarios.

6GTWINROAD

This project achieved significant milestones across its four subprojects. **SP1** developed a Predictive QoS Management system for safe teleoperation of autonomous vehicles, successfully tested at IDIADA, to avoid connectivity-related risks. **SP2** advanced maneuver coordination at unsignalized intersections with centralized and decentralized systems that outperformed traditional traffic rules in live demos. **SP3** enhanced vehicle perception by combining infrastructure and onboard sensors to build a shared, real-time 3D map of the environment. Finally, **SP4** delivered a digital twin of Barcelona's C-32 highway, using real-time data and AI-driven forecasting to improve traffic flow, reduce emissions, and support intelligent traffic management.

6GSMART

In 2024, researchers delivered two integrated demonstrations showcasing how 6G technologies can enhance productivity in the manufacturing sector. The first demo, at **BOSCH Aranjuez**, featured an AI-powered quality control system using low-cost cameras along a production line. These cameras transmitted images to a central AI server via an integrated Wi-Fi+5G private network, reaching speeds up to 600 Mbps on a 40 MHz 5G carrier. The system enabled end-to-end defect detection in under 500 ms, ensuring real-time quality checks without affecting production flow. The second demo focused on the remote operation of a Coordinate Measurement Machine (CMM) by **Trimek** over a public mobile network. Researchers tested Bandwidth Parts (BWPs) to safeguard CMM traffic, successfully maintaining performance even when the network was congested with multiple eMBB users.

6GSatNet

In 2024, this project achieved several key technical milestones that advance the integration of Non-Terrestrial Networks (NTNs) into future 6G systems. Highlights include the development of the Minerva payload by **MWSE**, a compact system capable of executing 5G network functions, ready for in-orbit validation. **Keysight** advanced medium access mechanisms for massive user access in satellite links, while secure satellite-to-satellite communication protocols were implemented to ensure robust end-to-end authentication. **Open Cosmos** developed an AI-powered platform for satellite operation optimization. Internally, a MANO framework integrating satellite mobility and service location was built on OSM and Kubernetes. A hybrid RF-optical terminal system enhanced pointing accuracy, and a QKD simulation engine supported advanced security research. The flexible payload system also progressed, with optimized hardware management features. These results have been translated into prototypes, demonstrations, and widely disseminated through technical publications.

OPEN6G

Among its key achievements, the Open6G project successfully designed and developed an O-RAN-compliant experimentation platform for advanced 5G and 6G technologies (the Open6G platform). Within Open6G, substantial advancements have been delivered in AI-powered network automation, including intelligent resource management (**CloudRIC, MemorAI**), anomaly detection (**ANEMON**), and the application of federated learning in high-mobility scenarios (**Slice Management**). Furthermore, the project designed and evaluated practical **ISAC systems** (OROS, 3DSAR/3DSAR+,5GNSS, Redirected Walking) and effectively integrated **RIS** to improve communication, sensing, localization, and computation (mmWave IRS, JCAS IRS). A major Key Performance Indicator (KPI) demonstrating the project's impact is the publication of 24 scientific articles in prestigious conferences and high-impact journals, validating the innovative technological solutions developed, and the given talks and workshops in academic, industrial and scientific events (Green 6G, ISAC/RIS, MATT Talk, etc.)

6GOpenVerso

Within this project, **Ericsson** deployed a 5G-Advanced network at i2CAT, incorporating both FR1 and FR2 radio cells along with a core network that supports advanced analytics. This setup enabled i2CAT to extend its **Holomit®** system, which facilitates holographic calls, to dynamically adapt to network conditions. By leveraging analytics from the Ericsson network, Holomit® can now detect congestion in real-time for XR users and take corrective actions such as adjusting the data rate or requesting Quality on Demand from the network, ensuring optimal session quality even under varying conditions.

Plan for the Promotion of Teleccomunicacions

In March 2024, we hosted a **five-day Workshop** for 13 PhD students and early-stage postdocs to explore advanced digital tech topics through demos, seminars, and visits to top research centres in Barcelona. In November, we organized a **Winter PhD School**, welcoming 16 participants for an intensive five-day programme featuring presentations, demos, and keynote lectures by experts in advanced digital technologies, offering insights into our current and future research.

UNICO *Infraestructuras*

i2CAT has been awarded nearly €10 million through two calls of the *Infraestructuras y Equipamiento Científico-Técnico* subprogramme, aimed at universities and research centres, by the Ministry for Digital Transformation. This initiative is part of the **UNICO I+D 6G programme**, backed by Spain's **Recovery, Transformation and Resilience Plan** and funded by **NextGenerationEU**. The programme seeks to position Spain as a leader in cutting-edge 5G and 6G research. With this funding, we will enhance our technological capabilities by upgrading and integrating existing labs into a unified experimental infrastructure and establishing new facilities for advanced study in next-generation mobile technologies.

10M€ Investment

5 Experimental Infrastructures

This unified infrastructure will be open to external users from industry, academia, and public administrations. It is being deployed progressively through the following phases:

6GEN (6G rEsearch iNfrastructure) serves as the foundational infrastructure, supporting experimental research across key 6G domains, including RAN, O-RAN, NTN, Cloud Continuum, programmable networks, V2X, IoT, XR, and cybersecurity. It also interconnects the specialized infrastructures described below:

- **6GStarLab:** An in-orbit laboratory dedicated to researching and validating Non-Terrestrial Networks (NTN), enabling experimentation with virtualized satellite communications.
- **6GCAMLab:** Focused on Connected and Automated Mobility (CAM), this lab supports in-lab and outdoor testing of V2X communications, advanced positioning systems, and computer vision technologies.
- **6GEN-ORAN:** A platform for research in open radio access networks, it supports experimental evaluation of virtual RAN (vRAN) solutions, Reconfigurable Intelligent Surfaces (RIS) adaptation to O-RAN, deployment of rApps (radio applications), and interoperability testing.
- **6GQuCryptoLab:** A specialized lab for Quantum Key Distribution (QKD) research, enabling experimentation with both Continuous Variable (CV-QKD) and Discrete Variable (DV-QKD) systems over optical fibre and free-space links, including simulated environments.

IN 2024, WE LAUNCHED TENDERS FOR TWO MAJOR PROJECTS WITHIN THIS PROGRAMME: ↘

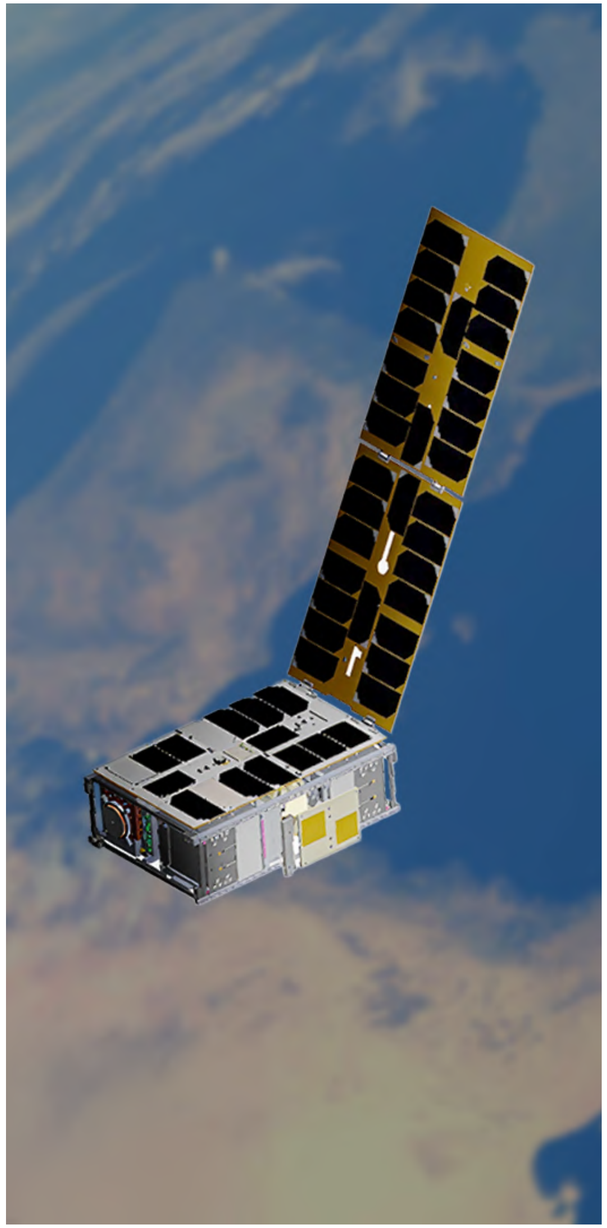
6GEN

i2CAT has awarded contracts with a total value of more than €1.3M to the following companies:

- Netmetrix Solutions S.L.
- CENTRA Tecnologia S.L.
- Keysight Technologies Sales Spain S.L.U.
- Precisión Aérea Innovación y Nuevas Tecnologías S.L.
- NEC Ibérica S.L.U.
- DAGRAM TI S.L.
- DISTRON S.L.

6GStarLab

6GStarLab will be **Europe's first Low-Earth Orbit (LEO) laboratory** dedicated to non-terrestrial network (NTN) research. i2CAT has awarded a €1.65M contract to **Open Cosmos** for the design, integration, launch, and operation of the 6GStarLab satellite. The satellite will also incorporate payloads designed by i2CAT and **Microwave Sensors and Electronics (MWSE)**, a space-to-ground optical communication laser terminal and a corresponding ground station from the Singapore-based company **Transcelestial**. Finally, the set of antennas for radio frequency communications will be developed by the **NanoSat Lab group of the Universitat Politècnica de Catalunya (UPC)**.



UNICO I+D 6G

Funded by the European Union NextGenerationEU

MINISTERIO PARA LA TRANSFORMACIÓN DIGITAL Y DE LA FUNCIÓN PÚBLICA

Plan de Recuperación, Transformación y Resiliencia

Talent in research

i2CAT strives for excellence to increase the centre's scientific competitiveness. In 2024, we continued to invest in research and innovation talent to maintain its scientific and technological leadership.

Marie Skłodowska-Curie Doctoral Networks

Two researchers from the **Marie Skłodowska-Curie Innovative Training Networks (MSCA-ITN)** started their secondment PhD stages within the **5GSmartFact project**. Their placements include NEC Laboratories (Germany) and ABB Group (Sweden), as well as Robert Bosch GmbH (Germany) and Ingeniarius - ING (Portugal), respectively.

In 2024, we applied to the **MSCA Doctoral Networks (MSCA-DN)** call and recently secured the coordinated project **GENOME (GENerative and connected intelligence for 6G Open ManagemEnt)**. Led by the Software Networks research group, the programme will explore, adapt, and validate large language models (LLMs) for the autonomous management and orchestration of various network domains—such as O-RAN, edge, and cloud—using intent-based networking and task-agnostic network functions.

AGAUR Grant Programmes

In 2024, i2CAT applied for five FI Joan Oró grants funded by the Agency for Management of University and Research Grants (AGAUR) of the Catalan Government. **One grant was awarded**, allowing a researcher to join the Distributed Artificial Intelligence research group and contribute to ongoing research projects. These grants support doctoral candidates in Catalan institutions by funding their research and training, boosting their academic and professional development in the early stages of their careers.

In the same year, we also submitted two applications for the ***Ajuts per a la contractació de personal investigador predoctoral en formació*** and three applications for the ***Programa de suport a l'estabilització de personal investigador postdoctoral (ESTAB 2024)*** in the fields of artificial intelligence and cybersecurity. **The outcomes of these applications are still pending**.

Finally, during 2024, we hosted three doctoral interns from ING (Greece), the Technical University of Cluj-Napoca (Romania), and the University of Valladolid (Spain). Additionally, a researcher from the AI-driven Systems research group at i2CAT participated in a research stay at Chalmers University of Technology (Sweden).

Research publications

Excellence, cooperation, openness, inspiration, and commitment are i2CAT's hallmarks. In 2024, our research groups worked to produce relevant scientific results to contribute to the general advancement of digital technologies and to boost standard bodies such as ETSI and ISO. We are committed to making our scientific outcomes available to everyone and also giving further visibility to the results achieved by our researchers.

PUBLICATIONS

In 2024, i2CAT's research areas made **86 scientific contributions** across a diverse range of formats, including Journals, Conferences, Workshops, and Book Chapters, demonstrating the depth of its research output.

37 Journals | **31** Q1 Journals **6** Q2 Journals

38 Conferences | **2** A and A*

8 Workshops

1 Book 2 Book chapters

THE MAIN PUBLICATIONS OF 2024 ARE THE FOLLOWING ONES:

1 A* Arnau Romero, Carmen Delgado, Lanfranco Zanzi, Raúl Suárez, Xavier Costa-Pérez: Cellular-enabled Collaborative Robots Planning and Operations for Search-and-Rescue Scenarios. CoRR abs/2403.09177. In 2024 IEEE International Conference on Robotics and Automation (ICRA).

2 A* Leonardo Lo Schiavo, Gines Garcia-Aviles, Andres Garcia-Saavedra, Marco Gramaglia, Marco Fiore, Albert Banchs, and Xavier Costa-Perez. 2024. CloudRIC: Open Radio Access Network (O-RAN) Virtualization with Shared Heterogeneous Computing. In Proceedings of the 30th Annual International Conference on Mobile Computing and Networking (ACM MobiCom '24). Association for Computing Machinery, New York, NY, USA, 558–572.

3 Q1 Suneel Kumar, Daniel Camps-Mur, Eduard Garcia-Villegas, C-SLA-MLO: Enhancing SLA Compliance in Industrial Wi-Fi through Cooperative Multilink Operation, Internet of Things, Volume 27, 2024, 101269, ISSN 2542-6605.

4 Q1 A. Singla, A. Calveras, F. Betorz and J. A. Ruiz-De-Azua, "Enhancing Satellite Non-Terrestrial Networks Through Advanced Constellation Management: Optimizing In-Orbit Resources for NB-IoT," in IEEE Open Journal of the Communications Society, vol. 5, pp. 2113-2131, 2024, doi: 10.1109/OJCOMS.2024.3384265.

5 Q1 Bartra, G.C., Lemic, F., Pascual, G., Rodas, A.P., Struye, J., Delgado, C. and Pérez, X.C., 2024. Graph Neural Networks as an Enabler of Terahertz-based Flow-guided Nanoscale Localization over Highly Erroneous Raw Data. IEEE Journal on Selected Areas in Communications.

6 Q1 J. Pueyo, D. Camps-Mur and M. Catalan-Cid, "PHaul: A PPO-Based Forwarding Agent for Sub6-Enhanced Integrated Access and Backhaul Networks," in IEEE Transactions on Network and Service Management, vol. 21, no. 6, pp. 6273-6289,
Dec. 2024.

7 Q1 S. Roy, H. Chergui and C. Verikoukis, "Explanation-Guided Fair Federated Learning for Transparent 6G RAN Slicing," in IEEE Transactions on Cognitive Communications and Networking, doi: 10.1109/TCCN.2024.3400524. 2024.

8 Q1 S. Roy, H. Chergui and C. Verikoukis, "Toward Bridging the FL Performance-Explainability Tradeoff: A Trustworthy 6G RAN Slicing Use-Case," in IEEE Transactions on Vehicular Technology, vol. 73, no. 7, pp. 10529-10538, July 2024, doi: 10.1109/TVT.2024.3364363. 2024.

9 Q1 R. C. Sofia et al., "A Framework for Cognitive, Decentralized Container Orchestration," in IEEE Access, vol. 12, pp. 79978-80008, 2024, doi: 10.1109/ACCESS.2024.3406861.

10 Q1 Sarabia-Jácome, D., Giménez-Antón, S., Liatifis, A., Grasa, E., Catalán, M., & Pliatsios, D. (2024). Progressive Adoption of RINA in IoT Networks: Enhancing Scalability and Network Management via SDN Integration. Applied Sciences, 14(6), 2300. https://doi.org/10.3390/app14062300.

RESEARCH PORTAL OF CATALONIA (CORA.PRC)

HIGHLIGHTED ↘

Research led by i2CAT won the "Best Paper Award" in one of the most relevant international conferences on Machine Learning and telecommunications networks

A scientific article led by researchers from the AI-driven Systems research group, Xavier Costa and Ethan Sánchez, won the **"Best Paper Award"** during the **IEEE International Conference on Machine Learning for Communication and Networking 2024 (IEEEICMLCN)**, held in Stockholm (Sweden) in May 2024. In the article, researchers present cache memory optimisation mechanisms to reduce the energy consumption of a virtualised radio access network (vRAN) platform.

04

Technology Transfer

i2CAT strives to generate market-oriented technologies and solutions. We establish agreements with private companies to create joint R&D teams to solve market-driven technical challenges, valorise technologies and exploit the intellectual property rights of research. We lead the design and deployment of technical and functional proofs-of-concept with ICT companies, public administrations, and end-users to validate technologies and disseminate their adoption.

Technological Ecosystem

In 2024, we consolidated our income through royalties, technology transfer deals, and our market position as an invaluable partner to support and advance entrepreneurship and spin-off creation.

ROYALTIES

In 2024, we doubled our income through royalties, which increased by 99% compared to 2023, achieving a turnover of 52.443€.

The centre produced four new valorised assets, reaching ten in total.

5 Assets licensed

2 Spin-offs

Research Outcomes

ASSETS AND VALORISATION ↘

NEW **DSSIM**

DSS-SIM is a **simulator for Distributed Satellite Systems**, an integral solution that emulates spacecraft systems and payloads, simulates network procedures, and implements protocol stacks, as well as executes autonomous mission-management algorithms.

The simulator integrates an operations module, which represents the tasks or system functions executed to achieve a mission, and a networking module, which utilises NS-3 as the backbone for network-related aspects, extending its implementation to define the dynamic environment of satellite-to-satellite and satellite-to-ground communications.

FlexStack®

FlexStack is a **flexible and cost-effective software solution** designed to accelerate the development of **V2X (Vehicle-to-Everything)** applications.

This software is ideal for researchers, entrepreneurs and industry professionals seeking to streamline the creation of V2X prototypes and proof-of-concept applications, as it supports the ETSI Cooperative ITS protocol stack and offers a Python-based design for enhanced accessibility and faster iteration.

There are two releases: the **Community Edition (open source)**, which serves as the foundation for experimental research, and the **Business Edition**, designed for developers with support, additional features, ready-to-use use cases, and scalability.

Transferred

NEW **Content Proxy**

The ContextProxy is a **tool that assists in disseminating User Equipment (UE)** contexts in a multi-satellite Non-Terrestrial Network.

It is capable of fetching UE contexts from the Mobility Management Entity (MME) at one satellite and inserting them into the MME at another satellite, effectively enabling multi-satellite service provisioning.

The Knowledge Industry Programme · Pending transference

Holomit®

Holomit® is an **advanced holoportation system that delivers high-quality, real-time 3D representations for VR/AR/XR applications**. By leveraging cutting-edge reconstruction techniques and efficient data compression, Holomit® enables seamless integration of volumetric point clouds into dynamic, immersive environments.

A spin-off company, Volum Technologies, will further develop and commercialise this technology.

NEW **Sieva Evolution**

SIEVA Evolution is a **tool for SIEM visibility analysis** that utilises Large Language Models.

It classifies and identifies logs within a SIEM and maps the output to the MITRE ATT&CK Framework matrix, enabling organisations to understand their monitoring needs and capabilities better. It also develops a mid- and long-term data integration strategy, achieving higher operational maturity.

Unlike other visibility tools, SIEVA Evolution analysis is based on the information in the logs instead of the rules deployed on the SIEMs.

NEW **Infohound**

A tool for **domain/organisation profiling using OSINT (Open Source Intelligence) techniques**.

It utilises a default set of modules to gather various types of data, and users can create their modules, thereby integrating the tool with other sources.

InfoHound centralises them in one place, helping users avoid installing and executing multiple tools and importing or exporting their results, with visualisation for easy understanding.

It has been **released publicly under AGPL in i2CAT's GitHub** repository as an open-source tool.

PreventUEBA

PreventUEBA is **an AI-driven cybersecurity solution** that shifts the focus from traditional threat detection to proactive risk prevention.

Unlike conventional User and Entity Behaviour Analytics (UEBA) solutions, which primarily detect anomalies, PreventUEBA analyses user behaviour patterns to assess exposure to threats and recommend mitigation strategies.

By leveraging machine learning, PreventUEBA builds taxonomies of user behaviours and calculates risk levels, providing cybersecurity teams with strategic insights to reduce attack surfaces. The system integrates with existing Security Information and Event Management (SIEM) platforms, enhancing their capabilities with predictive analytics.

Transferred

Sync-X

Sync-X is a technology that ensures **seamless, synchronised playback across multiple devices in shared media sessions**. It combines a suite of software modules to deliver frame-accurate synchronisation in any media environment.

This technology is ideal for social TV, OTT platforms, video walls, and multi-camera production.

Sync-X has been transferred to the privatecompany IntoReality. ↗

VALORISATION NETWORKS ↘

The Catalonia Valorisation Networks help organisations to valorise their assets, contribute to funding patent applications, execute Proofs of Concept, and disseminate their milestones. i2CAT is a member of 2 Valorisation Networks conceived to bring project results to the market.

XARXA RDI·IA

Xarxa AccessCat

05

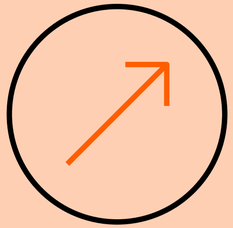
Digital Strategies and Policies

At i2CAT, we actively support the Government of Catalonia's digital policies and strategic initiatives, contributing to the region's technological transformation, addressing social challenges across the territory, and fostering the development of a strong digital innovation ecosystem. These efforts are carried out with a clear focus on promoting technological sovereignty and ensuring a fair, transparent and sustainable society that leaves no one behind.

Digital and Technological Transformation of the Public Administration

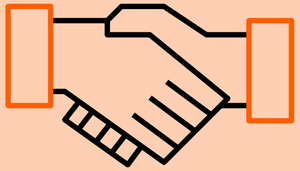
i2CAT drives the digital transformation of Catalonia's public sector by turning emerging technologies into efficient, inclusive, and citizen-centric public services. From applied research to real-world pilots, we work across the full innovation chain in close collaboration with all levels of government to convert technology into public value.

THE PROGRAMME INTEGRATES 4 STRATEGIC LINES ↘



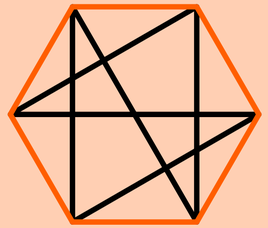
Pioneering Innovation in Public Services

We have spearheaded the development of **mission-driven projects with high institutional impact**, demonstrating how digital technologies can modernise existing services, generate new ones, and extend them across Catalonia. Key advances have included using AI for image recognition, satellite-based agriculture and water management monitoring, and **launching the first mobile citizen service unit equipped with resilient 5G and satellite connectivity** (OAC Mòbil).



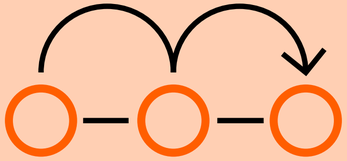
Catalysing the emerging digital ecosystem

Through ecosystem-building and cross-sector collaboration, we promote innovation adoption and attract digital talent. In 2024, **the Digital Catalonia Alliance (DCA) surpassed 600 members**, reinforcing its position as a key hub in the region's digital landscape. Flagship initiatives such as the **AI Accelerator** and **GovTech Catalonia** strengthened collaboration between startups, research centres, and public institutions, enabling the co-creation of tech-driven solutions to public sector challenges. Additionally, the year saw the launch of a new digital transformation programme aimed at boosting the local economy in the Terres de l'Ebre region.



Promoting territorial equity and digital cohesion

We collaborate closely with municipalities, county councils, and regional administrations to pilot digital services tailored to local needs and realities. With a firm commitment to equity and economic impact, recent initiatives have addressed challenges such as **detecting illegal landfills, monitoring tourist flows, and developing data-driven solutions for small municipalities**. In 2024, we expanded our territorial presence, reinforcing our role in ensuring digitalisation reaches every corner of Catalonia.



Innovating with impact: from pilots to policy

Several pilot projects have gained significant traction within their respective sectors and are now contributing to **developing new governance strategies**. A notable example this year is the **application of artificial intelligence to detect rabbit burrows—an** initiative that enables rural agents to enhance wildlife management and prevent annual crop losses of up to 80,000 kg. This project exemplifies the potential of emerging technologies to generate tangible public value and inform evidence-based decision-making.

Government of Catalonia Digital Strategies

GovTech Catalonia: public innovation through open collaboration

GovTech Catalonia is a strategic initiative promoted by the Government of Catalonia and led by the i2CAT Research Centre to **accelerate the digital transformation of the public sector through open innovation**. The programme fosters collaboration between public institutions, startups, technology SMEs, and research centres to co-create digital solutions that address real public challenges.

GovTech Catalonia bridges the public sector and the innovation ecosystem, providing a structured framework for agile experimentation, pilot deployment, and scaling of tech-based services for citizens.

KEY ACHIVEMENTS IN 2024

In 2024, GovTech Catalonia reinforced its position as a pioneering programme in Europe by expanding its reach and impact across government levels:

- **6 challenges launched through open innovation challenges** in collaboration with government departments and local authorities
- **Over 20 public administrations involved**, including municipalities, county councils, and regional bodies
- **Over 75 companies and startups engaged** through open calls and matchmaking sessions
- **6 pilot projects deployed**, validating AI, IoT, and data-driven solutions in real public service contexts
- **Active collaboration with international GovTech networks**, enhancing visibility and knowledge exchange

GovTech Territori: Bringing innovation closer to communities

The *GovTech Territori* is a dedicated space within the GovTech Catalunya programme that focuses on **bringing innovation closer to local and regional administrations**. The initiative has ensured equitable access to innovation throughout Catalonia, supporting municipalities and local entities in identifying challenges, defining open calls, and validating solutions in real-world settings.

In 2024, the initiative became a reference point for territorial innovation, providing personalised support and technical guidance to ensure that even small municipalities can participate in and benefit from the GovTech model.

Participation in Strategic Events

In 2024, GovTech Catalunya gained international recognition by participating in prestigious events, including the Smart City Expo World Congress, the Mobile World Congress, and GovTech 4 Impact. These engagements reinforced Catalonia's public innovation leadership, facilitated global partnerships, and showcased successful GovTech pilot projects from the region.

DIGITAL CATALONIA ALLIANCE

The Digital Catalonia Alliance (DCA) initiative is promoted by the Government of Catalonia and the i2CAT Research Centre. It serves as a **hub for the advanced technology ecosystem in Catalonia**, fostering growth, innovation, and the development of new digital solutions through collaboration among its members. The DCA is a leading platform that enables its members to access market opportunities, funding sources, and networking spaces, driving the competitiveness of the Catalan technology sector.

In 2024, the DCA exceeded **620 members**, including other relevant milestones:

- €8.6 million in business value generated through DCA activity, representing a 244% increase compared to 2023
- Over 430 networking and collaboration requests managed, contributing to sectoral revitalisation
- Innovation driven across 45% of the Catalan technology sectors represented in the DCA
- 9% year-on-year growth in membership

In 2024, **the Digital Catalonia Alliance took part in the Mobile World Congress and the Smart City Expo World Congress for the first time** with a booth at the Catalonia Pavilion, promoted by the Government of Catalonia.

This milestone enabled the DCA to participate in the world's leading technology events, showcasing its services to the Catalan tech ecosystem, establishing new connections with companies and institutions worldwide, and supporting the participation of its more than 620 members.

Participation in trade fairs and international congresses is a key pillar of the DCA's visibility and opportunity-generation strategy. In addition to MWC and SCEWC, the DCA also had a dedicated presence at the Advanced Factories, while actively supporting members' participation in national and international events.

MEMBER COMPANIES / ENTITIES

DCA-IoT	DCA-Drones
169	119
DCA-Cibersecurity	**DCA-IA**
110	124
DCA-NewSpace	**DCA-Blockchain**
63	42

PARTNERS

Government of Catalonia Digital Strategies

New Space Strategy

i2CAT plays a pivotal role in driving Catalonia's New Space Strategy. Backed by the Government of Catalonia and carried out in partnership with the Institute of Space Studies of Catalonia (IEEC) and the Cartographical and Geological Institute of Catalonia (ICGC), this initiative aims to transform the region into a vibrant hub for space innovation. The strategy's vision is to position Catalonia as a global leader in cutting-edge space research and technology, turning knowledge into real-world impact for society and business.

Catalonia's New Space Strategy opens the door to exciting opportunities in Earth Observation, Telecommunications, and Global Navigation Satellite Systems. It empowers partners to harness the full potential of space data and turn it into valuable insights. With a forward-thinking, all-encompassing approach, **the strategy is built on six key pillars**: energising and globalising the ecosystem; driving research and innovation; attracting, developing, and retaining top talent; promoting the adoption of space-based services through real-world use cases and public engagement; advancing both space missions and ground infrastructure; and shaping a solid regulatory framework to support long-term growth.

In 2024, the nanosatellite Enxaneta, the first satellite mission promoted by the Government of Catalonia within the New Space Strategy, returned triumphantly to Earth. The mission, contracted and supervised by the Institute of Space Studies of Catalonia (IEEC) and awarded to the company Sateliot, was thus successfully and sustainably completed. It completed de-orbit and disintegrated in the upper layers of the Earth's atmosphere in July. **In its three years in orbit, Enxaneta has validated the viability of IoT satellite connectivity for expanding terrestrial coverage through use cases coordinated by i2CAT** in areas such as agriculture, livestock, and climate monitoring.

Following Enxaneta's success, at the end of 2024, our team at i2CAT worked on the **commissioning of Minairo, the mission that will follow Enxaneta's path in becoming a flying lab**. It will validate the innovative concept of flexible payloads that can be reprogrammed in flight to enable different functions and services adapted to various use cases and challenges. The IoT communications nanosatellite, developed by the Catalan company Sateliot, is the first in history to be launched under the 5G standard. Among other technologies, **Minairo will be a key element in testing the new Narrowband-IoT (NB-IoT) protocols in Low Earth Orbit (LEO) orbits**. They will continue to support the use cases developed using Enxaneta.

In 2024, we contributed to the New Space Strategy of Catalonia through the following milestones:

- 2 PoCs with the public sector executed
- 2 PoCs with the private sector conceptualised
- 11 academic publications
- 12 potential partners contacted
- 14 M€ of additional funding unlocked from public and private funds

Catalonia.ai

i2CAT plays a key role as a strategic partner in the Government of Catalonia's CATALONIA.AI strategy, which is structured around seven core pillars: the AI ecosystem, research and development, talent, infrastructure and data, AI adoption, ethics, and society. Within this framework, i2CAT leads or actively contributes to several initiatives, including the DCA-AI and the CIDAI initiative.

In 2024, the i2CAT team continued to lead the development of **Data Spaces** for Catalonia's public and private sectors. These environments, aligned with European standards, aim to enable secure and sovereign data sharing in B2B and G2B contexts. Our team also continued preparatory activities for **upcoming RETECH calls**, co-organising a workshop with Eurecat to foster interest in mobility, health, and industry use cases, and contributed to high-impact projects (PAIs) through a project with Sistema d'Emergències Mèdiques de Catalunya (SEM), in collaboration with Eurecat and Huawei. The outcome was a real-time incident prediction dashboard using Kibana. The project has sparked strong interest from SEM, which is exploring ways to continue and further evolve the solution.

As part of our **PoC initiatives**, we presented a project to identify images from diverse sources using an AI model trained on the datasets employed in Sant Climent de Taüll's site 3D reconstruction.

Through **CIDAI**, we participated in innovation challenge workshops organised for Autoritat del Transport Metropolità de l'Àrea de Barcelona (ATM) and Àrea Metropolitana de Barcelona (AMB), proposing solutions such as a proof of concept (PoC) on lifecycle explainability and on-demand prediction and voice-based service support. Also within the framework of CIDAI, we delivered a **private masterclass on Explainable AI for CETAQUA**. We contributed to the White Paper on AI in Industry with a use case developed for Mitsubishi Electric, which involved designing an architecture to capture and leverage data from robotic arms to optimise industrial automation and enable more efficient and sustainable service models. Additionally, we participated in the **10th AI & Big Data Congress**, contributing to expert panels on Generative AI and Multiagent Systems. These efforts reinforce i2CAT's strategic role in bridging cutting-edge research, innovation, and societal impact.

06

Market-oriented Innovation

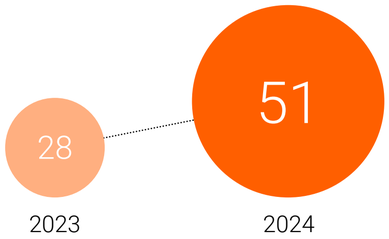
We put digital transformation at the heart of our mission, leveraging our expertise in international R&D to drive innovation across social and productive sectors. By fostering collaboration with private organisations, we drive innovation in the market, ensuring that cutting-edge technological advances empower companies to thrive and create meaningful solutions and competitive products.

Collaboration & co-creation with the private sector

Our strategic alliances with private companies and innovation ecosystem players are dedicated to co-creating in transformative fields such as Mobility, Space, Industry 5.0, Media, Telecom, Digital Administration, and Health. These focus areas ensure our collaborations are impactful and aligned with the needs of the Catalan ICT sector.

At i2CAT, we aim to create impact by transferring knowledge from our R&D projects. We support the Catalan ICT sector through proofs of concept and valorization activities. In 2024, we enjoyed a successful year, forming valuable collaborations with private companies that revealed innovative, market-oriented solutions. This year, we dedicated our strategic efforts to advancing mobility and exploring the vast potential of space.

NEW AGREEMENTS



With private companies

PUBLIC-PRIVATE ALLIANCES ↘

DIH4CAT

The DIH4CAT project was launched in May 2022, becoming one of Europe's first European Digital Innovation Hubs (EDIH) and a reference EDIH in Spain. **The project has consolidated its role as a critical infrastructure to facilitate the adoption of advanced digital technologies by SMEs and start-ups**. This programme allows businesses to test before investing in advanced technologies, photonics, robotics, 3D printing, and smart connectivity. The i2CAT Research Centre, in cooperation with Mobile World Capital Barcelona and UPC, is in charge of the Smart Connectivity node. i2CAT is also carrying out different activities, from viability studies, testing and validation, prototyping, and training on technologies such as AI, cybersecurity, 5G, IoT, new media formats, and, more recently, space communications. **i2CAT also coordinates the project's ecosystem development activities**, where alliances and synergies occur with associations like the DCA or projects like Arees Digitals.

Some of the activities that took place in 2024 are:

- The PADIH programme, managed by the EOI, is a beacon of opportunity for SMEs and start-ups. It offers funding of up to 30k€ for technological services (tests, training, viability studies, access to funding) by the EDIHs. The total funding available increased to a total funding of 24 M€, opening doors for innovative businesses to thrive.
- *Cupons tecnològics* (technological vouchers): yearly programme managed by ACCIO supporting digitalisation services by DIH4CAT partners and associates (pilots, tests, and viability studies). Grants up to 1.4 M€.
- +50 networking activities involving +1000 companies and public administrations to approach the ecosystem and find potential collaborations with stakeholders, including matchmaking, presentations, webinars and showcases.
- +70 training activities for 450 companies to boost knowledge and capacitate SMEs in advanced digital technologies.

CIDAI

The **Centre of Innovation for Data Tech and Artificial Intelligence (CIDAI)** proposes networked services for businesses and institutions, promoting technology transfer and cooperation among knowledge-generating organisations (universities, research and innovation centres), companies providing technology and services, and user companies and institutions demanding innovative solutions in applied AI. The CIDAI is modelled on the Digital Innovation Hubs set up by the European Commission and is conceived as a networked service centre working for businesses and institutions. It is a crucial instrument for the Government of Catalonia's AI Catalonia Strategy.

i2CAT plays a pivotal role in this initiative. As a founding member of CIDAI, we collaborate with other prominent entities to **foster the adoption of artificial intelligence and data technologies across various sectors**. Through CIDAI, we develop proofs of concept, high-impact projects, and organise masterclasses to disseminate knowledge and promote innovation.

STRATEGIC ALLIANCES ↘

acisa · AIRBUS · Alsína · ALSTOM · ambit · autopistas · esa · FACTUAL · Flash Park · gtd · indra · Italtel · Into Reality · keonn · MAXLINEAR · mosaicfactor · MWSE · NEC · NTT DATA · OPEN COSMOS · Opticks · OSMIUM · RDI network · RIVADA SPACE NETWORKS · SALTO · SATELIOT · Showee · simon · Telefónica · TELESPAZIO · TRANSCELESTIAL · Unblur · vodafone · VRAIn

R&D projects & strategic alliances

New shared lab i2CAT-SIMON to advance technological innovation in Ambient Intelligence

We have strengthened our strategic collaboration with SIMON in the development of technologies for home automation through a new shared experimentation space that fosters synergies, new projects, and shared infrastructures. In the new lab, we combine SIMON's market knowledge and digital product expertise with i2CAT's experience in radio technologies and artificial intelligence. The lab enables initiatives such as developing an algorithm based on the AINA project's database to recognise voice commands in Catalan in smart devices. This technology, focused on home automation, contributes to preserving and promoting the use of Catalan in the digital era. AINA is a project of the Government of Catalonia and the Barcelona Supercomputing Centre (BSC).

Autopistas and i2CAT teamed up in 2024 to boost the future of smart mobility together

i2CAT and Autopistas, a subsidiary of Abertis in Spain, collaborate on research, development and innovation in cooperative, connected and autonomous mobility, connected vehicles, smart infrastructures, digital twins and traffic and road safety systems. Through this partnership, we execute joint projects in R&D&I to advance smart mobility, identifying challenges and solutions in areas like vehicular communications, sensor technology, AI, distributed computing, cybersecurity, and other advanced technologies. The collaboration aims to develop new technological assets for traffic management and infrastructure optimisation, combining efforts in V2X communications, data governance, and other technological competencies.

Public-private collaboration with i2CAT accelerates the path towards sustainable and autonomous mobility

The agreement with Applus+ IDIADA consolidates a strategic alliance to jointly advance research and innovation in connected, cooperative and autonomous mobility (CCAM). This collaboration establishes a stable framework to develop advanced technologies oriented to the connected vehicle, with a shared vision of transforming mobility into a safer, more efficient and sustainable environment. Both organisations, rooted in the territory and with international projection, join capacities to accelerate the impact of innovation and strengthen the industrial and technological ecosystem of new mobility.

i2CAT is working in partnership with the start-up company Flash Park in various pilots

i2CAT is committed to collaboration with startups as a driver of innovation and competitiveness. With FlashPark, we are developing technological solutions that start from research to become real products with impact. Specifically, we are working on monitoring unbounded car parks using IoT technologies and low-cost sensing, creating a scalable and sustainable solution for urban mobility. This collaboration shows how open innovation can respond to complex challenges and how the centre is helping to bring technologies from the lab to the city.

MasOrange, Telefónica, Vodafone Group and i2CAT establish Europe's first multi-operator Open Gateway laboratory in Barcelona

MasOrange, Telefónica, Vodafone Group, and the i2CAT research centre have launched the first multi-operator Open Gateway API lab in Europe. This developer-ready environment allows companies and creators to explore and leverage telco capabilities through standardised APIs, accelerating the adoption of interoperable APIs, creating joint use cases and unifying performance in an accessible and collaborative environment. The working group implements tests and testbeds to reach a consensus on deploying existing and newly created APIs and fosters an open discussion environment based on technological and business innovation criteria. The lab is part of the GSMA-led Open Gateway initiative to transform telecommunications networks into programmable platforms to deliver network capabilities to everyone.

Vodafone and i2CAT jointly develop an automated Open RAN management system for greater innovation and security

In 2024, Vodafone and i2CAT announced the creation of a highly responsive multi-vendor management system to fix faults and respond to cyber threats faster and cheaper. It uses the improved automation offered by Open Radio Access Networks (RAN), which promotes enhanced innovation by introducing new features and services, enabling the use of software and hardware from multiple vendors. This approach also paves the way for greater use of automated and virtualisation techniques, replacing manual tasks associated with traditional networks. Combining the collective strengths of i2CAT's pioneering research and development in new digital technologies with Vodafone's advanced engineering expertise at its Innovation Centre in Málaga, the two organisations use machine learning techniques to manage and analyse multi-vendor Open RAN network logs effectively.

i2CAT participates in the design phase for the first Spanish mission on quantum-key distribution over LEO

The Ministry of Science, Innovation and Universities, through the Centre for the Development of Industrial Technology and Innovation (CDTI), has awarded a contract to a consortium led by Telespazio Ibérica to design Spain's first low Earth orbit (LEO) quantum key distribution (QKD) mission, aimed at strengthening communications security. The project focuses on developing a dedicated payload for deployment on a LEO satellite and its associated ground segment. As a key consortium member, we contribute our expertise in quantum technologies applied to secure communications during the mission's design phase.

Spain launched in 2024 the ESA Phi-LabNET in Barcelona to boost space innovation

i2CAT is a partner in the winning consortium led by IEEC that brings to market innovative and disruptive ideas in the field of climate resilience. Through open calls for funding, IP management, technical support, access to infrastructure and business coaching, ESA Phi-LabNET supports selected projects reaching market maturity, supporting Spain's goal to become a European leader in space technology. Its ultimate goal is to accelerate the future of the space sector, both upstream and downstream, through innovative projects with high commercial potential and to help overcome the barriers of transferring research outputs into successful products and services.

07

Social and Territorial Impact

We believe that true progress starts with people. That's why we put advanced digital technologies at the service of society—to empower citizens, reduce inequalities, and unlock new opportunities for all. Through bold innovation and inclusive collaboration, we work to bring technological benefits to every corner of the territory. Whether through local projects or global initiatives, our goal is to build a more connected, inclusive, and resilient future where no one is left behind.

Àrees Digitals

Àrees Digitals is a Government of Catalonia initiative in collaboration with Mobile World Capital Barcelona, i2CAT and territorial institutions. It has strengthened its role in **bringing cutting-edge digital technologies to all parts of Catalonia**. The initiative has made significant progress by working closely with local stakeholders to identify strategic challenges and implement targeted solutions.

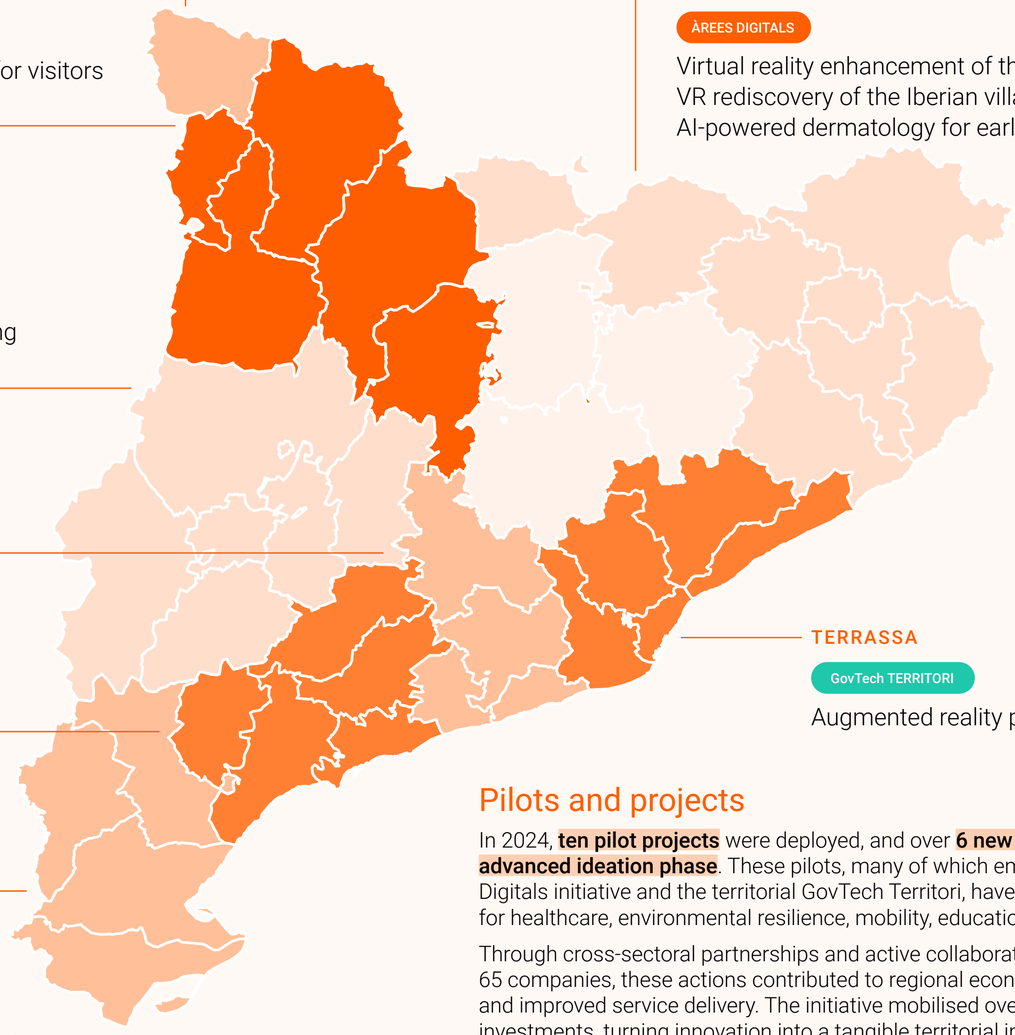
In 2024, Àrees Digitals intensified its efforts through workshops, certified training programmes, and pilot projects that combined research expertise with the capabilities of TDA companies. These activities contributed to improving public services and increasing the competitiveness of key economic sectors, particularly in rural areas.

With 5G as its backbone, **the programme integrates technologies like IoT, AI, XR, and blockchain to address real-world needs and promote digital cohesion across the territory**. By the end of 2024, Àrees Digitals had established itself as a benchmark for digital innovation in all Catalan regions, with initiatives aimed at reversing depopulation and reducing the digital divide.

ÀreesDigitals

HIGHLIGHTS OF THE YEAR INCLUDE

12 Training sessions
1 Certified course
+780 People trained
21 Outreach events
2 Co-creation workshops
3 Strategic congresses
68 Innovation challenges



ARAN

ÀREES DIGITALS

Guarda+: Safety and cultural heritage information for visitors

PIRINEU

DIH4CAT

Digital monitoring of medication adherence

Smart mobility in Vall de Boí

GovTech TERRITORI

Cycling route improvement and real-time monitoring

PONENT

GovTech TERRITORI

Rabbit burrow detection via drones and AI for wildlife management

PENEDÈS

ÀREES DIGITALS

VR-connected nursing for patient monitoring in care homes

CAMP DE TARRAGONA

ÀREES DIGITALS

AI-based detection of illegally dumped bulky waste in Tarragona

TERRES DE L'EBRE

ÀREES DIGITALS

Experimental farms for climate resilience

Sensor deployment for wildfire prevention

Early detection of visual health issues in rural schools

5G and IoT training for vocational education teachers

GIRONA

ÀREES DIGITALS

Virtual reality enhancement of the Torre Gironella site

VR rediscovery of the Iberian village of Ullastret

AI-powered dermatology for early melanoma detection

TERRASSA

GovTech TERRITORI

Augmented reality platform for museums

Pilots and projects

In 2024, **ten pilot projects** were deployed, and over **6 new ones reached an advanced ideation phase**. These pilots, many of which emerged through the Àrees Digitals initiative and the territorial GovTech Territori, have tested digital solutions for healthcare, environmental resilience, mobility, education, and culture.

Through cross-sectoral partnerships and active collaboration with more than 65 companies, these actions contributed to regional economic development and improved service delivery. The initiative mobilised over €370,000 in pilot investments, turning innovation into a tangible territorial impact.

Generalitat de Catalunya
Unió Europea
Fons Europeu de Desenvolupament Regional
Mobile WorldCapital Barcelona

Innovation Programme for the Transformation of Society and Economy

Promoted by the Secretariat for Digital Policies of the Government of Catalonia and implemented by i2CAT, this programme aims to transform the 96 municipalities affected by the closure of the Ascó and Vandellòs nuclear power plants into **rural innovation and digital hubs**. Running through the end of 2026, the initiative represents a bold, future-oriented strategy focused on Advanced Digital Technologies (ADT), cultivating locally rooted talent, and promoting high-value economic activities in the region.

In 2024, i2CAT launched the design and preparation of this programme, which is structured around **four main strategic pillars**.

Incubate Digital Talent

The programme launches a dedicated incubation initiative to **attract, train, and support technology-based projects rooted in the territory**. It places special emphasis on empowering female talent and generating quality employment. It also integrates a techno-anthropological study to evaluate socio-economic impact and promotes training activities in primary schools, vocational training centres, and among professionals through the CoebreLab Talent initiative.

Digital Innovation Hub

The **CoebreLab** is being expanded and upgraded to become a **leading rural innovation hub**, with new specialised laboratories, equipment for 5G, IoT, AI, and other advanced technologies, and **personalised support for local businesses**. This space is designed to act as a **catalyst for technological transfer and business innovation**.

Use Cases with Advanced Digital Technologies

The programme identifies and deploys **pioneering and transformative use cases** in key health, agri-food, sustainability, and logistics sectors. A team of experts supports developing and implementing scalable digital solutions that address real local challenges.

AINA Challenge

The programme promotes **AI projects in the Catalan language**, strongly focusing on **social inclusion, digital accessibility, and linguistic diversity**. Through a competitive public tender (Art. 183 LCSP), it selects innovative and mission-driven proposals that deliver broad societal impact.

Mechanisms for Co-Creation and Systemic Transformation

In 2024, the i2CAT team intensified its efforts to explore how structures such as **collaboratories** and **living labs** can serve as true catalysts for territorial transformation. Through the Col·laboratori Catalunya project and various international initiatives, i2CAT began to address this question with a systemic and collaborative approach.

Collaboratories are physical and digital spaces where public administrations, companies, academia, and citizens collaborate to identify real-world challenges and co-create innovative solutions. These open social laboratories promote distributed governance, mutual learning, and context-driven innovation.

At the international level, the **Living Lab Senegal** project exemplifies the global potential of this model. Promoted by the Government of Catalonia, in collaboration with the Catalan Agency for Development Cooperation, i2CAT, and local partners such as Fonds de Développement du Service Universel des Télécommunications (FDSUT), the project represents **a pioneering effort to export models of digital cooperation grounded in open innovation**.

In 2024, a strategic agreement between Catalonia and Senegal was consolidated to support the deployment of the country's first living lab ecosystem, with the aim of:

- Defining digital co-creation methodologies with social impact.
- Empowering local innovation with a territorial focus.
- Building a stable network of open innovation laboratories as the foundation for a new model of inclusive development.

This project represents **a commitment to transformative international cooperation** and reinforces the hypothesis that hybrid innovation structures can be key instruments for systemic transformation, both in the Global South and in our territory. With a first phase scheduled until June 2025, this project has enabled the deployment of **two living labs in Senegal and the initiation of two additional ones**.

Funded by the Nuclear Transition Fund

08

Events & Media

Events and congresses are key platforms to share knowledge, learn from others, and stay at the forefront of innovation. Whether at world-renowned tech gatherings or collaborative activities with citizens, these spaces offer opportunities to connect, spark new ideas, and build strategic partnerships. Likewise, at i2CAT we see media outreach as an essential tool to promote and disseminate research outcomes and innovative solutions.

2024 was a dynamic year for events.

2024 was a dynamic year for events. The i2CAT team attended world-class research congresses and organised workshops, community events and dissemination sessions to bring technology and innovation closer to citizens.

A significant highlight was the organisation of specific events for priority sectors. We drove gatherings focused on smart mobility, exploring the latest trends and innovative solutions for more efficient and sustainable transport. Likewise, the space sector was the focus of events where advancements and opportunities in this constantly evolving field were discussed.

TOTAL EVENTS

175+

PUBLIC SECTOR EVENTS

42

CORPORATE EVENTS

9

HIGH IMPACT RESEARCH CONFERENCES

2A*

JANUARY 01

Research

ISE 2024

At ISE 2024, i2CAT presented how holoportation, the centre's patented technology DOWI, 5G, AI, and blockchain act as facilitators of enhanced experiences for attendees at live events.

Public

Selection Event for the First Edition of AI Accelerator

Through the DCA-AI community, the Government of Catalonia presented the Catalan AI Strategy and launched the 1st AI acceleration programme. The selected projects were Atempo, Link3rs, One Shot, Energethics, and SInfon-I.

FEBRUARY 02

Corporate

i2CAT's 20th anniversary celebration

i2CAT gathered 300 people from the innovation, research, and ICT sectors in an event presided over by Laura Vilagrà Pons, the Government of Catalonia's vice president and i2CAT's board president.

MWC Barcelona 2024

i2CAT presented the Reconfigurable Intelligent Surfaces technology (RIS). In industrial environments, they enable robust 6G industrial private networks, support real-time monitoring and control applications in smart manufacturing, and facilitate the precise localisation of objects.

Public

Digital Catalonia Alliance debuts with a stand at MWC

MARCH 03

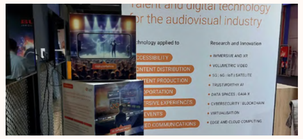
Research

UNICO I+D 6G Programme Advanced Digital Technologies workshop for EU postgraduate students

Thirteen doctoral and early-stage postdoc students participated in a five-day workshop at i2CAT to explore cutting-edge research topics and participate in demos and seminars focused on 5G, 6G, IoT, AI, immersive communications, space communications, and digital social technologies. The students also visited some of Barcelona's leading research centres and universities.

APRIL 04

Public



DCA Showcases Industrial Innovation at Advanced Factories

The Digital Catalonia Alliance participated in the Advanced Factories congress with a stand where five member companies — Maccion, BitGenoma, InterSystems, Datision, and Digital Smart Group — presented their cutting-edge solutions. DCA reinforced its commitment to promoting its ecosystem and driving digital transformation in the industrial sector.

MAY 05

Corporate

IoTSWC 2024

i2CAT attended the IoT Solutions World Congress in collaboration with the Catalan start-up Showee, a member of the Digital Catalonia Alliance. Showee showcased its main product, the first accessible and eco-intelligent shower that automates and personalises showering to improve the autonomy and privacy of people with special needs while saving more than 50% in water.

Research

Best Paper Award at IEEE ICMLCN 2024

The study "MemorAI: Energy-Efficient Last-Level Cache Memory Optimisation for Virtualised RANs", led by Xavier Costa and Ethan Sánchez, and written in collaboration with NEC Labs Europe, won the "Best Paper Award" at the IEEE International Conference on Machine Learning for Communication and Networking 2024.

Agreement i2CAT-Giga

i2CAT signed a two-year partnership with Giga, the association between UNICEF's Office of Innovation and ITU's Telecommunications Development Bureau, to foster knowledge sharing, research and technology development in the field of connectivity.

JUNE 06

Research

5GMED Final Event

The Final Public Event of the H2020 research project 5GMED took place at Castell de Peralada (Girona). i2CAT was the Technical Coordinator of 5GMED, which tested diverse technologies beyond 5G, including on-board sensors to provide advanced connectivity services along transport routes.

Public

DCA Participated in UNVEX 2024 with a stand

On June 4 and 5, the Digital Catalonia Alliance participated in the only European event dedicated to the unmanned systems community. DCA participated with a booth that facilitated a platform for networking and promoting innovations in the air, land, and maritime sectors for its members.

JULY 07

Corporate

Best Innovation Strategy at CIAC Awards 2024

The Cluster of the Automotive Industry of Catalonia (CIAC) awarded i2CAT the prize for the Best Innovation Strategy of 2024 at the 7th edition of Míting d'Auto. The centre's director, Sergi Figuerola, highlighted its efforts to transform administration, companies, and society and its specialisation in connected and autonomous mobility by leveraging V2X technologies, network software design, AI, and cybersecurity.

Public

Presentation event: GovTech Catalunya

Espai Bital hosted the presentation of the GovTech Catalunya programme and the first GovTech challenges competition. This initiative, managed by i2CAT, aims to offer citizens flexible, proactive, and agile public services while incorporating the digital ecosystem's innovation throughout the transformation process.

SEPTEMBER 09

Corporate

Open Living Lab Days

i2CAT attended Open Living Lab Days (OLLD) in Romania to engage in discussions focused on policy, governance, and citizen participation, all essential for building inclusive digital ecosystems, emphasising the capacity of Living Labs to foster digital innovation that prioritises social impact, inclusion, and sustainability.

OCTOBER 10

Corporate

i2CAT Mobility Event: What will the future of mobility look like?

i2CAT and the Government of Catalonia gathered the Catalan mobility innovation ecosystem at the Movistar Centre in Barcelona to discuss how industry, public administration and the technology research sector are joining hands on the road to a more autonomous, safe and sustainable future mobility.

Public

Guarda+ pilot presentation

The Guarda+ pilot project (part of Àrees Digitals) was presented at the Conselh Generau d'Aran. It uses immersive experiences, virtual and augmented reality, and meteorological sensors to provide real-time information about routes, weather conditions, and other relevant data through a mobile application and a dedicated website.

NOVEMBER 11

Corporate

Tomorrow.Mobility 2024

For the first time, i2CAT participated with a stand at Tomorrow.Mobility World Congress to highlight the collaborations with leading partners in the mobility sector like Applus +IDIADA and Autopistas. Working together with the private sector, we help companies innovate and solve complex challenges through advanced technologies that adapt to their needs.

Research

2nd edition of the Winter PhD School organised within TelecoRenta (UNICO I+D 6G Programme)

i2CAT hosted 16 European doctoral students and early-stage postdocs to participate in a five-day Winter PhD School. They engaged with research topics such as 5G and 6G, IoT, AI, immersive technologies, cybersecurity and digital social technologies. They attended various presentations and live demonstrations by the i2CAT team and three keynote lectures by prestigious researchers in advanced digital technologies.

Public

DCA Members Day

The DCA brought together more than 200 representatives of the Catalan digital ecosystem at the third edition of its annual conference DCA Members Day. The event was chaired by the Secretary for Digital Policies, Maria Galindo.

DECEMBER 12

Research

Demo 6GTWINROAD Terrassa

6GTWINROAD (UNICO I+D 6G programme) demonstrated its vehicular digital twin in a real-world scenario in collaboration with ACISA and Aimsun. It is designed to optimise the efficiency of public transport, enabling buses to transmit priority requests and adapting traffic lights in real-time to adjust traffic priorities in the event of a hypothetical road incident.

Public

Presentation of the Alt Pirineu telemedicine pilot (DIH4CAT-Àrees Digitals)

Researchers from i2CAT, in collaboration with Group Saltó, presented a digital telemedicine system that combines 5G, AI, and IoT to facilitate the monitoring of medication intake for patients with chronic conditions residing in rural areas of the Pyrenees.

Media Impacts

El centro de investigación i2CAT celebra sus 20 años

El Economista | 02.2024


Projecte europeu

Un cotxe conduït a distància travessa a França per l'AP-7 per primera vegada

El projecte 5GMED posa a prova, en un acte celebrat a Peralada, un sistema amb 5G que elimina les interrupcions d'internet transfrontereres

Un cotxe conduït a distància travessa a França per l'AP-7 per primera vegada

Diari de Girona | 28.06.2024


CIÈNCIA

L'Enxaneta, el primer nanosatèl·lit català, completa amb èxit la missió

L'aparell s'ha desintegrat sense deixar rastre a l'òrbita de la Terra

L'Enxaneta, el primer nanosatèl·lit català, completa amb èxit la missió

Diari Ara | 30.07.2024


La Mañana · DISSABTE 14 DE DESEMBRE DE 2024 PÀGINA 3

CIÈNCIA APLICADA A LA MEDICINA

Sistema pioner d'IA a Lleida per optimitzar les urgències

L'eina que han implementat l'Arnau de Vilanova i l'Ambulatori indicarà als pacients quin dels dos centres és millor per atendre'ls

Els usuaris descriuran els símptomes des de casa

Sistema pioner d'IA a Lleida per optimitzar les urgències

La Mañana | 14.12.2024


Abertis y la Fundación i2CAT desarrollan una carretera inteligente

Michael Ignatieff, premio Princesa de Asturias 2024

Abertis y la Fundación i2CAT desarrollan una carretera inteligente

Cinco Días | 16.05.2024


ENCUENTRO EXPANSIÓN - 5GMED

El proyecto 5GMED para conectar España y Francia se cierra con éxito

TECNOLOGÍA/ La iniciativa, liderada por Cellnex, ha desarrollado cuatro casos de uso en los ámbitos de conducción remota, digitalización de autopistas, comunicaciones móviles ferroviarias y entretenimiento.

El proyecto 5GMED para conectar España y Francia se cierra con éxito

Expansión | 11.07.2024


Imatge de la Terra des de l'espai il·luminada pels rajos del Sol.

L'Agència Espacial Europea tria Barcelona per combatre el canvi climàtic

L'Agència Espacial Europea tria Barcelona per combatre el canvi climàtic

Diari Ara | 30.07.2024


EMPRESAS

Masorange, Telefónica, Vodafone Grupo e i2CAT crean un laboratorio de innovación en APIs Open Gateway

• La iniciativa tiene como objetivo acelerar la adopción de APIs interoperables

Masorange, Telefónica, Vodafone Group e i2CAT crean un laboratorio de innovación en APIs Open Gateway ↗

La Vanguardia | 14.11.2024

TOTAL MEDIA IMPACTS

778

09

About us

Since 2003, we have driven advanced digital solutions through applied research and innovation. With an approach focused on knowledge transfer, we are proud to positively impact the economy and improve people's lives by connecting public administration, private enterprise, the scientific community and citizens.

At i2CAT, we believe technology should be close, accessible, and understandable to everyone.

We build strong, human connections and make innovation part of everyday life. **Creativity drives us** — we tackle every challenge with an open mind and a fresh perspective. We're deeply committed to helping public administrations, businesses, researchers, and citizens face technological challenges and create lasting, positive impact.

Flexibility is in our DNA. We listen carefully, adapt quickly, and shape our solutions to fit diverse sectors, needs, and contexts. Our work is defined by excellence: we lead pioneering projects in Advanced Digital Technologies and deliver disruptive, cutting-edge solutions.

Research fuels our innovation. We generate knowledge and apply it to drive Catalonia's leadership in digital infrastructures and services. We power our region's technological development and sovereignty by connecting public administrations, private companies, academic organisations and citizens.

Above all, we are here to make a real difference — creating an impact for society, the economy, and public institutions and building a **digital future that is inclusive, fair, and for everyone**.

STRATEGIC GOALS ↘

1. Generation of academic and non-academic research impact
2. Increase R&D cooperation with companies and organisations
3. Co-develop innovative, multi-technological digital solutions to meet market challenges
4. Promote research and digital social innovation to benefit citizens and the territory

MISSION AND VALUES ↘

MISSION

The primary objective of i2CAT is to actively shape and refine a comprehensive framework for digital innovation, catalysing Catalonia's evolution into a sophisticated digital society within the broader European context. This mission will be tackled through:

- **Mission-driven research:** generating knowledge to solve the challenges of companies, citizens and public administrations.
- **Talent promotion:** leveraging the talent of i2CAT's local and international researchers.
- **Collaboration:** establishing synergies with other agents of the R&D local ecosystem and co-developing solutions and products that generate a transformative impact.
- **Digital empowerment:** giving tools to citizens through a digital social innovation system that is open, participative and has ample territorial reach.
- **Leadership:** pioneering initiatives that enhance Catalonia's projection and international visibility as a digital and innovative country.

VALUES

Excellence

Creativity

Humanism

Collaboration

Board of Trustees, Executive Committee & Scientific Advisory Board

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Regional Director for Catalunya Comunitat Valenciana, Illes Balears, Aragón and Región de Murcia, Telefónica

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University of Murcia

At i2CAT we work to guarantee equity, diversity and respect in all areas of the centre, generating spaces where there is no room for any kind of discrimination.

We consider equality from a broad perspective, encompassing factors such as gender, origin, nationality, age, cultural diversity, religion, beliefs, and sexual orientation.

We firmly believe that these factors cannot and should not be barriers to talent in the professional environment, but rather are values to be promoted and that enrich us as a centre. Diversity is a differential value, an added value.

i2CAT GENDER EQUALITY

GENDER BALANCE

Women	Men
32%	68%

Equality Commission and Anti-Harassment Committee

i2CAT's Equality Commission and Anti-Harassment Committee ensure equal treatment and opportunities for people of any gender identity.

THEIR WORK INCLUDES

1. Create and update the Gender Equality Plan, and monitor its implementation and effectiveness.
2. Promote the Foundation's equality policies.
3. Train and inform the team on matters of gender equality.
4. Prepare proposals for activities related to gender equality policies.
5. Define and review a workplace anti-harassment protocol.
6. Assist people who may be experiencing harassment.

Activities and campaigns

TRAININGS

3 Staff trainings and sensitisation on equity

4 Staff trainings on inclusive and non-sexist language

1 Staff training on new masculinities

11 February
International Day of Women and Girls in Science

Interview with Carmen Delgado and Andra Blaga (AI-Driven Systems group)

25 November
International Day for the Elimination of Violence Against Women

Keynote "Technological Solutions with Gender Perspective: Towards a Safer Future"

Participation of i2CAT women technologists in 4 Young IT Girls association sessions for schools

Aimed at stimulating creativity, solving technological challenges and introducing female role models in STEAM.

YOUTUBE PLAYLIST

i2CAT Female talent

Visualizations
1,800+

1. Andra Blaga, investigadora de la Fundación i2CAT
2. Julia Igual. Ingeniera de telecomunicación - Telemática
3. "Les comunicacions per satèl·lit ofereixen accés global a Internet"
4. "Satellite communications provide the worldwide internet access"
5. BNEW 2023 / Ana Moliner / i2CAT Foundation
3. 8M: La perspectiva femenina amb les expertes STEM
7. Laura Sanz, CCAM Strategy Lead at i2CAT
8. Cicle DonaTIC a Lleida | Col·laboratori Catalunya
9. Cicle DonaTIC a Reus | Col·laboratori Catalunya
10. Cicle DonaTIC a Girona | Col·laboratori Catalunya
11. Cicle DonaTIC a Tortosa | Col·laboratori Catalunya

Local partners

COMMUNITY ↘

COMPANIES ↘

PUBLIC ADMINISTRATION AND ORGANISATIONS ↘

RESEARCH AND UNIVERSITIES ↘

Official certifications & associations

OFFICIAL CERTIFICATIONS ↘

ACCIÓ Catalonia Trade & Investment · Generalitat de Catalunya
tecnio catalonia
Vigència: 29/12/2028

HR EXCELLENCE IN RESEARCH

ASSOCIATIONS, STANDARDISATION ORGANIZATIONS & PLATFORMS ↘

CERCA Centres de Recerca de Catalunya
ACER Associació Catalana d'Entitats de Recerca
acia 1996 2019
adra The AI Data Robotics Association
AIOTI Alliance for Internet of Things Innovation
ENHANCING DIGITAL SKILLS ACROSS EUROPE · ALL DIGITAL
Ametic LA VOZ DE LA INDUSTRIA DIGITAL
BDV BIG DATA VALUE ASSOCIATION
CCAM CONNECTED, COOPERATIVE & AUTOMATED MOBILITY
ciac Clúster de la Indústria d'Automoció de Catalunya
DIHNET.EU Europe's Network of Digital Innovation Hubs
ECS EUROPEAN CYBER SECURITY ORGANISATION
European Network of Living Labs
ESSI European School of Social Innovation
ETSI World Class Standards
gaia-x
GÉANT
INTERNATIONAL DATA SPACES ASSOCIATION
M2F Move to Future Plataforma de Automoción
nem New European Media
NESSI
NETWORLD EUROPE
(one6G)
O-RAN ALLIANCE
RENIC Red de Excelencia Nacional de Investigación en Ciberseguridad
SCoDIHNet
Tech Barcelona
5G PPP PUBLIC-PRIVATE PARTNERSHIP
6G SNS IA

Organisation Chart

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Legal and Procurement Office

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Project Management Office

Violeta Morquecho
Head of Pre-Award

Jan Vara
Head of Post-Award

i2cat

The Internet
Research Centre

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FUJITSU

Gran Capità, 2-4
Nexus I Building, 2nd Floor

08034 Barcelona
Tel. (+34) 935 532 510

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