2023

ANNUAL REPORT

Research, Devolopment and Innovation Area (RDI)
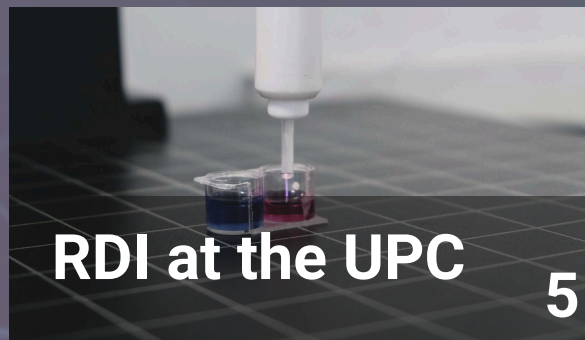
Activities and indicators

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH
UPC

Content

Introduction

2023, a record year for the UPC in RDI

In 2023, the UPC's RDI revenue reached a record value of 118.9 million euros, double that of 2020 and 52% more than in 2022, due to an increase in competitive and non-competitive projects. In addition, the University strengthened collaboration with companies through the Connèxia programme and fostered RDI with its own funding for research groups, teaching staff, networks, consortia and university entrepreneurship.

"The 2023 results confirm our commitment to RDI and consolidate our position of leadership."

"We are still committed to internal grants for our research staff, and to strengthening collaboration with companies."

Jordi Llorca

Vice-rector for Research

Climent Molins

Vice-rector for Transfer, Innovation and Entrepreneurship

# Exponential growth and new collaboration initiatives

The year 2023 ended with figures that show for themselves how intense RDI activity has been at the UPC. The high number of projects under contract has generated **record revenue: 118.9 million euros.**

In context, this is double the revenue of 2020 and 52% more than that of 2022, due above all to an increase in revenue from **competitive projects** (up 93.8% for national projects and 69% for international projects) and revenue from **royalties** for **licences to third parties and spin-offs** (up 28.8%).

At the same time, the University has continued to focus on strengthening collaboration with companies through the launch of the **new Connèxia programme**, and on fostering **RDI activity with its own financing**, through grants for research groups, teaching staff and participation in networks and consortia, and for university entrepreneurship and the protection and exploitation of patents.

RDI at the UPC
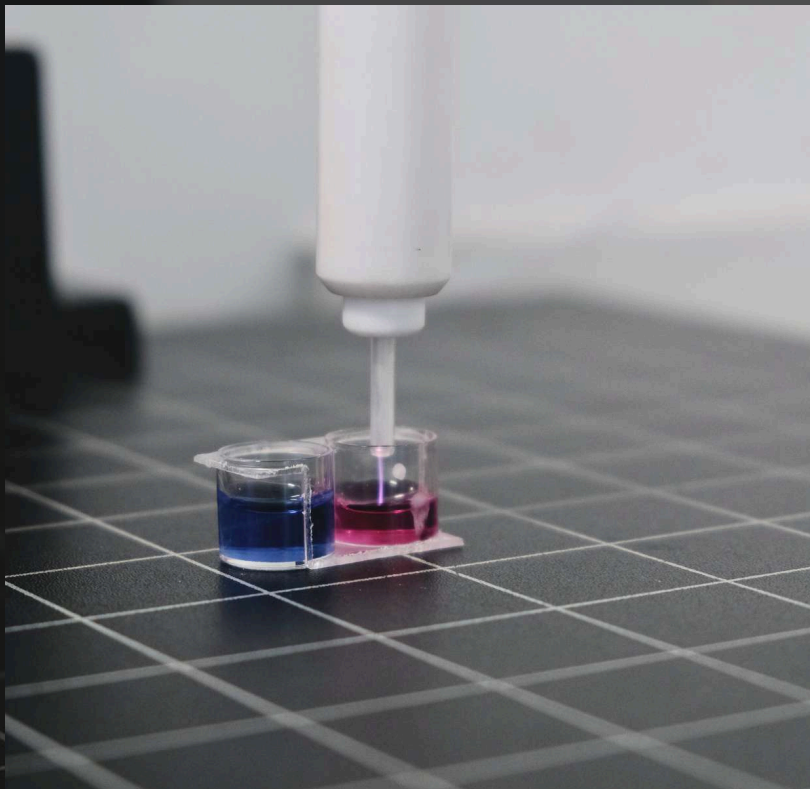
## Fostering collaboration and innovation

The Research, Development and Innovation Area is focused on enriching the research environment and promoting RDI through close collaboration with the University's teams. This commitment entails adopting guidelines issued by the Office of the Vice-Rector for Research and the Office of the Vice-Rector for Transfer, Innovation and Entrepreneurship, so that actions are centred on promoting the best possible scientific and technological ecosystem.

With a comprehensive vision, the RDI Area is dedicated to providing value by implementing innovative practices, identifying opportunities for development and consolidating synergies that contribute to the sustainable growth of research and knowledge transfer to society.

People: essential for boosting RDI activity

The UPC's Research, Development and Innovation Area has a staff of more than eighty people, distributed among the four main services. The management team determines which actions to take, which are then implemented in close collaboration with UPC units and services. The research support units (RSUs) of the management and support units (UTGs) are the teams in charge of interacting directly with teaching staff in schools (front office). The Personnel Service, working closely with the Research Employment Advice and Support Unit, plays a key role. In turn, the UPC Technology Centre (CIT) plays an important role in promotion, to raise awareness of RDI activities and attract companies operating in the sector.
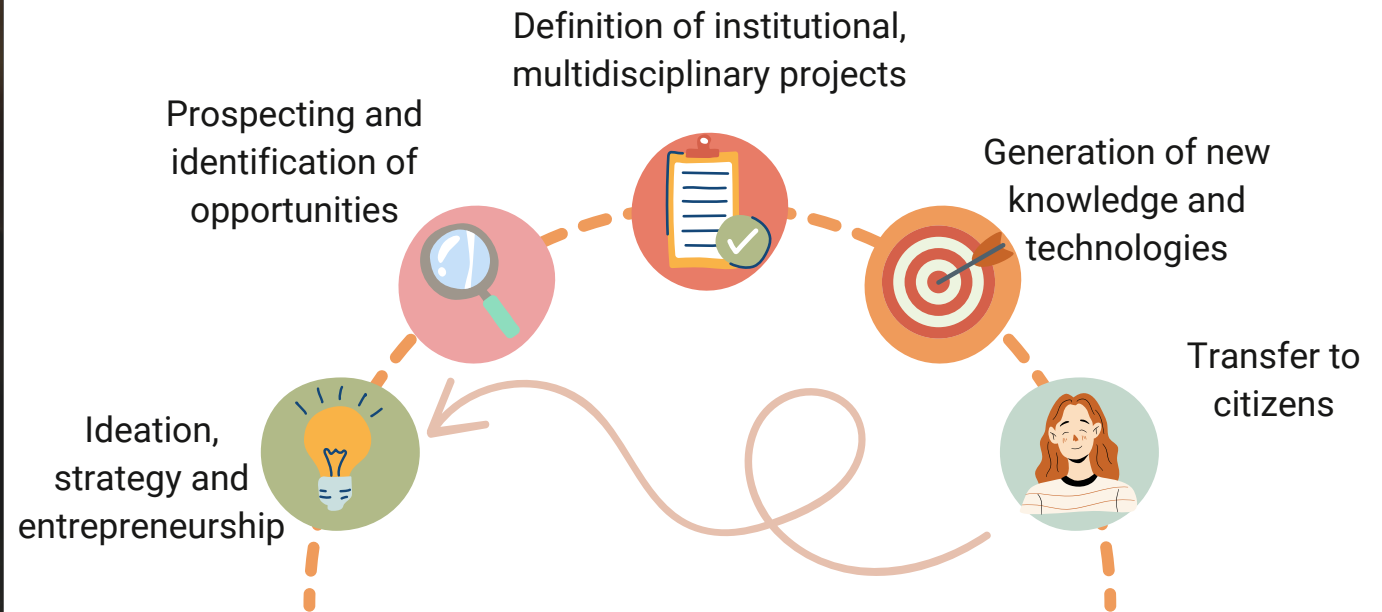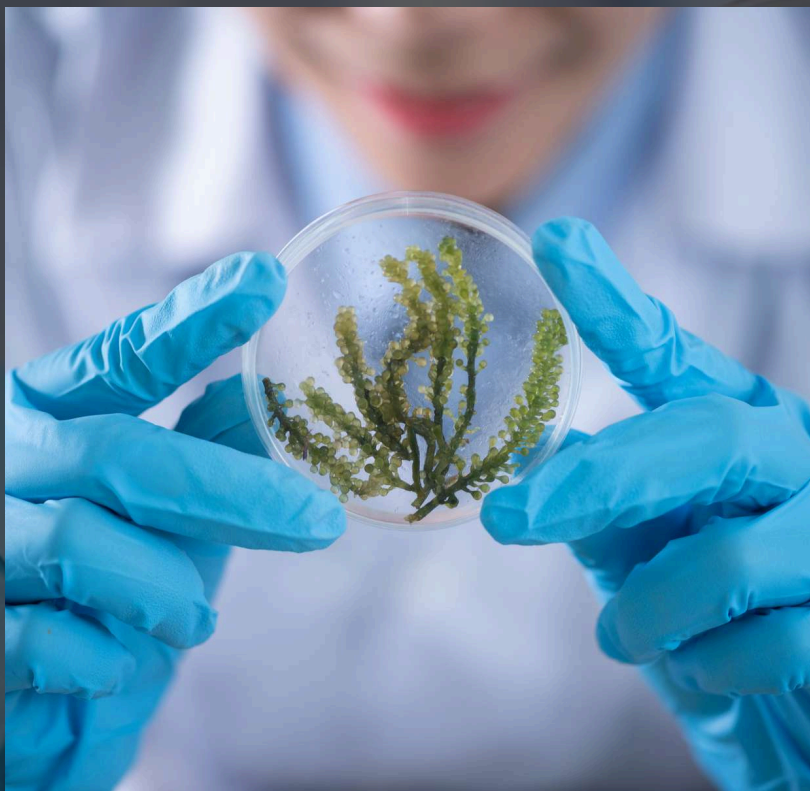
Click to access the interactive infograph
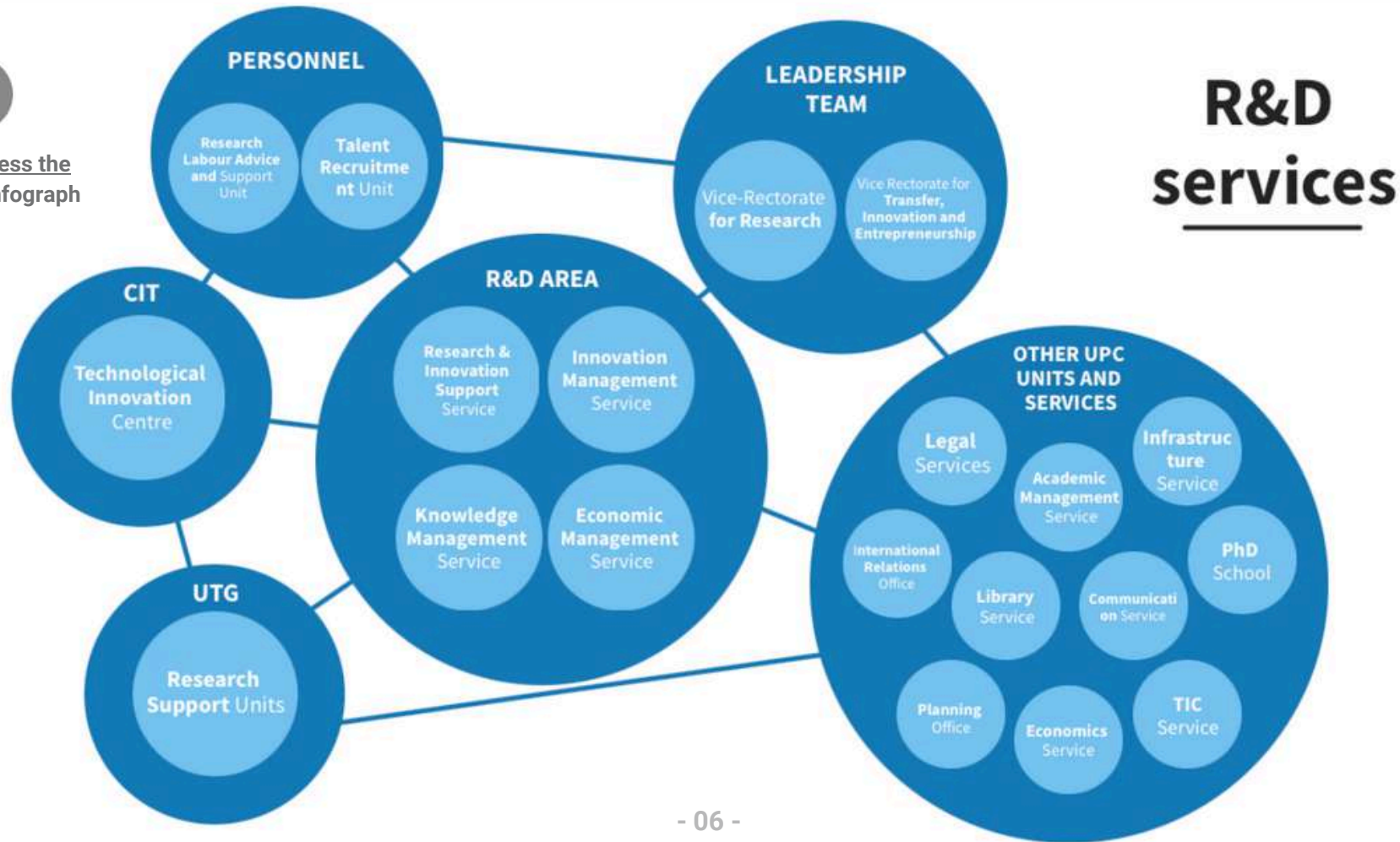
The methodology of RDI teams

Making research, development and innovation a key, cross-cutting factor in the progress of society

To continue to work for the present and the future, we are devoted to transforming knowledge into research, development and innovation results that have a high value for society, industry and the academic community. We are committed to achieving significant improvements in these areas, and guide our efforts through the five key stages of the value chain in RDI management. Using this strategy, we ensure that each stage contributes optimally to our end goal: the progress and well-being of all sectors involved.

Prospecting and identification of opportunities

Definition of institutional, multidisciplinary projects

Generation of new knowledge and technologies

Transfer to citizens

Ideation, strategy and entrepreneurship

2023 summary

Notable achievements in RDI during 2023 at the UPC

Over the course of 2023, initiatives were implemented in all key stages of research and innovation, fostering creativity notably and generating value. We are pleased to present in detail the most relevant results within this narrative of innovation. They are closely linked to the strategic objectives established by the UPC for RDI and consolidate the University's presence as a key agent in the configuration and promotion of knowledge and innovation

Participation in research and transfer calls

Competitive projects

In 2023, up to 510 competitive projects were awarded for a value of 88.5 million euros.

In the international arena this year, the UPC had 48 projects approved in the Horizon Europe programme (3 were withdrawn). In addition, through portability, an ERC CoG project was awarded from the Horizon 2020 programme. Of these projects, 11 are monopartner or coordinated by the UPC.

In the national arena, the UPC submitted 238 proposals to calls in the 2021-2023 State Plan. A total of 97 projects were approved (41% success rate), with funding of almost 24 million euros.
In 2023, the UPC's results stood out in the State Research Agency's (AEI) 2022 call for knowledge generation projects (PID). The UPC submitted 109 proposals for a total amount of 18.8 million euros and 59 proposals were accepted (54% success rate), for a total of 9.2 million euros.

The UPC's participation is also notable for the large number of specific local and autonomous community calls that it entered, and the calls of foundations and private entities.

Non-competitive projects

Regarding research and innovation activity in non-competitive projects, a total of 412 contracts were signed with companies and institutions, which generated total revenue of 12 million euros. In addition, 77 donations and subsidies represented up to 4.3 million euros.

UPC calls

The University's RDI activity was also promoted by grants from its own funds. Through calls such as AGRUPS, ALECTORS, Networks, Congresses or IMPULS, research professionals were given extra support to promote new research, encourage new scientific careers and launch new companies.

# Participation in research and transfer calls

International calls

Horizon Europe
48 projects approved in 2023
11 coordinated
121 projects ongoing

Pilar I
1 ERC CoG, 12 MSCA (8 Doctoral Networks, 3 coordinated by the UPC and 4 individual), and 2 Research Infrastructures.

Pilar II
14 projects of clusters (9 of Cluster 4), 1 Restore our Ocean and Waters mission project, 8 Joint Undertaking (JU) projects.

Pilar III
2 Pathfinder projects, participation in EIT Raw Materials, Innoenergy, Urban Mobility and incorporation in EIT Manufacturing

WIDERA (cross-programme)
Unite! project Widening, €5 m

Outside of the framework programme
2 UCPM programme projects, 2 LIFE+ projects, 1 RFCS programme project and 1 CREA programme project

ERASMUS+
28 proposals: 14 Cooperation Partnerships, 9 Capacity Building and 5 Alliance for Innovation.

5 Cooperation Partnerships

2 Capacity Building

1 Alliance for Innovation

Participation in Joint-AQ Africa

ENGAGE Project

National calls

PROMETHEUS
Project started with the aim of increasing the UPC's participation in international projects and programmes

The revision of three European Research Council (ERC) Consolidator Grant (CoG) proposals was funded.

A Marie Skłodowska-Curie Actions (MSCA) Doctoral Networks (DN) training day was organised.

The revision of five coordinated proposals was funded.

Two pre-award specialists for the International Projects Unit were hired for two years.

Participation in research and transfer calls
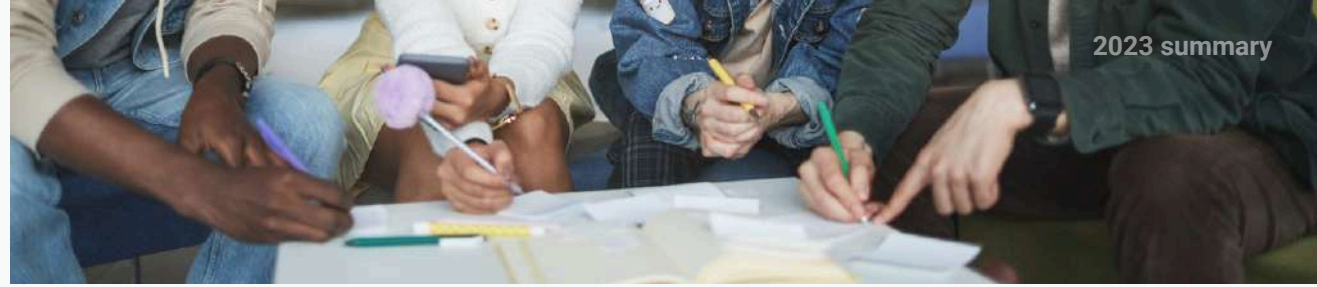
National calls

EINA Chair (National IA Strategy)
Funding of €1.6 m applied for Period of 3 years
Pending resolution

Chip chair
Funding of €3.8 m applied for Period of 3 years
Pending resolution

UNICO advanced 5G and 6G R&D programme
2 proposals accepted:

- 6G-OpenLab, with a €1,996,933 grant awarded
- 6G-CommSensLab, with a €1,090,700 grant awarded
- 2 provisional resolutions with grants of €825,200 and €1,999,965

Spanish National Cybersecurity Institute
Signature of 2 agreements for €1 m for cybersecurity chairs (3-year period) and €200,000 for the strategic project (2-year period)

TransMisiones initiative
2 proposals for €700,000

Ministry of Universities funds
Collaborative research plans in the area of artificial intelligence

- 15 proposals submitted (1 as coordinator), total budget of €22 m of which €4 m are allocated to 2 years of research

Ministry of Science and Innovation funds
iCIEM+ plan, €204,300

Ministry of Industry, Trade and Tourism funds
The UPC is a collaborating entity in:

- DIH4Cat
- Digital Impulse Hub

Bilateral Spanish-German call
7 proposals for €1.7 m

Severo Ochoa and María de Maeztu call
€5.5 m applied for in two calls of 4 years each

Knowledge generation (PID)
109 proposals, €18.8 m applied for. 54% success rate

State Research Agency
Research Career Consolidation call, 33 proposals reviewed

PERTE CHIP proof of concept
6 projects in the 2023 call: €0.9 m

AGAUR

- Decision on the SGR call: €3 m for research groups
- Projects on climate change mitigation. 2 proposals awarded for €575,000

Ministry of Research and Universities
€262,000 to reinforce the promotion of the transfer and transmission of research results and knowledge. TECNIO groups

Knowledge Industry Programme
13 projects in the 2023 call (Seed, Product, Innovators): €1.2 m

Proof of Concept Deep Tech Hub - Barcelona City Council
2 projects 2023 call: €90,000

More RDI

UPC calls

⊕ **AGRUPS 2023**

⊕ **Impuls UPC**

⊕ **Congressos UPC**

⊕ **UPC conferences Networks and consortia**

⊕ **ALECTORS 2023**

RDI networks

⊕ **XaRFA**

⊕ **XARTEC**

⊕ **BlueNetCat**

Contracts and tenders

⊕ **370 projects signed**

⊕ **UPC staff in associated research entities (EVR)**

- 106 affiliated of which 51 are full affiliations (according to EVR regulations) and 55 are associated with specific RDI projects

- 47 new affiliations and preparation of extensions of agreements for 7 EVR.

RDI protection

⊕ **Patents**

- 10 priority patent applications

- 7 PCT

- 14 patent applications to EPO and 13 granted

⊕ **Licensing revenue**

€642,259.95 royalty return through licensing agreements

⊕ **Contractual agreements**

- 10 licensing agreements
- 17 confidentiality agreements

Entrepreneurship and Impuls

⊕ **Support and creation of TBCs**

⊕ **Emprèn Space**

⊕ **Incubation**

⊕ **Parc UPC**

⊕ **MWC 2023 4YFN**

Communication

⊕ **New web portal + menu on the UPC website**

⊕ **UPC research portfolios**

⊕ **SET Plan Conference**

⊕ **Support for the Hydrogen Conference**

RDI activity indicators

A wide range of data on RDI

The most relevant data on UPC activity in research, development and innovation: from
general indicators such as revenue, expenditure, and amount and number of projects awarded, to more specific indicators of **projects with international, state, autonomous, local and private sources of funding,** and indicators of innovation such as patents, technology-based companies, licences or royalties, **indicators of economic management** such as requirements and justifications, **and indicators of research output.**

You can consult the interactive version of the graphs on the website version of the 2023 RDI report.

A glance at the RDI indicators for 2023

GENERAL INDICATORS

Revenue	Expenditure	Contract revenue	New projects	Publications**
€118.92 m	**€73.66 m**	**€108.35 m**	**1.033**	**4.876**

RESEARCH OUTPUT

International projects* €58.51 m	**Staff** €30.83 m	**International projects*** €56.76 m	**Contracts** 412	**Journal articles** 2.425
National projects €37.52 m	**Transfers and subsidies** €25.32 m	**International projects** €31.94 m	**National** 313	**Conference presentations** 1.349
Contracts and services €14.72 m	**External services** €5.5 m	**Contracts and services** €12.91 m	**International*** 199	**Doctoral theses** 331

INNOVATION

Technology-based companies	Priority patents***	European patents	State entity in Horizon Europe	Applications submitted for national projects
13	**10**	**14**	**5th**	**392**
Revenue from royalties 642.260 €	**Licences contracted** 10	**Investment mobilised** €34.69 m	**Projects substantiated** 701	**Requirements met** 685

ALTRES

See the graph explorer

* Also includes coordinated projects (revenue that is then redistributed among other project partners).

** The number of publications is increasing as the publications from 2023 are registered in Futur. Data from May 2024.

*** A total of 7 patents have also been extended through an application for an international patent extension (PCT).

Revenue

2023 closed with 52.25% more overall revenue than in 2022, which increased the total by €40 m compared to the previous financial year

Legend: ■ Contracts and services ■ Training ■ National projects □ International projects ■ Coordinated international projects ■ Donations/Records ■ Others

1,39 M€
3,88 M€
14,72 M€
37,52 M€
25,46 M€
33,05 M€
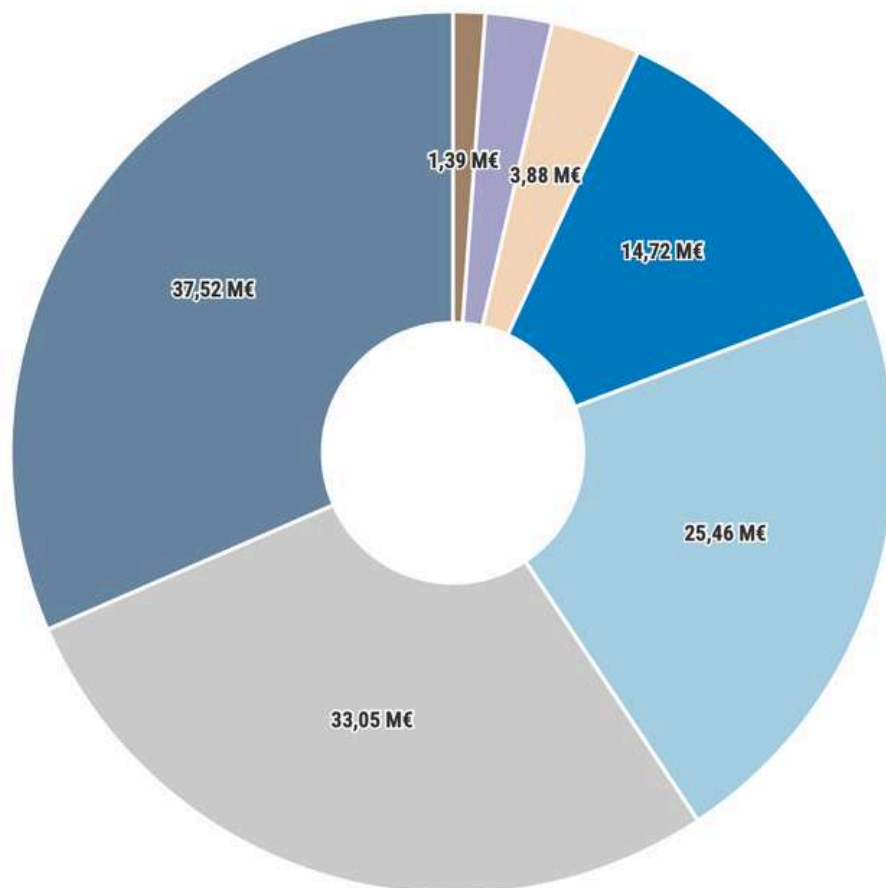
The revenue from national projects was the largest percentage of the total (31.52%), followed closely by international projects (27.79%) and coordinated international projects (21.41%).

Total revenue 2023

€118.92 m

See the graph explorer

Revenue

Compared to the previous year, the revenue has gone up 68.7% for international projects and 93.7% for national projects

Legend: Contracts and services | Training | National projects | International projects | Coordinated international projects | Donations/grants | Other
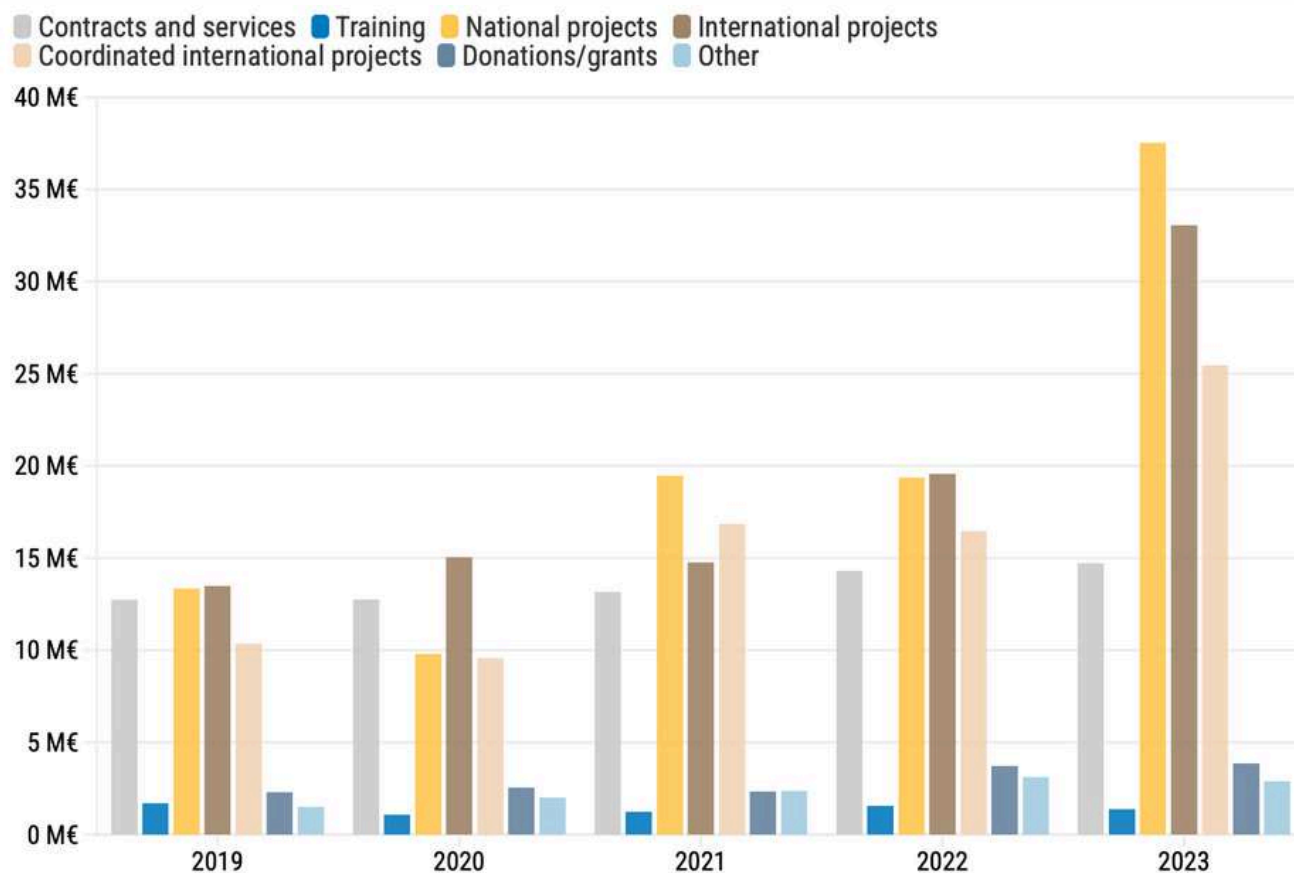
The growth curve for projects has beaten records in 2023. Revenue from contracts and services, training, donations and subsidies remained stable.

Total revenue 2019-2023

€357.55 m

See the graph explorer

Revenue

The ICT area (ETSETB and FIB) continues to generate the most revenue

The areas with most growth compared to the previous year were the RDI Area/Institutional, Civil Engineering and Industrial Engineering.

* RDI Area/Institutional refers to institutional projects in which the principal investigator belongs to the management team.

See the graph explorer

Expenditure

Expenditure has increased 20.55% compared to the previous year
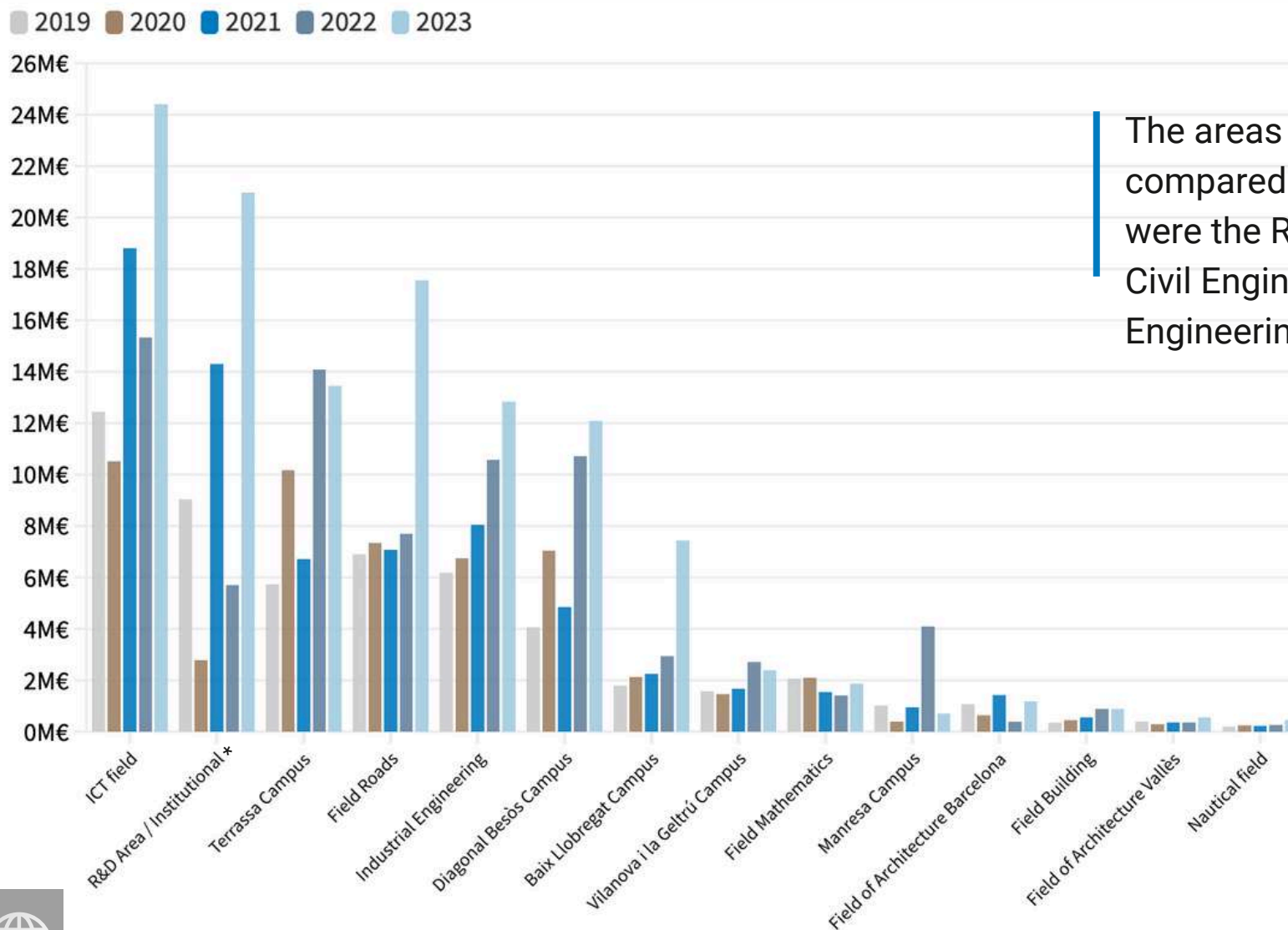

Shopping ■ Staff ■ External services ■ Inventory material ■ Travel expenses ■ Transfers and subsidies
■ Other expenses
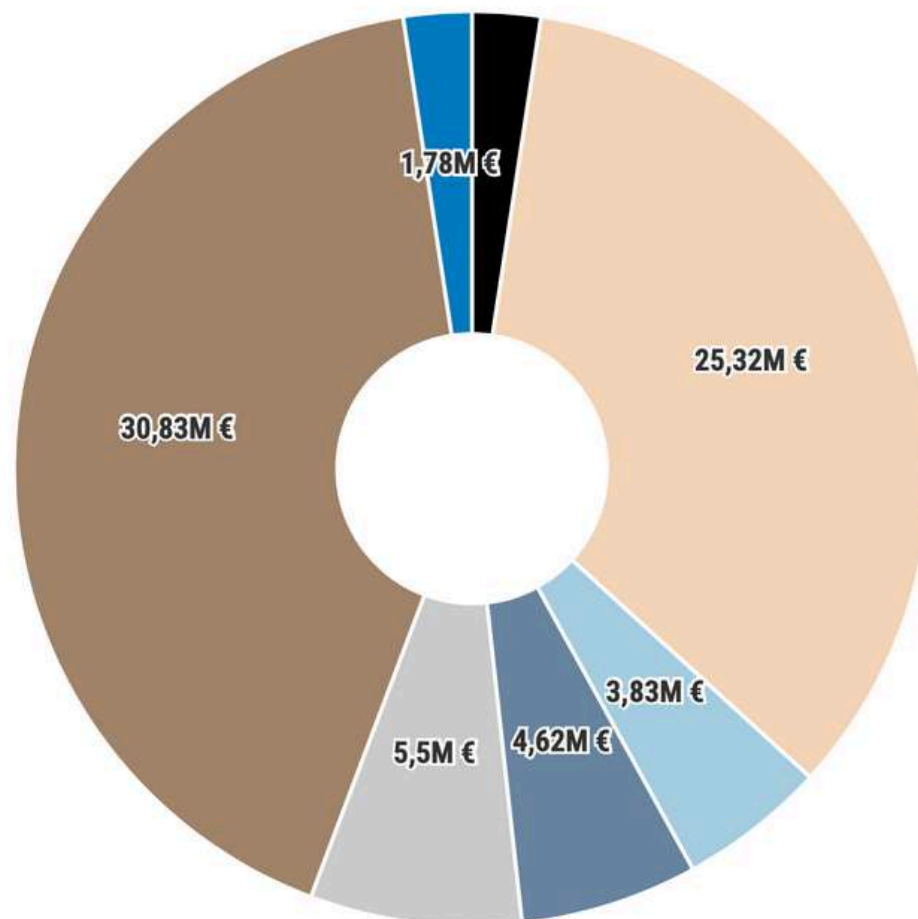
The highest amount was for the item Staff, with total expenditure of 30.83 million euros, followed by Transfers and subsidies*, with a value of 25.32 million euros. This was followed, with a considerable drop in magnitude, by the items External services (€5.5 m), Inventory material (€4.62 m), Travel expenses (€3.83 m), Purchases (€1.78 m) and Other expenses (€1.77 m).

Total expenditure 2023

€73.66 m

See
the graph
explorer

* The figures shown on the chart do not include transfers for coordinated projects, where money is received by the UPC and distributed among partners, without any expenditure.

Revenue and expenditure
Més despesa, però en menor percentatge respecte als ingressos
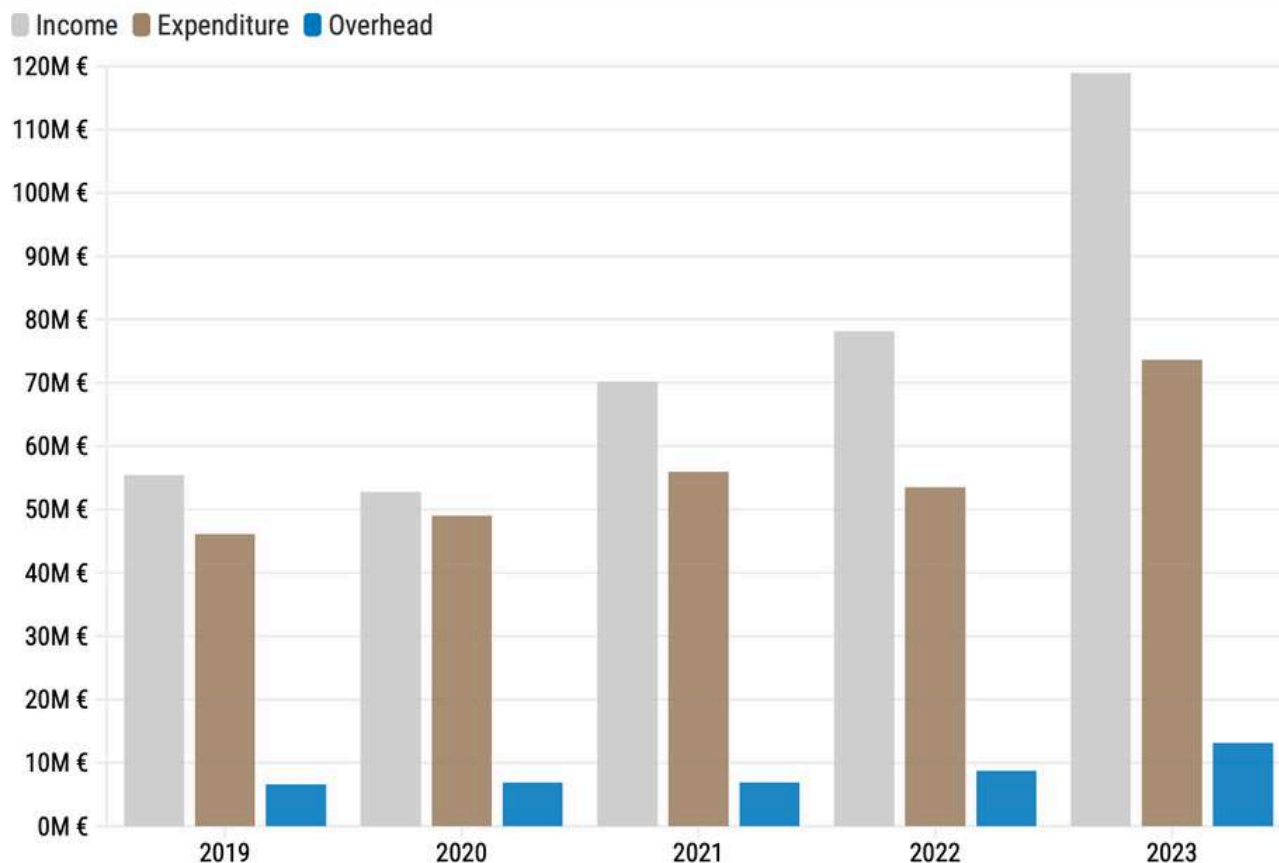
In 2023, the expenditure in relation to revenue represented 61.92% of activity, a positive balance of 38.08% (€45.26 m). Investment in staff remained the main expense, followed by transfers and subsidies.

Overhead 2023

€13.14 m

See the graph explorer

2023 contract revenue
The contract revenue for coordinated international projects increased 72.8% compared to 2022

Legend: ■ Contracts ■ National projects ■ International projects ■ Coordinated international projects ■ Donations/Grants ■ Other

Pie chart values:
- 12,91 M€
- 2,38 M€
- 31,94 M€
- 27,89 M€
- 4,36 M€
- 28,87 M€
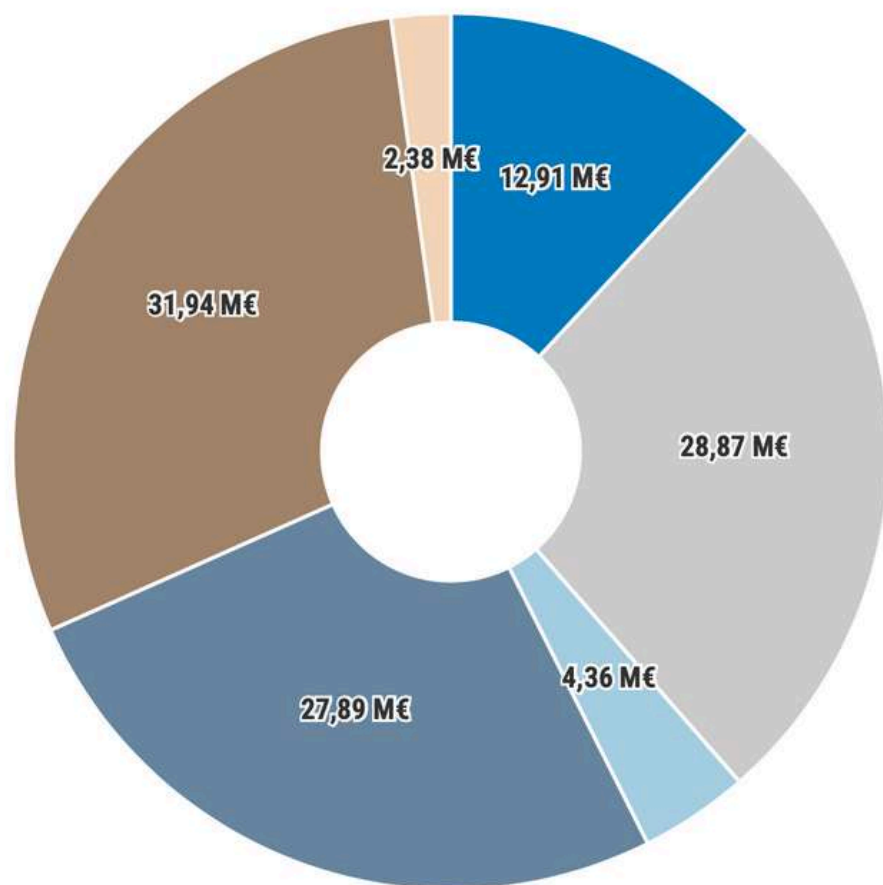
In 2022, record figures were obtained, with €121.9 m revenue from project contracts. However, in 2023 figures were higher than the average for other years.

Total 2023 contract revenue

€108.35 m

See the graph explorer

Contract revenue by number of projects
More contracts for national and international projects

Legend: ■ Contracts ■ National projects ■ International projects ■ Coordinated international projects ■ Donations/Grants ■ Other

- 412
- 313
- 176
- 77
- 23
- 32
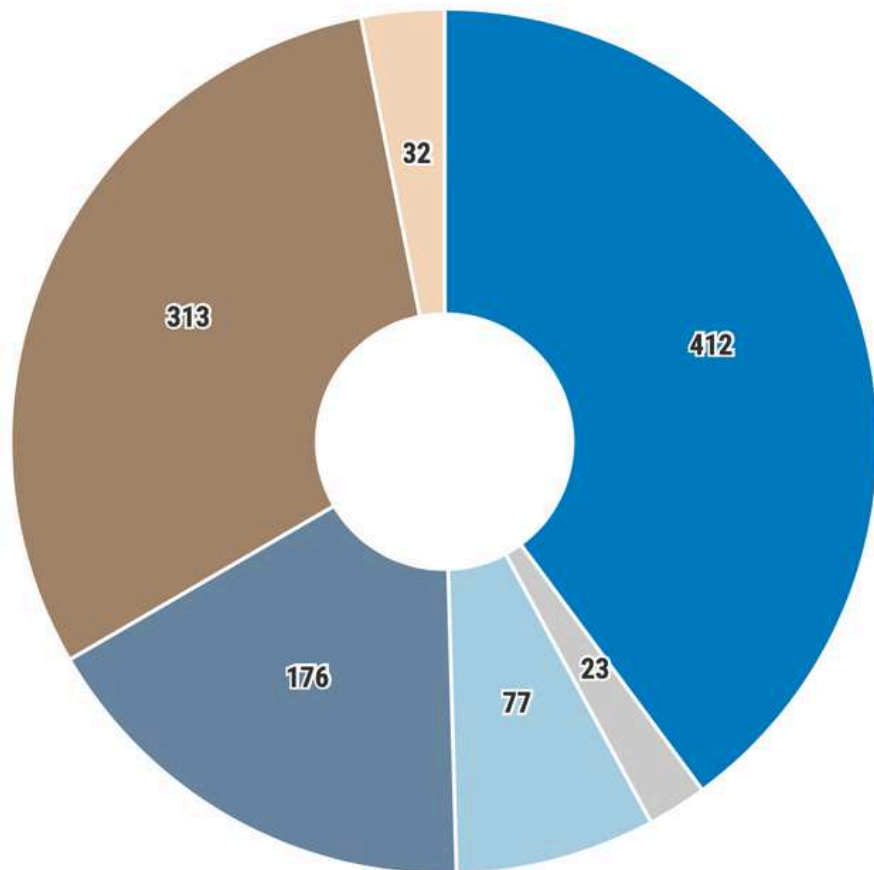
In 2023, the number of projects increased 37.9% in the national arena and 14.3% in the international arena. In total, 22 more contracts per project were signed than in the previous period.

Total number of projects 2023

1.033

See the graph explorer

Evolution of contract revenue
In 2023, the total average of recent years was surpassed by 36.8%

Legend: Contracts · Training · National projects · International projects · Coordinated international projects · Donations/Grants · Other
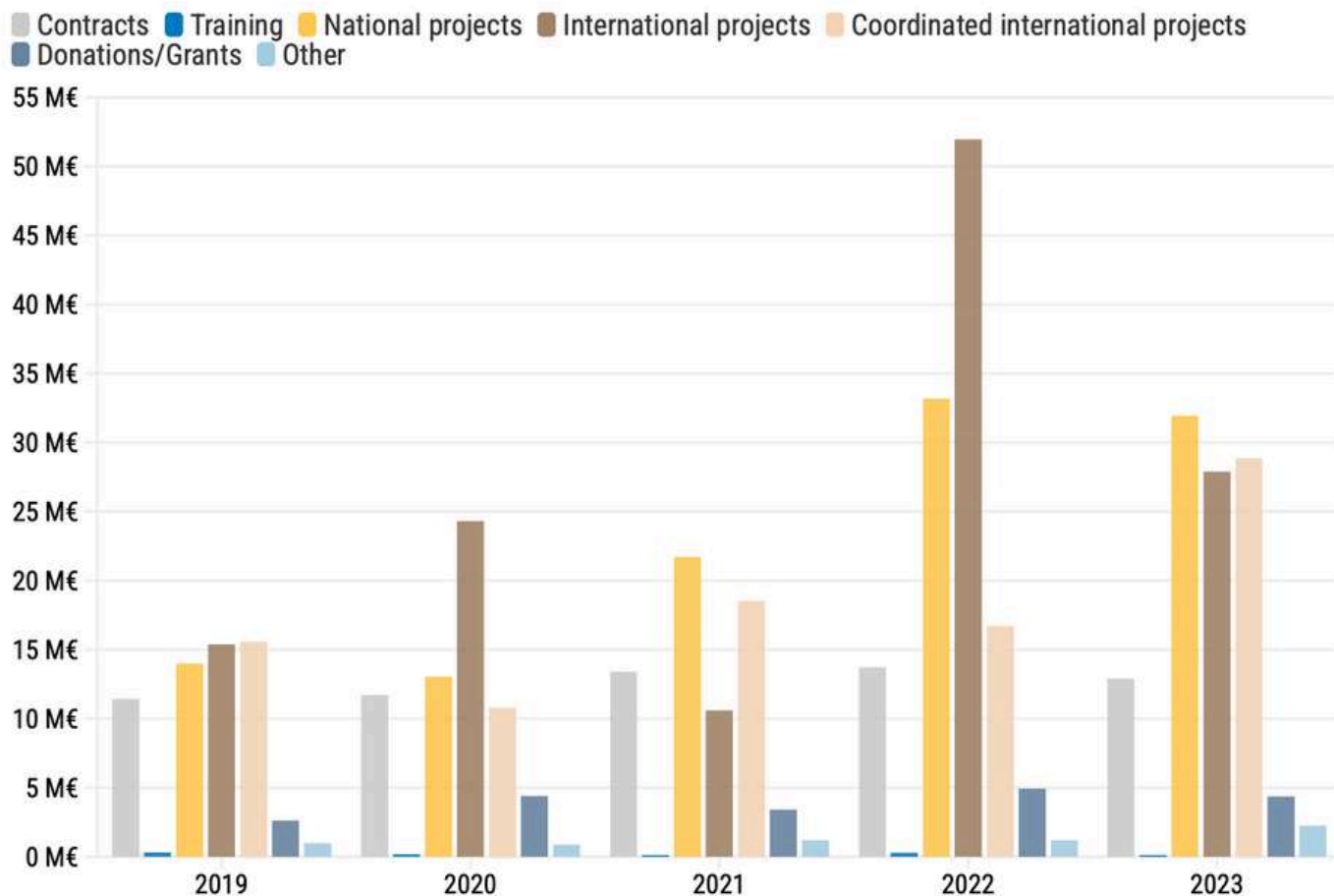
The number of contracts for national projects stabilised and the leadership of the UPC in the coordination of international projects was consolidated.

Total contract revenue 2019-2023

€425.03 m

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Contract revenue by UTG
The ICT area accounted for the largest amount of contract revenue
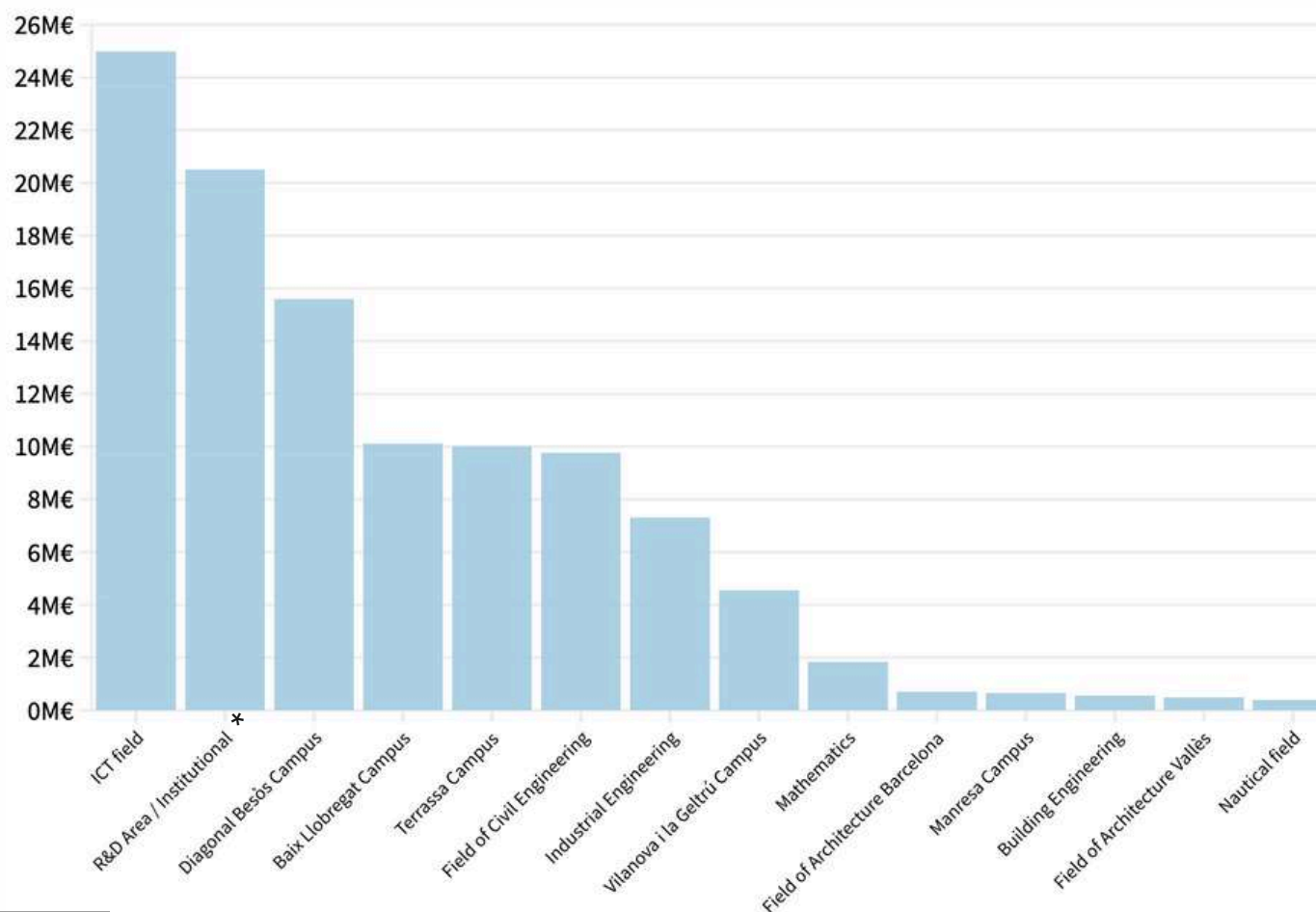
The ICT area (ETSETB and FIB) led contracts made by management and support units, for a total amount of €24.9 m.

Total contract revenue 2019–2023

€462.32 m

See the graph explorer

*Contracts for institutional projects increased compared to the previous year, due to the new inclusion of coordinated projects in this category.

Contract revenue by UTG
The ICT area, also leader in the number of projects
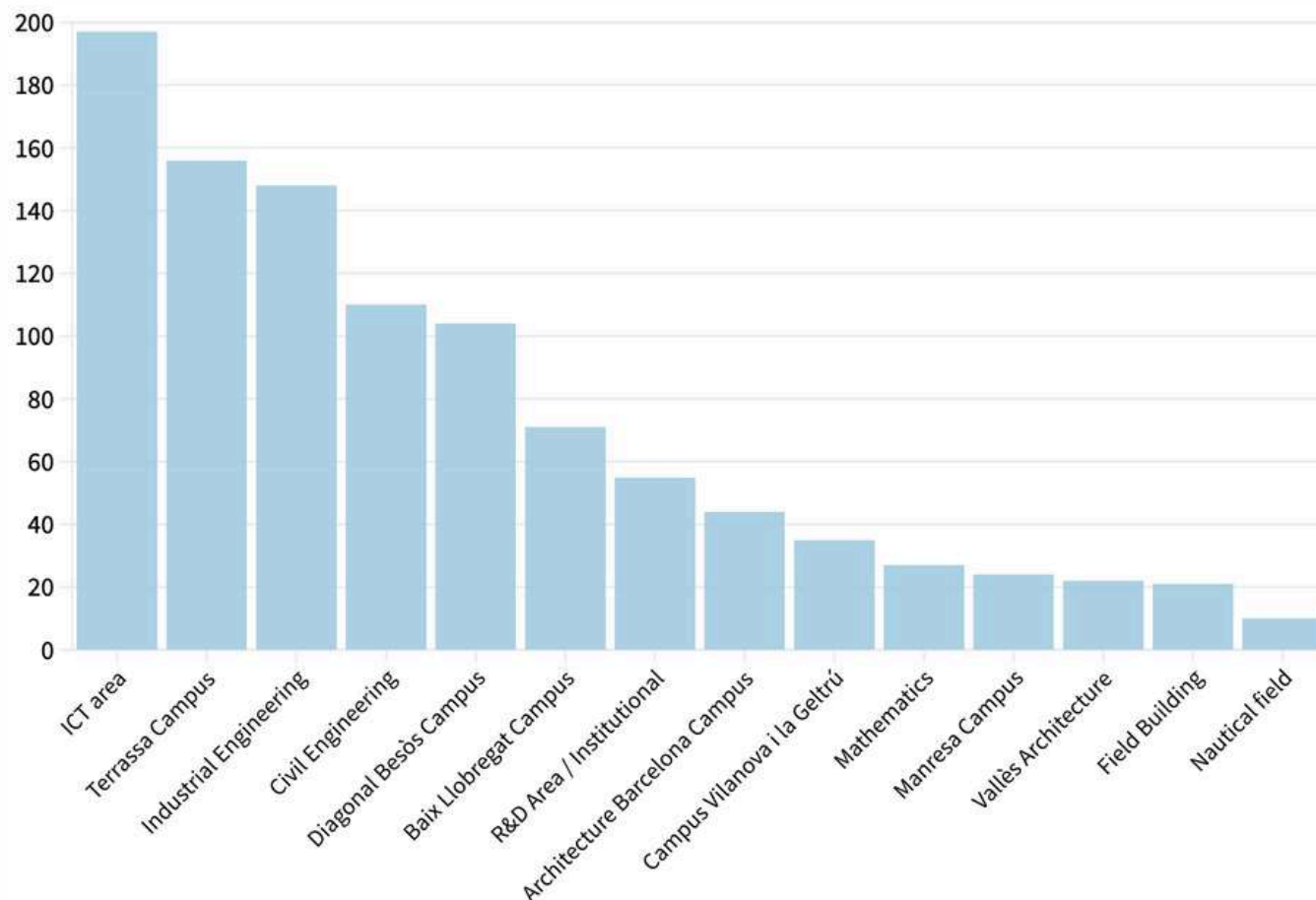
ETSETB and FIB signed a total of 197 contracts for projects, followed by the Terrassa Campus UTG with 156, and the Industrial Engineering Area with 148 projects.

Total contract revenue 2019-2023

1.033

See the graph explorer

Evolution of revenue from international projects

€13.46 m more in revenue for national projects and €9 m more in revenue for coordinated projects

*Note that revenue for coordinated projects is shared among the partners involved, while in the case of international projects, all of the revenue stays within the UPC.

The revenue for international projects increased 68.79% compared to 2022, and that of coordinated projects increased 54.63%. In total, the revenue for international projects in 2023 rose by 62.37%.

2023 revenue from international projects

€58.51 m

See the graph explorer

Evolution of contract revenue for international projects
Fewer contracts, but more revenue

Despite the drop in contracts signed for non-coordinated projects, the revenue was greater than in 2022. In addition, the number of contracts for coordinated projects increased significantly by 72.8%.

2023 contract revenue for international projects

€56.76 m

See the graph explorer

Participation in Horizon Europe
A total of 121 projects, 51 more than in 2022

EU contribution (in M€)

Cluster 5	22,11
Cluster 4	14,85
ERC	7,62
MSCA	7,57
Cluster 3	2,73
EIC	1,79
Cluster 6	1,75
Cluster 1	1,44
INFRA	1,02
REFORMING	0,82
WIDENING	0,77

Number of projects

	23
	29
	5
	36
	6
	4
	3
	3
	7
	2
	3

See the graph explorer
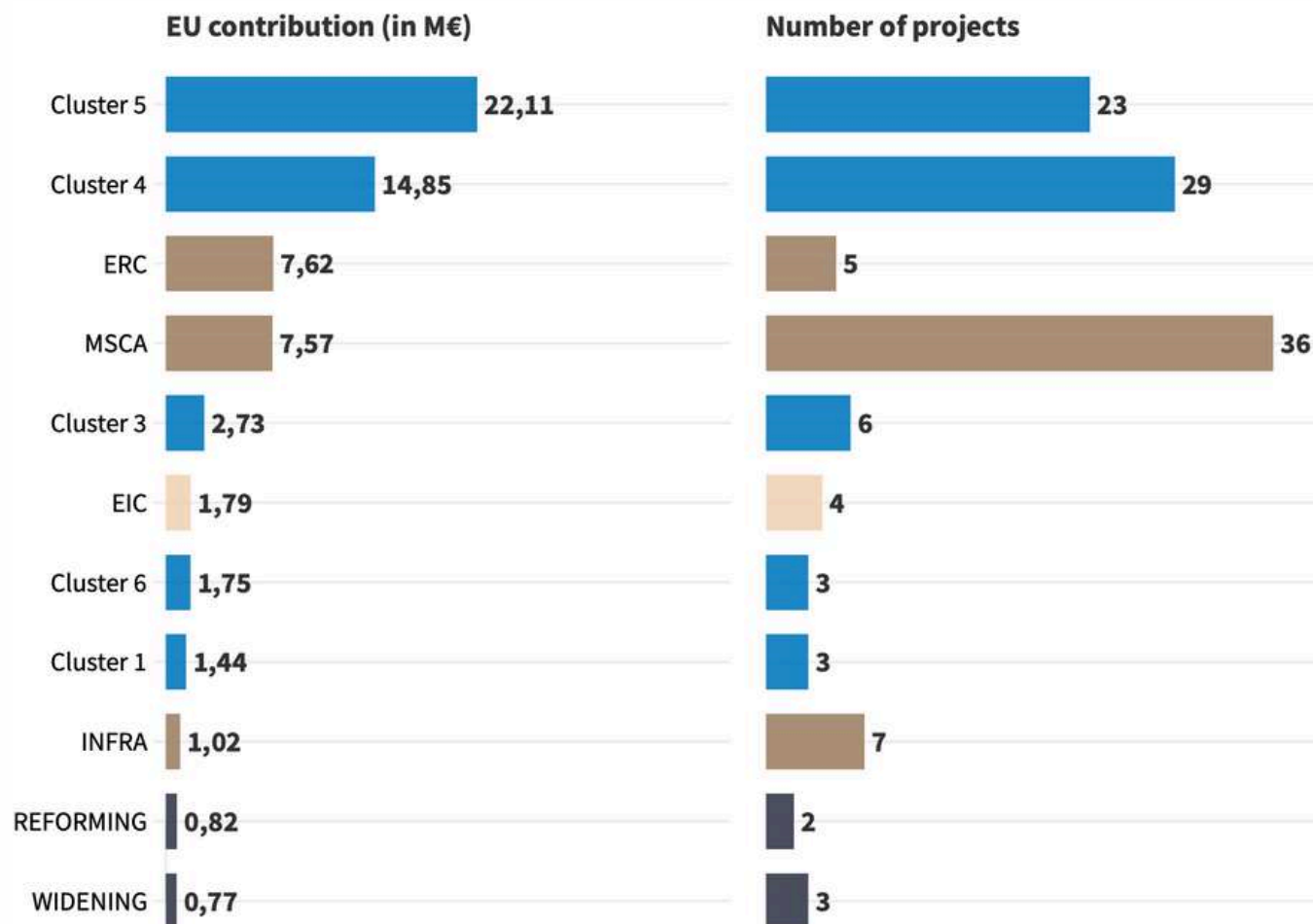
Above all, the number of projects increased in clusters 4 (digital world, industry and space) and 5 (climate, energy and sustainability), as well as in Marie Skłodowska-Curie Actions.
The contribution of the EU increased by 45.4%.

EU contribution for Horizon Europe projects with UPC participation

€62.52 m

Horizon Europe comparison with other state entities

The UPC continues to be one of the main entities in Spain with respect to the Horizon Europe framework programme

The UPC is the university in Spain with the second highest European funding, with figures that are very similar to those of the UAB. So the UPC's role is consolidated with respect to progress in coordination with the EU.

EU contribution for Horizon Europe projects with UPC participation

€62.52 m

See the graph explorer

Participation in Spanish public calls
Within the 2021-2023 State Plan for Scientific, Technical and Innovation Research

	No. of applications	No. granted	Amount requested (M€)	Amount granted (M€)
PID 2022	109	59	23,5	9,2
PID 2023*	128		29,5	
CONSOLIDACIÓN INV 2023	33	7	5,8	1,5
TRANSMISIONES 2023	16	2	10,7	0,7
CPP 2022	11	7	2,4	1,5
PLANES IA 2023*	15		4,2	
AGRUP. EMP. INNOV. 2023	10	6	0,5	0,3
FECYT 2023	10	3	0,3	0
REDES INVESTIGACIÓN 2022	9	3	0,9	0,1
CPP 2023*	8		1,8	
MARIA DE MAEZTU 2023	2	1	4,5	2,3
EQUIPAMENT UNICO 6G 2023	2	2	2,8	2,8
CÀTEDRA CHIP 2023	1	1	3,8	3,8
BILATERAL HISP-ALEM 2023*	7		1,1	
PCIN2023-2	3	3	0,5	0,5
ATRAE 2023	4	0	1,8	0
CÀTEDRA ENIA 2023	1	1	1,2	0,7
ICTS 2022	1	1	1,3	0,2
PROJECTES I+D ISCIII 2023	3	0	0,2	0
PCIN2023-1	1	1	0,2	0,2

See the graph explorer

*2023 calls, pending resolution.

The UPC has submitted 238 proposals for calls within the 2021-2023 State Plan. A total of 97 projects were awarded (41% success rate), with almost €24 m in funding.

Amount awarded in projects with state public funding in 2023

€23.8 m

Participation in autonomous community public calls

Catalan government and other public autonomous and local bodies

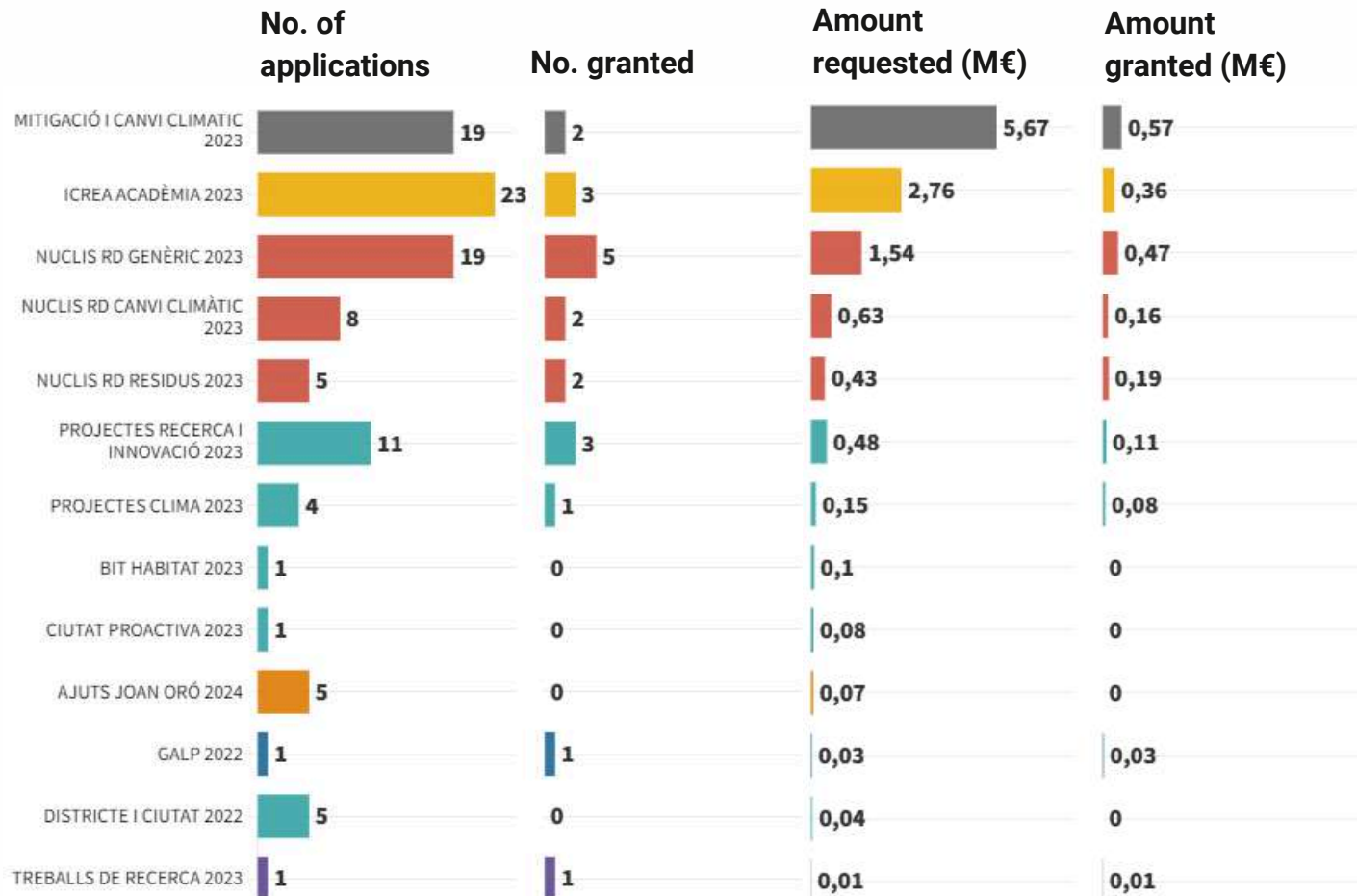|	No. of applications	No. granted	Amount requested (M€)	Amount granted (M€)
MITIGACIÓ I CANVI CLIMATIC 2023	19	2	5,67	0,57
ICREA ACADÈMIA 2023	23	3	2,76	0,36
NUCLIS RD GENÈRIC 2023	19	5	1,54	0,47
NUCLIS RD CANVI CLIMÀTIC 2023	8	2	0,63	0,16
NUCLIS RD RESIDUS 2023	5	2	0,43	0,19
PROJECTES RECERCA I INNOVACIÓ 2023	11	3	0,48	0,11
PROJECTES CLIMA 2023	4	1	0,15	0,08
BIT HABITAT 2023	1	0	0,1	0
CIUTAT PROACTIVA 2023	1	0	0,08	0
AJUTS JOAN ORÓ 2024	5	0	0,07	0
GALP 2022	1	1	0,03	0,03
DISTRICTE I CIUTAT 2022	5	0	0,04	0
TREBALLS DE RECERCA 2023	1	1	0,01	0,01

The participation of teaching and research staff (PDI) in autonomous and local public calls stands out for the 103 proposals submitted. Total funding of €2 m was obtained for 20 projects.

Total amount awarded in projects with autonomous and local public funding in 2023
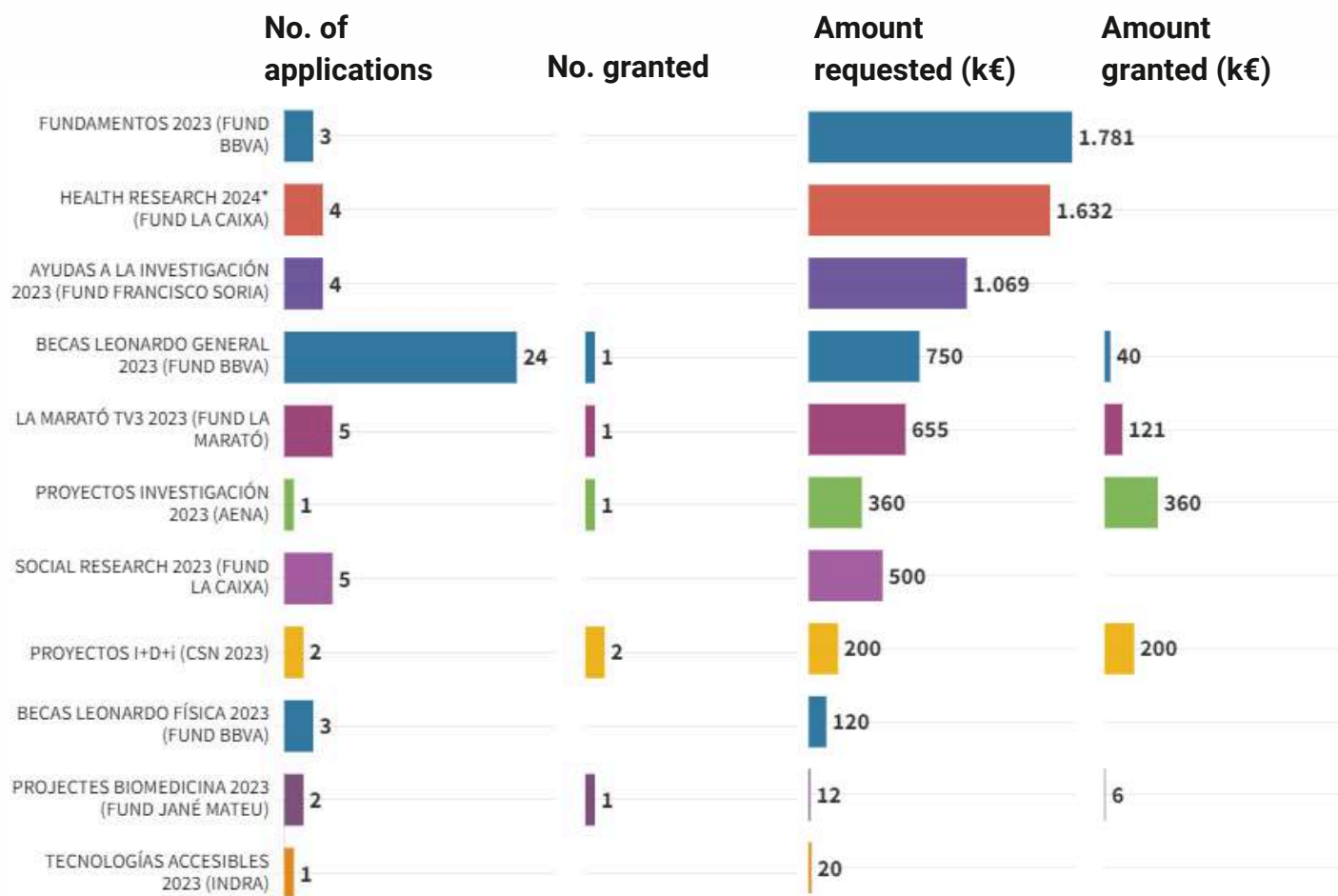
€2 m

See the graph explorer

Participation in calls with private funding
Foundations and other private entities

	No. of applications	No. granted	Amount requested (k€)	Amount granted (k€)
FUNDAMENTOS 2023 (FUND BBVA)	3		1.781	
HEALTH RESEARCH 2024* (FUND LA CAIXA)	4		1.632	
AYUDAS A LA INVESTIGACIÓN 2023 (FUND FRANCISCO SORIA)	4		1.069	
BECAS LEONARDO GENERAL 2023 (FUND BBVA)	24	1	750	40
LA MARATÓ TV3 2023 (FUND LA MARATÓ)	5	1	655	121
PROYECTOS INVESTIGACIÓN 2023 (AENA)	1	1	360	360
SOCIAL RESEARCH 2023 (FUND LA CAIXA)	5		500	
PROYECTOS I+D+i (CSN 2023)	2	2	200	200
BECAS LEONARDO FÍSICA 2023 (FUND BBVA)	3		120	
PROJECTES BIOMEDICINA 2023 (FUND JANÉ MATEU)	2	1	12	6
TECNOLOGÍAS ACCESIBLES 2023 (INDRA)	1		20	

In calls of foundations and other private entities, during 2023, 54 proposals were submitted, with a total budget of €7 m. The UPC obtained total funding of €762,000.
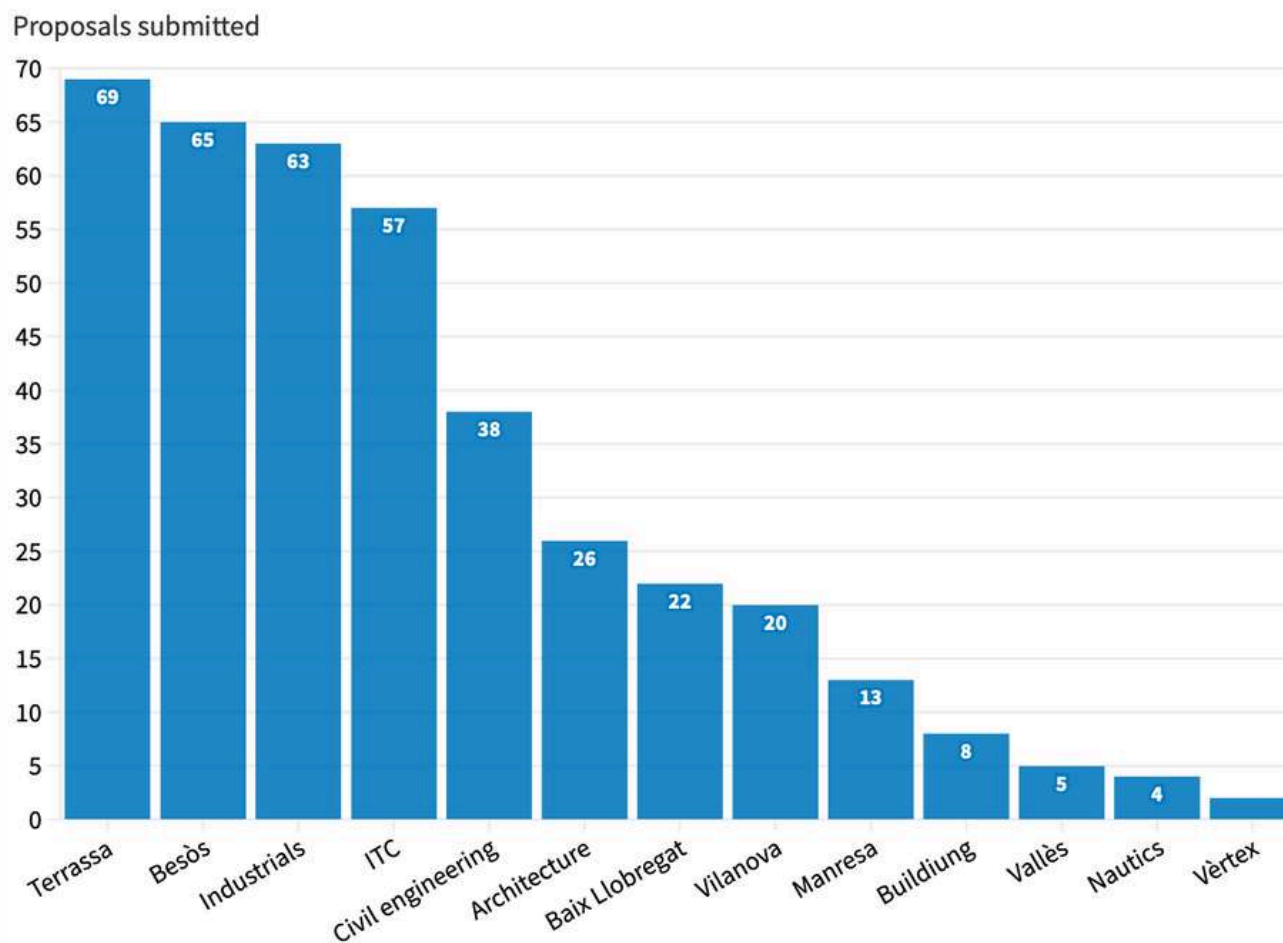
Total amount awarded in projects with private funding in 2023

€762,000

See the graph explorer

National projects: Participation by UTG

Proposals submitted

In 2023, the Terrassa management and support unit (UTG) submitted 69 projects in the national, autonomous and local area. This was followed by the Besòs and Industrial Engineering UTGs, with 60 projects submitted each.
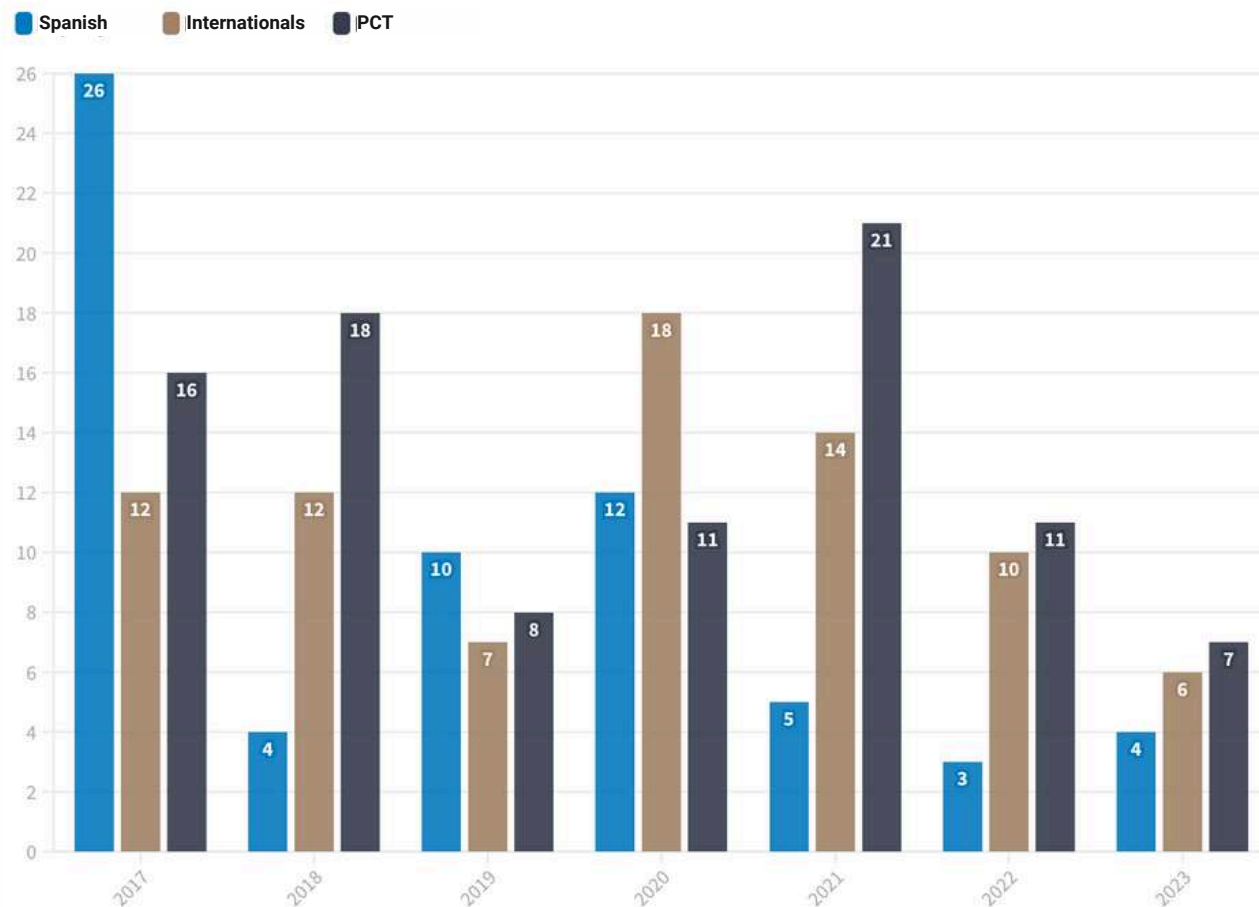
Proposals submitted during 2023

392

See the graph explorer

Priority patents
10 priority applications were filed, 6 of which were European

Spanish   Internationals   PCT

In 2023, applications were filed for a total of 10 priority patents.

A total of 7 patents were extended through an application for an international patent extension (PCT).
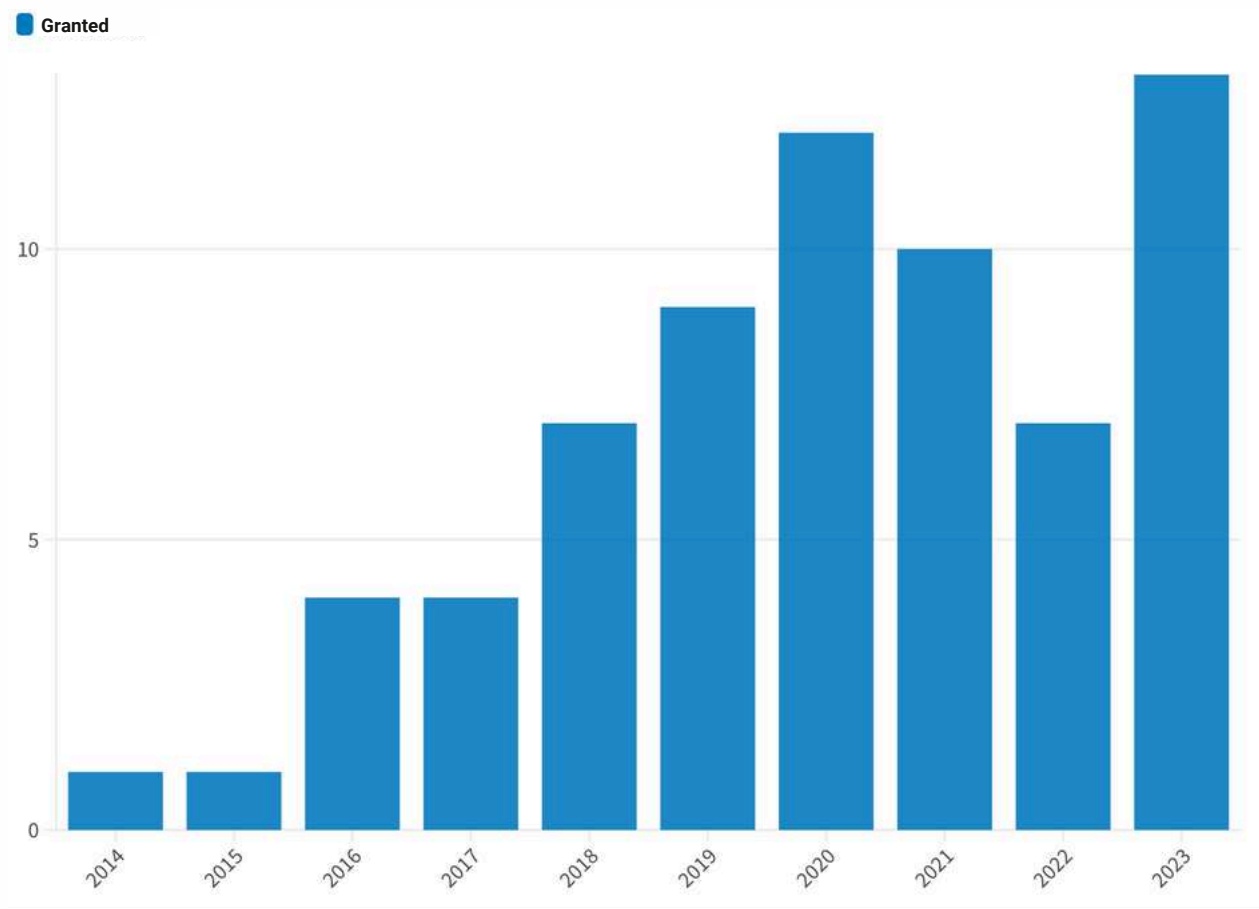
Priority patents 2023

10

European patents

14 patents awarded by the European Patent Office (EPO)

Granted

> Due to the policy implemented at the UPC since the entry into force in April 2017 of the new Spanish patent law, there has been a positive trend of patents awarded by the EPO.
>
> In 2023, 14 new European patent applications were approved, which puts the UPC among the 10 leading applicants in Spain for European patents.
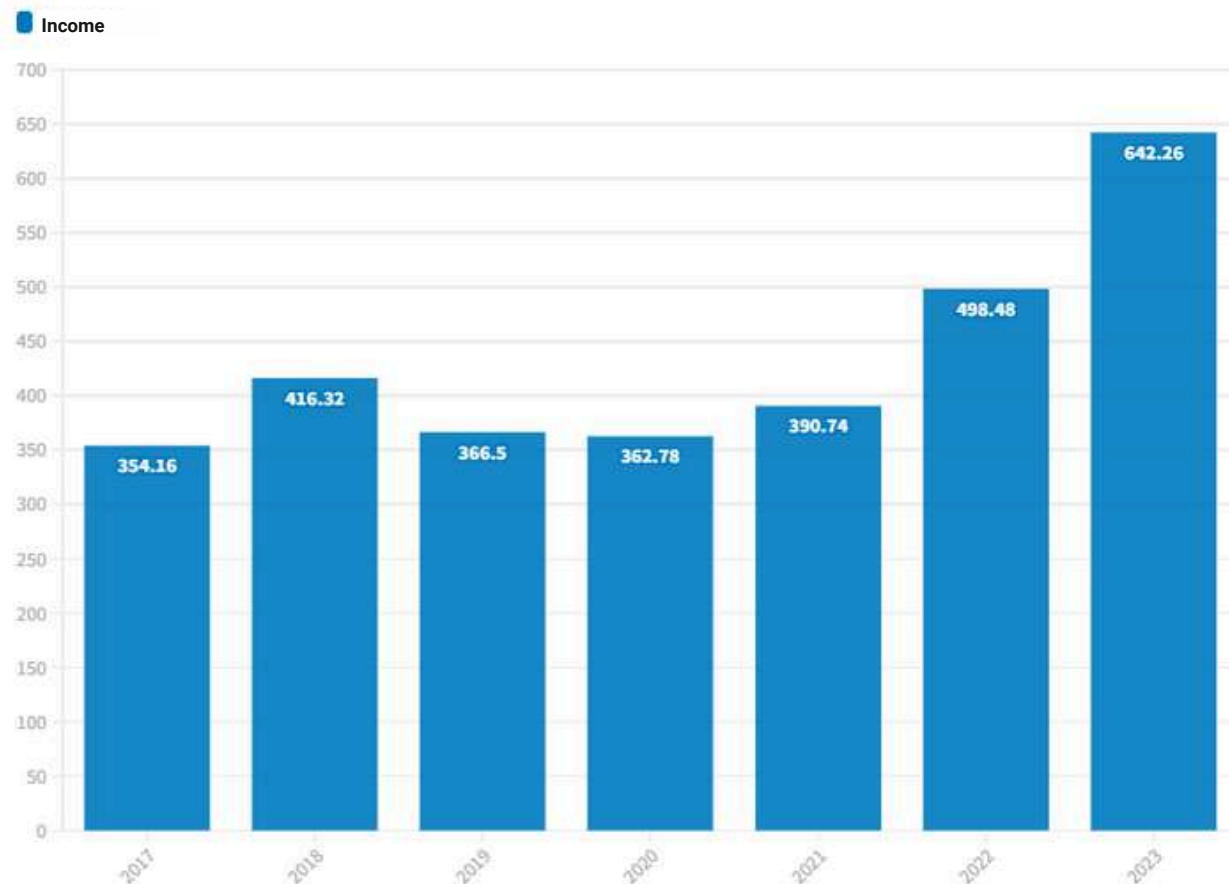
See the graph explorer

Patents awarded by the EPO

14

Royalties

Evolution of royalty revenue from licences granted to third parties and spin-offs

Income

The return on royalties and transfers resulting from signed licensing agreements: the total revenue was €642,260.

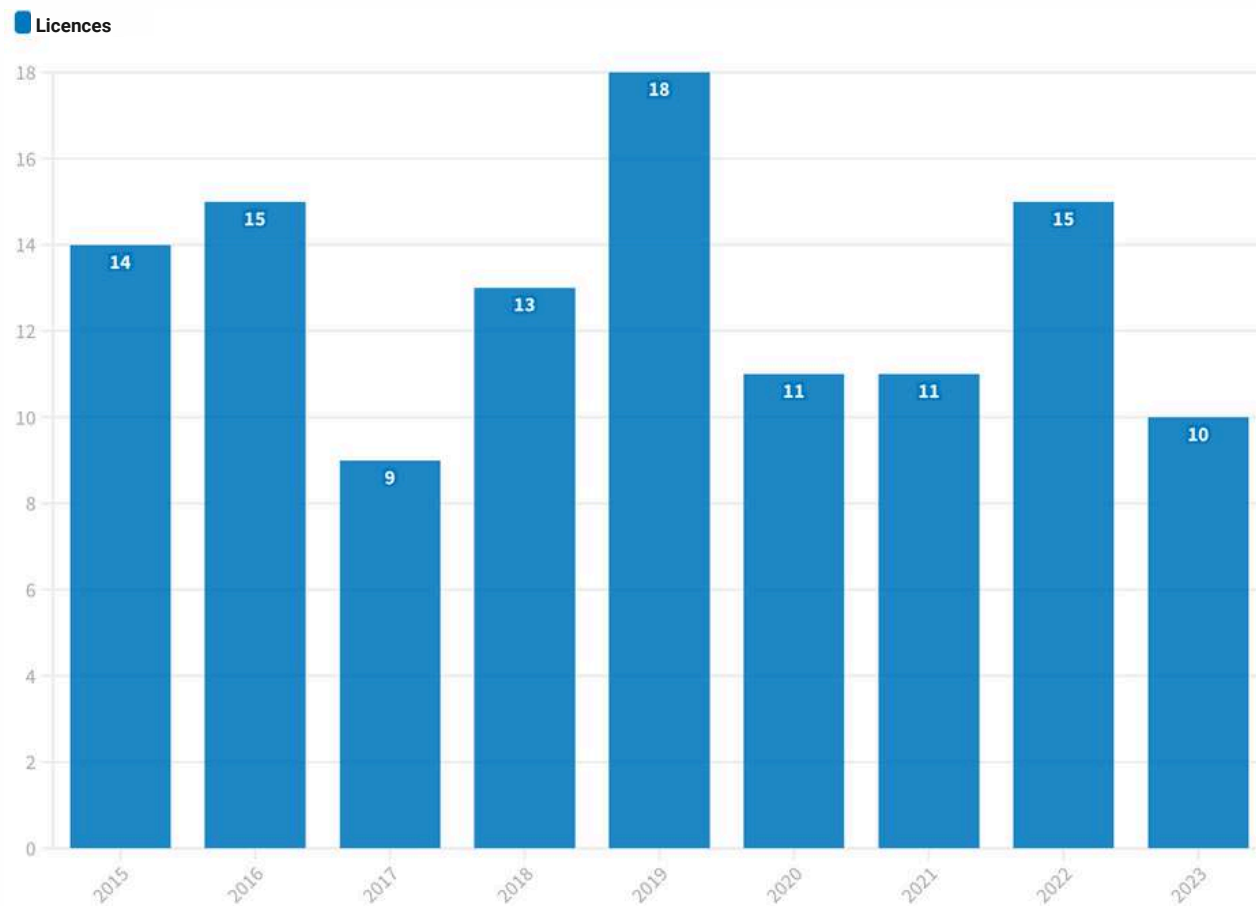**Royalties 2023**

€642,260

See
the graph
explorer

Licences

Evolution of new licences granted

Licences

10 new agreements for technology licences were signed: 3 of them with the spin-offs Nanochronia, Aridditive and Algorae and 7 licences for use and transfers to third-party companies that are already consolidated in the market.

New licence contracts 2023

10

See the graph explorer

Technology-based companies (TBCs)
he UPC has maintained an active portfolio on the creation of spin-offs and start-ups
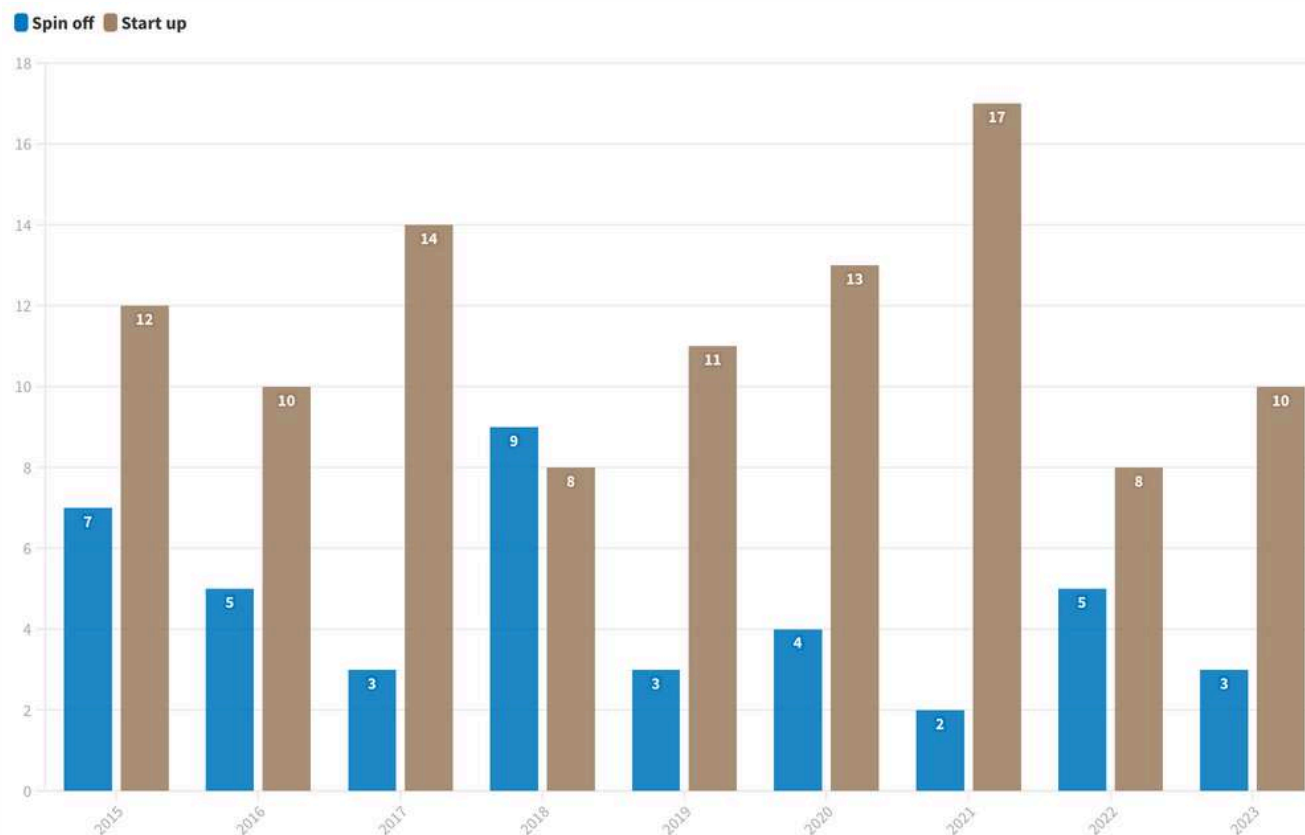
The UPC has continued to advise start-ups and promote entrepreneurship days, pre-accelerator programmes and the participation of TBCs in events such as 4YFN, the Barcelona Deep Tech Summit and the Smart City Expo World Congress.

TBCs created in 2023

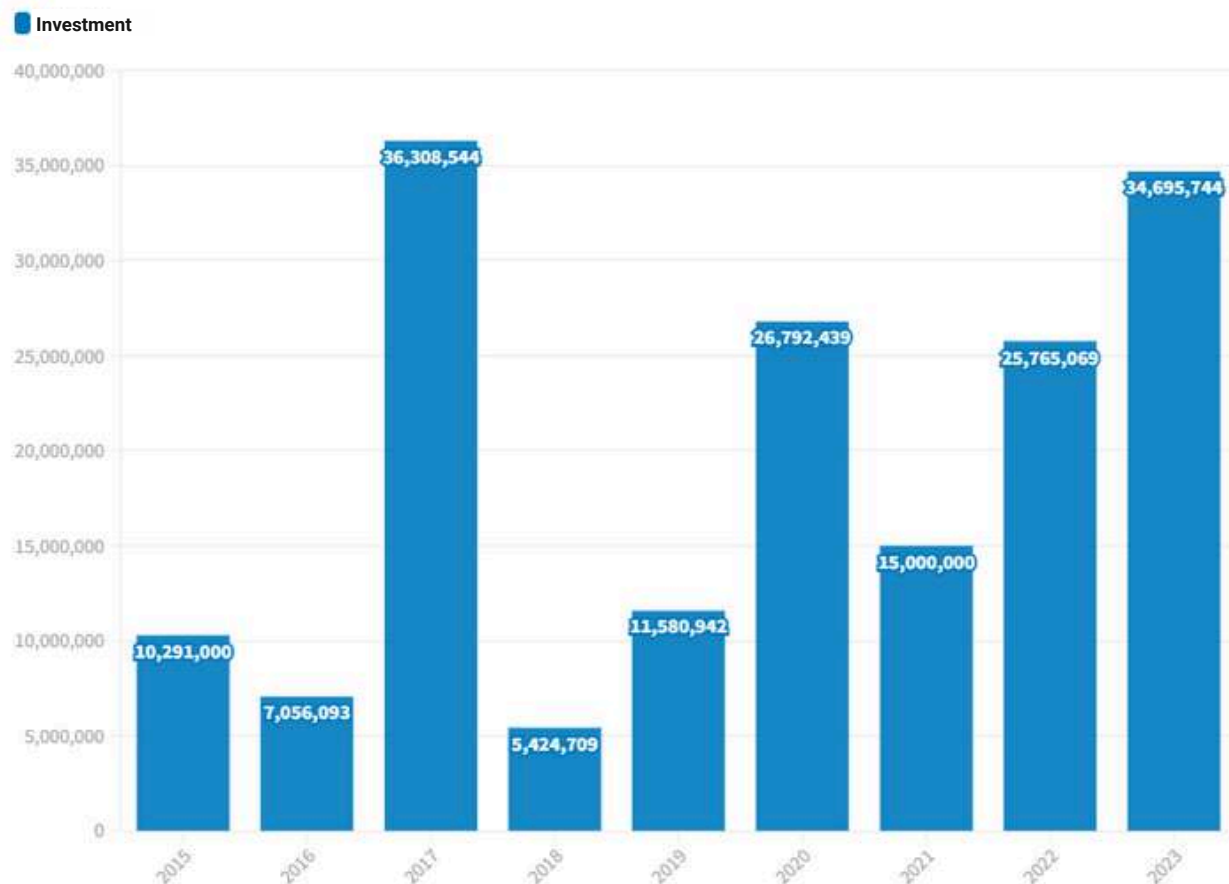# 13

See the graph explorer

Investment mobilised
Evolution of the mobilisation of capital by TBCs

In 2023, technology-based companies (spin-offs and start-ups) advised by the UPC raised capital in the form of private investments, participative loans and/or convertible loans and grants amounting to €34.7 m.

Investment and grants 2023

€34,695,744

See the graph explorer

Economic management: substantiation of project costs
Increase in substantiation of Horizon Europe projects
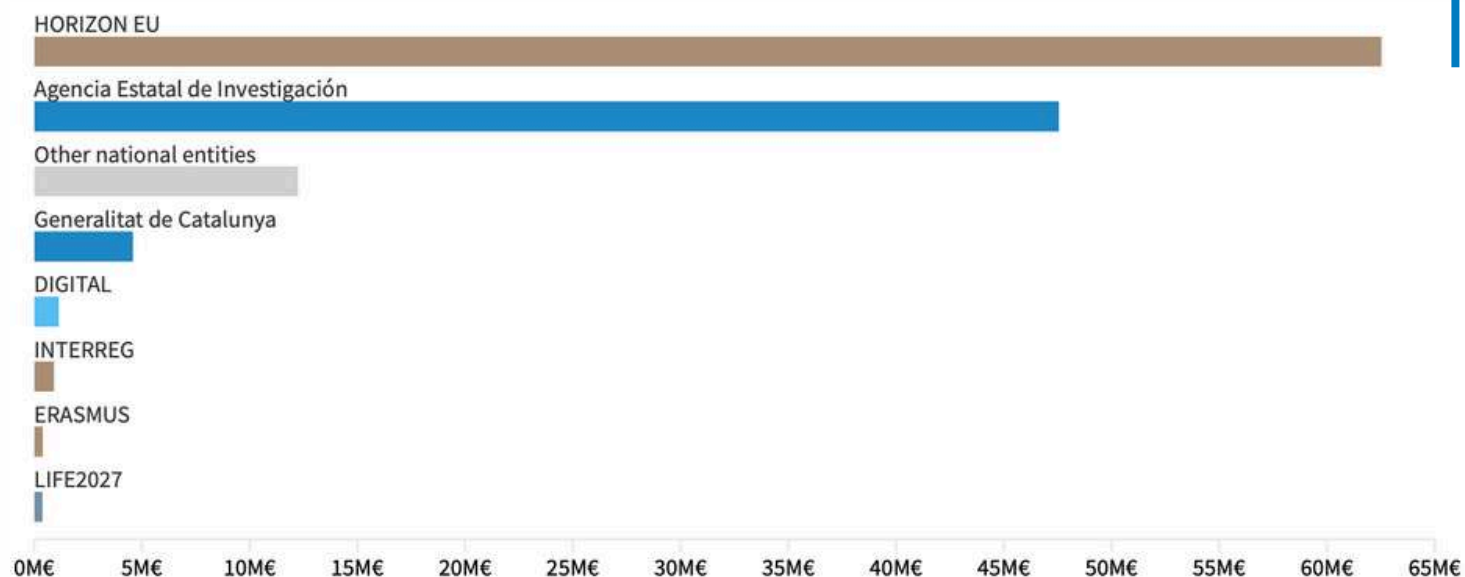
During 2023, costs were substantiated for a total of 121 projects in the Horizon Europe framework programme for a total amount of €62.53 m. The number of State Research Agency projects for which costs were substantiated dropped to 413, from 504 in the previous financial year.

Projects for which costs were substantiated in 2023

701

See the graph explorer

Economic management: requests from funding bodies

The most common requests were repayment decisions, appeals and interest for late payment

Number of requirements

Decisions on reimbursement, appeals, interest on arrears	311
Decisions to initiate and on-the-spot checks	196
Substantiation and documentary requests	178

Amount of requirements

Substantiation and documentary requests	2.665.668,19
Decisions to initiate and on-the-spot checks	1.423.808,62
Decisions on reimbursement, appeals, interest on arrears	504.558,3

In 2023, 351 requests more than in the previous year were dealt with, that is, up 105%. The amount related to these requests was €4.59 m.

Requests received in 2023

685

See the graph explorer

Research output

Publication of articles in journals and doctoral theses continues at a good pace

- Journal articles
- Book
- Conference paper presentation
- Book chapter
- Scientific-technical paper
- Doctoral thesis
- Exhibition catalogue edition
- Conference proceedings book
- Exhibition catalogue chapter

789 288

331

365

2425

1349
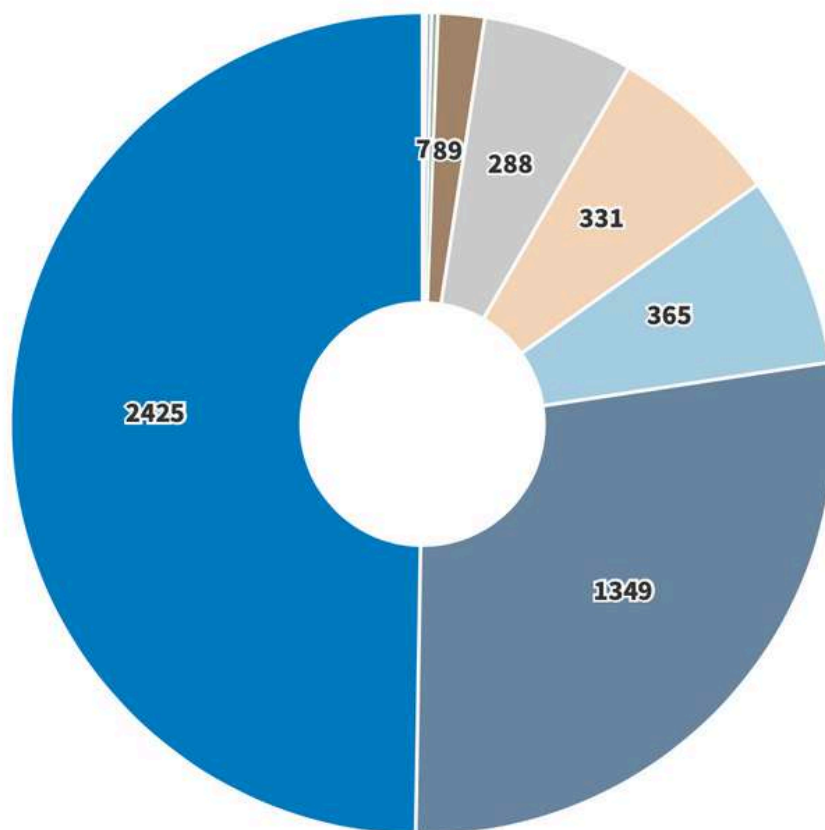
The number of articles published and papers presented at conferences remained stable. In 2023, the number of doctoral theses continued to rise, with a total of 331 presented, of which 11 are part of the Industrial Doctorates Plan.

Total output 2023

4876

See the graph explorer

Projects and calls

A leading university in raising funds

Once again, the UPC consolidated its position as a leading public university in projects approved through the main funding calls. In 2023, a new European Research Council project was awarded to the researcher Justin Zoppe. The University was highly successful in the State Research Agency (AEI) call, which made it possible to execute projects such as the Innovation Plan of the Maritime Research and Experimentation Wave Flume or ELEGANT, a singular 6G scientific infrastructure.

Horizon Europe

The UPC obtained €62.52 m in Horizon Europe funding in 2023, with 121 projects ongoing. This year, the number of projects increased in clusters 4 (digital world, industry and space) and 5 (climate, energy and sustainability). Marie Skłodowska-Curie Actions also provided considerable funding.

48 projects awarded in the Horizon Europe programme

This year, the UPC had 48 projects approved in the Horizon Europe programme (3 were withdrawn). In addition, through portability, an ERC Consolidator Grant project was awarded from Horizon 2020. Despite the good performance of the UPC in this programme, **only 8 of the projects have a woman as the principal investigator.**

Of these 48 projects, a total of 11 are monopartner or coordinated by the UPC. Of these, **only one is led by a woman.**

Specifically, during 2023, the following have been achieved:

- **Pilar I**: an ERC CoG, 12 MSCA (8 Doctoral Networks, 3 coordinated by the UPC and 4 individual), and 2 Research Infrastructures.
- **Pilar II**: 14 projects awarded for the clusters, notably Cluster 4 – Digital, Industry and Space that had 9 projects awarded. A Missions project, specifically that of the mission Restore our Oceans and waters. Institutional partnerships: 8 Joint Undertaking (JU) projects: 5 of JU SESAR, one of JU Smart Networks and Services (SNS), one of JU Clean Hydrogen and one of JU Innovative Health Initiative (IHI).
- **Pilar III**: 2 Pathfinder. projects. The UPC also participated in the KIC EIT Raw Materials, EIT Manufacturing, EIT Urban Mobility and EIT InnoEnergy.

Horizon Europe

Marie Skłodowska-Curie Actions (MSCA)

An institutional project proposal COFUND action (MSCA) was implemented to create excellent postdoctoral positions with promising training plans and careers. In addition, within the MSCA subprogramme, the following UPC-coordinated projects are notable:

BE-LIGHT Project

- PI: **Meritxell Vilaseca**
- Total budget: 2.52 M€ | UPC budget: **€503,000**

The project addresses the challenge of improving industrial competitiveness in health through advanced photonics and non-invasive diagnostic tools.

AIM-NEXT Project

- PI: **Luis M. Llanes Pitarch**
- Total budget: €2.71 m | UPC budget: **€503,000**

The project will train 10 doctoral students in hard materials based on non-critical raw materials for extreme applications. The programme will offer interdisciplinary training and technical, transferable skills.

Unite.Energy Project

- PI: **Ignasi Casanova**
- Total budget: €3.18 m | UPC budget: **€692,000**

European universities, companies and institutions study hydrogen storage techniques based on electrolysis and photoelectrolysis.

More coordinated projects

The UPC continues to coordinate projects in the Horizon Europe area of high relevance for the progress of society. Some of the most notable during 2023 were:

GOBEYOND Project

- PI: **Daniel Sempere Torres**
- Call: CI.3 **Civil security for society**
- Total budget: €5 m | UPC budget: **€1.29 m**

This project will support civil protection authorities and first responders through a combination of innovative algorithms for geological and meteorological hazards.

SIGN-AIR Project

- PI: **Josep Lluís Larriba**
- Call: CI.5 **Climate, energy and mobility**
- Total budget: €3.58 m | UPC budget: **€575,000**

The project will enable suppliers of transport services to register, establish agreements for sharing data and manage contractual relationships, with simplified legal and electronic processes.

6G-EWOC Project

- PI: **José A. Lázaro**
- Call: CI.4 **Digital, industry and space**
- Total budget: €3.99 m | UPC budget: **€499,000**

The project seeks to expand the capacities of the future 6G networks, especially in high mobility scenarios. It incorporates optical and wireless technologies, and aims to create a dynamic infrastructure that supports connected mobility.

Horizon Europe

ECHOES project

- PI: **Carlos Andújar**
- Call: **Cl. 2 Culture, creativity and inclusive society**
- Total budget: €23.97 m | UPC budget: **€753,000**

This is the first project with UPC participation in Cluster 2 (Culture, creativity and inclusive society), which shows that, although the UPC is a technical university, it is also involved in the social sciences.
The project will create a cultural heritage platform that will promote collaboration and the democratisation of knowledge, by integrating project results and ensuring sustainability with an inclusive legal entity.

Muspell project

- PI: **Pol Lloveras**
- Call: **European Innovation Council (EIC)**
- Total budget: €3.14 m | UPC budget: **€828,000**

The project aims to create an innovative thermal storage system for renewable energies in the industrial sector, to reduce emissions and improve the integration of renewable energies into energy systems, optimising the use of intermittent sources of energy such as wind and sun.

CELICOIDS project

- PI: **Justin Zoppe**
- Call: **European Research Council (ERC)**
- Total budget: €1.99 m | UPC budget: **€1.99 m**

The project investigates the use of chemical hybrid cellulose crystal phases for the creation of solid metallic nanohelicoid materials, with the aim of generating adaptable chiral responses with high sensitivity in the UV-visible region.
This interdisciplinary research combines knowledge of cellulose chemistry, polymer grafting and colloidal assembly, with potential applications in invisibility cloaking, super-resolution imaging and chiral sensing.

DIGI4ECO project

- PI: **Joaquín del Río**
- Call: **Cl. 6 Food, agriculture and environment**
- Total budget: €11.25 m | UPC budget: **€594,000**

DIGI4ECO creates a 4D environmental monitoring system using advanced digital technologies for fishery depleted areas, to improve the security and efficiency of the data flow and demonstrate its efficacy.

PROMETHEUS

The PROMETHEUS project has been launched with the aim of increasing the participation of the UPC in international projects and programs; increase the economic return, and the UPC's leadership in Horizon Europe projects.

Horizon Europe - Pillar III

Knowledge and Innovation Communities

Funded by the European Union

EIT Raw Materials

In 2023, the UPC participated in three innovation projects of this community, to validate technological solutions for recovering metals; to guarantee sustainable access to raw materials in a carbon-neutral Europe; and to secure the infrastructure of tailings dams with an innovative monitoring system. As part of this KIC, the Materials and Circularity conference was organised, which brought together representatives of EIT Raw Materials and several university research groups.

EIT Urban Mobility

In the framework of this community, in 2023 various projects were undertaken on topics as varied as the creation of a tool for transport demand management (TDM), the prevention of micromobility accidents or the implementation of the second phase of LogiSmile, the cutting-edge autonomous delivery system that consists of an autonomous hub vehicle (AHV). In the business creation pillar, the tasks of coordinating the accelerator programme Innovation Hub South continued.

EIT Manufacturing

In January 2023, the UPC joined EIT Manufacturing, the largest innovation in manufacturing network in Europe. It is promoted by the European Institute of Innovation and Technology (EIT) and centres on the digitalisation of industry in the framework of the circular economy. The EU manufacturing sector must address rapid technological advances and the need for a more circular economy. This year, work was done to disseminate among teaching and research staff (PDI) the opportunities offered by the community in innovation, education and business creation.

EIT InnoEnergy

Under the umbrella of InnoEnergy, the UPC continued to be active in the teaching of five master's degree programmes with a clear focus on innovation, entrepreneurship, creativity and leadership. It coordinates three of these programmes in Europe. In addition, it entered the last phase of the KICstartH2 initiative, aimed at accelerating the adoption of hydrogen in Europe through education and innovation, directed at students and professionals in the sector.

Consult the available training programmes

More RDI
in the international area

LIFE programme

LIFE is the European Union programme centred on the environment and climate action. The UPC took part in two projects during 2023:

LIFE PYRENEES4CLIMA Project
- PI: **Martí Rosas Casals**
- Total budget: €3.2 m | UPC budget: **€168,000**

Managed by 46 partners in Spain, Andorra and France, the project is focused on improving the resilience of the Pyrenees to climate change.

LIFE ABATE Project
- PI: **Marcel Macarulla**
- Total budget: €3.2 m | UPC budget: **€168,000**

Managed between 6 partners, LIFE ABATE proposes the implementation of a new scheme to mitigate the environmental and economic impact of industrial waste treatment plants.

Funded by the European Union

Other international calls

Two projects were awarded in the Union Civil Protection Mechanism, (UCPM) programme, one project in the Research Fund for Coal and Steel (RFCS) programme and one project in the CREA (Creative Europe Programme).

In the same line and also outside of the framework programme, in the first quarter of 2023, a new call was concluded in Acció 2 of the Erasmus+ programme: Cooperation among organisations and institutions. The University presented a total of 28 proposals, distributed as follows: 14 Cooperation Partnerships, 9 Capacity Building and 5 Alliance for Innovation.

8 grants were awarded: 5 Cooperation Partnerships, with the UPC as coordinator of one proposal, 2 Capacity Building and 1 Alliance for Innovation.

Participation continues in the Joint-AQ Africa project to contribute to the standardisation of higher education levels on the continent.

Erasmus +

In the ERASMUS+ programme for mobility between universities, the UPC presented 28 proposals, distributed as follows: 14 Cooperation Partnerships, 9 Capacity Building and 5 Alliance for Innovation.

SpaceSUITE project

- PI: **Àngela Aragón**
- Call: **Alliances for innovation**
- UPC budget **€280,166**

The SpaceSUITE project further develops knowledge and skills in Earth observation, geoinformation, satellite navigation and communication by creating educational programmes for various roles in the aerospace and defence sector. Over four years, 25 European partners will collaborate to promote innovative advances in European space.

ELA4ATTRACT project

- PI: **Elisabet Mas de les Valls**
- Call: **Capacity building (higher education)**
- UPC budget **€ 38,625**

This project seeks to increase the participation of national and international students in STEM, and women in particular, through good practices and data analysis. It provides tools for universities to retain more students and improve their integration.

CyberSea project

- PI: **Germán de Melo**
- Call: **Cooperation partnership**
- UPC budget **€60,472**

The CyberSEA project aims to improve cybersecurity in the maritime environment through educational materials, remote laboratories and online courses for cadets and seafarers. It is also designed to train trainers in Greece and identify vulnerabilities to disseminate best practices.
The final aim is to create a safer, more resilient maritime environment.

Unite! alliance

University Network for Innovation, Technology and Engineering

WIDENING project

The project, with 5 million euros in funding, aims to improve the scientific, technological and innovation capacity of higher education institutions that form part of the aliança Unite! in the European Union. The project is part of the WIDERA programme (Horizon Europe), whose aim is to reduce the disparity between research and innovation systems in European countries. The project seeks to redress these shortfalls and reinforce research and innovation in the framework of the alliance. Outputs will include policy recommendations, plans for gender equality and inclusion in research careers, a plan of action for opening up science and strategic innovation, and the creation of a science and innovation skills academy. These results will be shared beyond the end of the project to ensure their implementation by relevant stakeholders in developing countries of the Unite! alliance (Portugal and Poland).

Unite! Seed Fund

Another noteworthy call is the Unite! Seed Fund, with its teaching, research and student modes. The teaching and research modes have been opened for preparatory (Exploring) and consolidation (Developing) projects. Out of the total of 21 projects awarded, the UPC community forms part of 9, covering diverse subject areas.

021-2023 State Plan for Scientific, Technical and Innovation Research (PEICTI)

Knowledge Generation Projects (PID)

KThe UPC submitted a total of 109 proposals for an amount of €18.8 m in the AEI call Projects of Knowledge Generation 2022. Finally, 59 proposals were accepted (54% success rate), for a total amount of €9.2 m.
In the 2023 call, a total of 128 proposals were presented for an amount of €23.6 m. Pending resolution.

Public-Private Collaboration

The University also takes part in state projects in collaboration with companies. In the 2022 Public-Private Collaboration call of the State Research Agency (AEI), a total of 11 proposals were submitted, of which 7 were accepted for a total amount of €1.5 m.
In the 2023 call, 8 proposals were submitted with a UPC budget of €2 m. Pending resolution.

International collaborations

The UPC took part in 7 proposals in the bilateral Spanish-German call, with a budget of €1.7 m, currently pending resolution. These initiatives show the impact and the international collaboration of the UPC in strategic projects, expanding its partnerships and resources for global research.

021-2023 State Plan for Scientific, Technical and Innovation Research (PEICTI)

PERTE CHIP - proof of concept

The UPC obtained 6 projects in the State Research Agency call of the Ministry of Science, Innovation and Universities. The total funding was €0.9 m. The aim of the call is to finance projects that accelerate the transfer of knowledge and results in the strategic area relating to microelectronics and semiconductors (chips).

Artificial intelligence plans

EThe Ministry of Universities announced a call to fund collaborative research plans on artificial intelligencel. The UPC submitted 15 proposals for a total budget of €22 m, of which €4 m are allocated to research over two years. This participation reinforces interdisciplinary and interinstitutional collaboration, promoting advances in critical areas of technology and innovation.

iCIEM Infraestructure

- PI: **Agustín Sánchez-Arcilla**
- Call: **ICTS 2022**
- UPC budget: **€204,000**

The ICTS 2022 call awarded funding for the innovation plan of the Multifunction and Multiscale Maritime Research and Experimentation Wave Flume (iCIEM). This infrastructure is essential for research in maritime engineering. It enables advanced research and experimentation in multifunction and multiscale maritime environments.

Laboratori de freqüències Sub-THz

- PI: **Jordi Romeu Robert**
- Call: **UNICO I+D 6G 2023**
- UPC budget: **€825,000**

The CommSensLab project aims to improve the capacity for manufacturing and prototyping the circuits needed to develop converging communication technologies associated with 6G in sub-THz frequencies.

Projecte ELEGANT

- PI: **José Antonio Lázaro Villa**
- Call: **UNICO I+D 6G 2023**
- UPC budget: **€2 m**

ELEGANT will develop unique scientific infrastructure for low latency 6G, to facilitate the integration of AI in the network (6G-AI), which is crucial for research, training and technology transfer to society.

Government of Catalonia

SGR-Cat 2021

During the first semester of 2023, the final decision was made on a call for grants to support the scientific activity of Catalan research groups - SGR-Cat 2021. The UPC was the university that received most funding from AGUAR, at almost 3 million euros.

Leading RDI networks

The UPC leads three networks for research valorisation and collaborates actively in other leading RDI networks of the Catalan government. This leadership and collaboration demonstrates the University's capacity to influence and contribute to various science and technology areas, boosting knowledge transfer and having an impact on key sectors of the economy.

TECNIO centre grants

The Ministry of Research and Universities contributed €262,000 to strengthen the promotion of transfer and transmission of the research and knowledge output of TECNIO centres.

Government of Catalonia

Knowledge Industry

This area is notable for the submission of 50 projects in various modes (Seed, Product and Innovators). It reflects the UPC's efforts to promote innovation and knowledge transfer. The variety and quantity of projects submitted show a significant commitment to technological development and applied research.

R+D HUBS

In the 2023 R+D Hubs call of ACCIÓ, the UPC obtained funding for 9 projects for a total amount of €851,000.
These projects are conducted through cooperation between local companies and TECNIO centres, to support industrial research and experimental development.

Co-creation and Learning Spaces

The UPC is participating in Co-creation and Learning Spaces (ECA), which is part of the Knowledge Regions Programme of the Catalan Government, RIS3CAT2030, for the creation of the Laboratory of Transformative Social Innovation, coordination with the Mechanism of Discovering Opportunities of the Catalan government and the Shared Agendas of regional agents.

FILAMIN project

- PI: **Jessica Calvo**
- Call: **Nuclis R+D (ACCIÓ)**
- UPC budget: **€181,000**

The aim of FILAMIN is to achieve zero manufacturing defects through artificial intelligence in the processes of incremental flow forming. This project is led by the company Industrias Puigjaner S.A., in collaboration with the TECNIO DIGIFACT centre.

WEF4Build project

- PI: **Miquel Casals Casanova**
- Call: **Mitigació i Canvi Climàtic 2023**
- UPC budget: **€350,000**

The aim of WEF4Build is to increase the climate resilience of buildings through solutions based on the water-energy-food (WEF) nexus on the terraces of buildings, including technical and social perspectives.

URBANAT project

- PI: **Ivette Rodríguez Pérez**
- Call: **Mitigació i Canvi Climàtic 2023**
- UPC budget: **€224,000**

URBANAT will develop a digital twin (DT) of Barcelona for the prediction of thermal stress and air pollution scenarios.

More RDI in the national, autonomous and local environment

More Ventilated Schools project

- PI: **Fabián López Plazas**
- UPC budget **€80,000**

Improves air quality in Barcelona's schools through the use of passive systems for thermal comfort.

MARIONA project

- PI: **Ariadna Quattoni**
- UPC budget **€120,550**

AMultimodal automatic learning assistant (AI assistant) to optimise therapeutic action in patients with acute neurovascular conditions.

AeroNET project

- PI: **Miquel Casals**
- UPC budget **€360,000**

The airport system as an agent to mitigate climate change: energy flexibility and a community to manage zero emissions.

OVERPROET project

- PI: **Corrado Altomare**
- UPC budget **€39,731**

Semi-empirical model of wave overtopping on seafront promenades with an emergent toe.

ICREA ACADÈMIA

The researchers Maria Pau Ginebra, Eduard Alarcon and Albert de la Fuente have been recognised with ICREA Acadèmia 2023 grants that enable intensification of excellent research over a five-year period.

MdM unit of excellence

The Barcelona Research Center in Multiscale Science and Engineering (CCEM) has been recognised as a 2023 María de Maeztu Unit of Excellence. This recognition includes a grant of almost 3 million euros to undertake strategic research and training programmes in the next four years. The programmes will enable the centre to consolidate its scientific capabilities, increase its international visibility and promote the attraction and retention of talent.

Deep Tech Hub

The UPC obtained 2 projects in the Deep Tech Hub Proof of Concept call, with total funding of €90,000. The aim of this call is to provide high added value products and services to promote the stimulation of the local and international "deep tech" ecosystem..

Cybersecurity and Collaboration with INCIBE

The UPC has signed collaboration agreements with the Instituto Nacional de Ciberseguridad (INCIBE). It received funding of €1 m for the Cybersecurity Chair and €200,000 for a strategic project.

These programmes include the participation of various entities and universities, which consolidates the role of the UPC in cybersecurity research and training, a crucial field for the protection of digital data and infrastructure.

Chairs and business collaboration

University-business chairs have been founded in innovative areas such as artificial intelligence and semiconductors. The ENIA Chair, with the participation of Siemens Energy S.A., has applied for funding of €1.6 m, and the Chip Chair led by the UPC with other institutions and companies has applied for funding of €3.8 m.

These initiatives show the UPC's commitment to technological progress and collaboration with the industrial sector to promote applied research.

Support for Digital Innovation Hubs and Knowledge Transfer

With Recovery and Resilience Mechanism (MRR) funds, the UPC collaborates in two European Digital Innovation Hubs (DIH4Cat and Digital Impulse Hub), and provides essential services for digital innovation. In addition, the Ministry of Research and Universities has contributed €262,000 to reinforce the transfer of results to the market and the production sector, to facilitate the implementation of new technologies and innovative solutions in the economy.

The Collider and CaixaImpulse Innovation calls

The UPC presented the SynOptic project to The Collider programme, promoted by the Mobile World Capital Barcelona Foundation, and it participated in five projects in the CaixaImpulse Innovation, call, two of which were selected to receive funding. The aim of these programmes is to transfer scientific knowledge to society and promote the creation of new products and services. The participation and success in these calls reflects the UPC's commitment to technology and innovation

UPC calls

The Universitat Politècnica de Catalunya continues to provide support and grants to promote research, development and innovation through various initiatives.

AGRUPS 2023

With an allocation of €1.4 m, the aim of this call is to promote the activity of UPC research groups. This area is notable for its direct and substantial support of research groups, recognising and facilitating the continuity of their innovative activities.

Impuls UPC

The calls of Impuls UPC | Talent Emprenedor 2023 and Impuls UPC | Startups 2023 are important for their contribution to promoting entrepreneurship among UPC students and alumni. With allocations of €30,000 and €60,000 respectively, these initiatives support the creation of start-ups and promote the University's entrepreneurial ecosystem and the territory's economic development.

Congressos UPC

The main aim of the programme consists in promoting scientific conferences organised by UPC teaching and research staff, to contribute to improving quality and ensuring success. The objective is to foster the participation of prestigious teaching and research staff, and thus promote a context for debate and the exchange of ideas. A total of €20,000 were assigned to this initiative.

UPC networks and consortia

This programme promotes the active participation of the UPC in Spanish and international networks and consortia that, due to their high level of quality and scientific interest, play an important role in transfer and innovation processes, and thus contribute to expanding the presence of the institution.
The amount assigned to this support in 2023 was €30,000

ALECTORS 2023

A UPC programme of grants for working professors to promote research activity in the first year of affiliation to the University. The amount allocated is €400,000 for 138 new professors who form part of a UPC research group.

Agreements with companies and institutions

Framework agreement with the Catalan police force (Mossos d'Esquadra)

The UPC and the Mossos d'Esquadra police force have signed a framework agreement for collaboration to undertake joint scientific and technological research and innovation projects, through the FIB inLab. This laboratory will innovate in areas such as data science and big data, smart mobility, knowledge and service engineering, cybersecurity and simulation.

SIEMENS Artificial Intelligence Chair

Company: SIEMENS
UPC group: IDEAI UPC
Amount: €400.000

Development of bioreceptive concrete

Company: Soluciones de Movilidad Sostenible
UPC group: Department of Civil and Environmental Engineering
Amount: €345.000

Agreement in the framework of the Connèxia UPC programme

Company: Schneider Electric
UPC group: RDI Area
Amount: €300.000

Study of hydrogen storage solutions

Company: INDOX Energy Systems
UPC group: Heat and Mass Transfer Technological
Amount: €197.625

Notable activity

Harnessing the value of RDI

Constant, excellent research to promote scientific and technological progress is consolidated as a fundamental pillar of our commitment. We embark on a tireless search for creative solutions, to have a positive impact and benefits for society as a whole. We are driven by the conviction that innovation and quality research are vital catalysts to address contemporary challenges and build a brighter future.

Connèxia UPC

In October, Connèxia UPC, was launched, a Universitat Politècnica de Catalunya initiative to promote collaboration between researchers, companies and other institutions. This platform seeks to boost knowledge and technology transfer, and promote the creation of innovative projects that contribute to economic and social development. Through Connèxia, specialised advice is provided on intellectual property, research grants and funding for innovative projects. In addition, Connèxia organises networking activities, conferences and events that connect agents in the sector and create opportunities to establish fruitful collaborations. The platform also facilitates access to a wide network of contacts and resources, including laboratories and technology infrastructure, to boost competitiveness and the growth of the business sector through technological and scientific innovation.

Connèxia UPC is notable for its capacity to provide comprehensive support in the entire innovation process, from the initial idea to its implementation in the market. In addition to technical and financial advice, the platform provides support on legal aspects and industrial property, which helps companies and researchers to protect and valorise their inventions. Connèxia acts as a bridge between the academic and business worlds, promoting projects that combine advanced research with practical applications, and thus contributing to resolving real problems and developing innovative solutions. This close collaboration with the production sector and other institutions reinforces the role of the UPC as a driver of change and innovation in the knowledge economy.
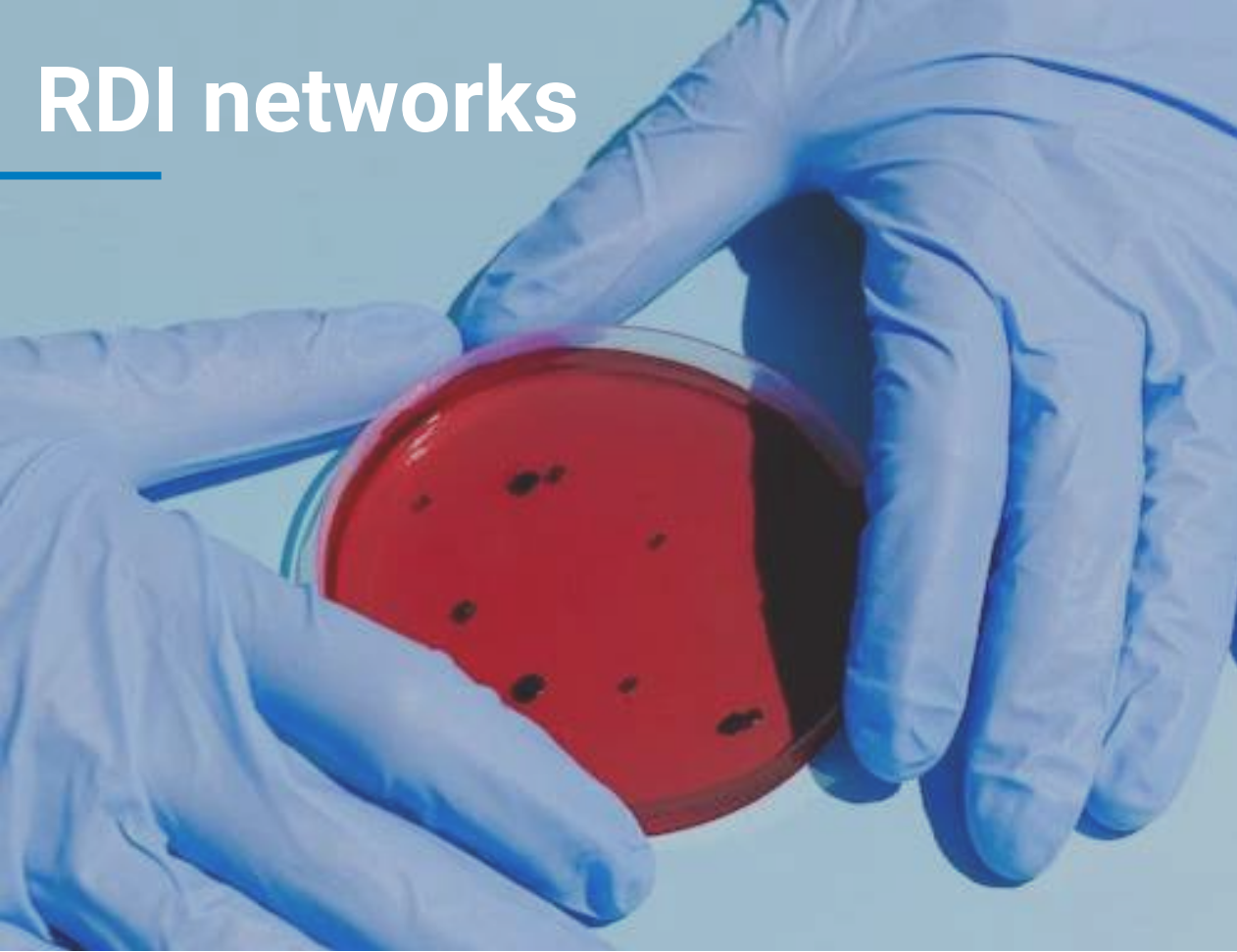
Opening of the hydrogen pilot plant

In 2023, the Universitat Politècnica de Catalunya opened the Hydrogen Laboratory and the pilot plant for the production of green hydrogen on the Diagonal-Besòs Campus. This is a pioneering infrastructure in Spain and one of the few facilities of its kind in operation in the European Union. The main aim of this laboratory is to promote the research and development of technologies related to green hydrogen, which is considered key to the decarbonisation of industry and transport. The pilot plant can produce over 40 kW of electric power and store up to 34 kg of hydrogen at 300 bars.

The Specific Centre for Hydrogen Research (CER-H2) of the UPC is leading this initiative, which brings together over 30 researchers from nine research groups. The centre is working on innovative projects such as liquid hydrogen storage, the creation of synthetic fuels for aircraft, the production of bimetallic catalysts for green and blue hydrogen, and the use of hydrogen as a fertiliser and fuel for maritime transport.

During the opening, the president of the Catalan government, Pere Aragonès, highlighted the importance of hydrogen in the reindustrialisation of Catalonia and the energy transition. The UPC rector, Daniel Crespo, stated that this infrastructure positions Catalonia as a European leader in green hydrogen. The laboratory was created through funding from the Ministry of Research and Universities, which contributed over a million euros.

RDI networks

XaRFA

The [Reference Network in Additive Manufacturing of Catalonia](#) (XaRFA), with 28 research groups from 14 Catalan entities, was established in 2023 to create up to 12 technology-based companies and facilitate the transfer of 3D printing technologies to society.
Its four action programmes address the evaluation of results, the promotion of transferable technologies, member training and the acceleration of relevant technologies.

XARTEC

[Xartec Salut](#), led by [CREB UPC](#), is composed of 81 research groups from 23 different institutions. It aims to be a catalyst for RDI in the field of health tech.
It fosters entrepreneurship, technology transfer and spin-off creation, sharing insights with key opinion leaders.

BlueNetCat

[BlueNetCat](#), the Maritime Network of Catalonia, is the innovation and transfer instrument of the Maritime Agenda of Catalonia. The network aims to incubate and accelerate Catalan scientific-technological projects in the blue economy.
With a clear international scope, the network is coordinated by the UPC and represents over 700 members, divided into 67 research groups, from seven Catalan institutions.

The [RDI networks](#) grant is promoted by the Catalan government's Ministry of Research and Universities and funded by the Agency for Management of University and Research Grants.

Through RDI networks, the aim is to promote collaboration with research groups from different entities and highlight interdisciplinarity and multidisciplinarity. The groups must have shared challenges and objectives of economic and social interest.

RDI networks must be composed of at least five research groups from at least three different participating entities and a coordinating entity.

Deep Tech Hub Fractus - UPC

In 2023, the actions of the agreement with Fractus that was signed in 2022 continued to be implemented.

AI and 5G-6G, the technologies with the greatest capacity for technological and social disruption

Work was done on the study Analysis, mapping and detection of Deep Tech areas and technologies. Up to 16 technologies were detected, in which approximately 50% of the University's research groups work, depending on social impact or industrial scalability.

The study also led to the conclusion that artificial intelligence, 5G-6G, big data, robotics, cybersecurity, networks, IoT protocols and 3D and 4D printing are the technologies with the most research groups at the UPC.

Deep Tech Hub Fractus-UPC was also present at the 2023 BCN Deep Tech Summit 2023.

RDI protection

Patents

In 2023, 10 priority patent applications were made, of which four were European, one Italian and one Portuguese.

The protection of 7 patents was extended through an application to the Patent Cooperation Treaty (PCT). Eleven families of patents have entered into national phases in the following countries: USA, Europe, Canada, Germany, England, France, China, Japan, Korea and Spain.

In the European Patent Office, 14 patents were applied for and 13 were granted, which places the UPC among the 10 top applicants to the EPO.

Contractual agreements

Licensing agreements are a way to transform the knowledge generated by the UPC's research groups and centres into productive value.

A total of 10 technology licensing agreements were signed as a result of valorisation activity, 17 confidentiality agreements to explore new collaborations and potential licences with companies and 4 co-ownership agreements, which maintain intellectual and industrial property rights in a high number of collaborations.

The return on royalties and transfers as a result of signed licensing agreements amounted to €642,259.95.

The UPC is the leading university in number of patents applied for and exploited, having filed more than 800 patent applications over its history.

A patent is an industrial property certificate that recognises the exclusive right to an invention, and prevents others from manufacturing, selling or using it without the consent of the owner.

Entrepreneurship

We promote an entrepreneurial culture between UPC alumni and researchers.

We organise events and generate services that promote exchange of knowledge on opportunities and the creation of synergies between projects, incubated companies and the UPC and/or other agents from outside our ecosystem.

Currently, we have a portfolio of 41 spin-offs in which the UPC has a stake. In 2023, the University disinvested in three spin-offs, with a total of €55.711 gained in the disinvestment operations.

Pre-incubation and incubation programmes
- Incubator: ESA BIC
- Pre-incubator: Industrial Tech (3rd edition)
- Pre-incubator: Science to the Market (5th edition)

Parc UPC
Ten new companies have been incorporated into UPC spaces, twice as many as in the previous year (45 companies incubated). Incubated companies have been encouraged to participate in events, such as the Foro Transfiere and the B2B Meeting on Cybersecurity.

Business start-ups
A total of 13 technology-based companies were created in 2023, with advice from the SGI, which generated total financing of €34 m.

Emprèn space
1,000 UPC students were advised, over 100 projects were supported and 300 hours of mentoring were provided.

Boosting innovation in the territory

The Innovation Management Service (SGI) promotes singular projects on transfer, entrepreneurship and innovation in the territory.

In 2023, the cradle of entrepreneurship at the UPC, the Innova Programme, celebrated its 25th anniversary. This is a pioneering initiative in Catalonia and Spain, focused on promoting a culture of innovation and entrepreneurship, and fostering the creation of spin-offs based on knowledge and technology.

BCN Deep Tech Node

In 2023, work continued on the development of the Barcelona Deep Tech Node, initiative, a partnership with a mission to make Barcelona an example to follow in scientific-technological entrepreneurship. The UPC, which is responsible for two of the eight areas of the action plan (Barcelona Deep Tech Summit and Open Innovation Deep Tech Club), jointly organised the third edition of the Barcelona Deep Tech Summit, a leading event in the Catalan entrepreneurship ecosystem.

Mobile World Congress 4YFN

In February 2023, the UPC participated in 4YFN, which is part of MWC, with over 25 start-ups and spin-offs presented. This was coordinated with the general strategy of the UPC and a tech tour was organised for Fractus. It will also collaborate with the El Trampolí UPC call to highlight final cycle projects.

UPC Ethics Committee

Strengthening ethics at the UPC

The UPC Ethics Committee (CEUPC) has continued its task in line with the University's 2022-2025 Strategic Plan. Actions to promote ethical awareness include the organisation of talks with experts in ethics and technology such as Virginia Dignum, Mark Coeckelbergh and Karma Peiró, and the production of content for dissemination by the University, such as the Ethics at the UPC series of videos. In addition, the CEUPC was active at events such as the Fourth Conference on Public Ethics, and it received a visit from a Basque Country Parliament delegation to discuss the ethical implications of artificial intelligence.

Operational support and lifelong education

Specific training was provided for technical, management, administrative and service staff (PTGAS) on ethical review processes. Actions were defined to raise student awareness of ethical implications in their studies. In the area of advice, a significant number of research project applications were reviewed, reflecting a 30% increase in demand for ethical assessment compared to the previous year.

Gender equality

In 2022, **only 24.1%** of the principal investigators of UPC projects were women.

In the 48 Horizon Europe projects awarded to the UPC in 2023, only 8 principal investigators were women, and only in one of the projects coordinated by the UPC.

Considering this situation, the Research and Innovation Support Service (SSRI), with the collaboration of the Equality Office, worked to draw up an **action plan to include the gender perspective in research at the Universitat Politècnica de Catalunya.**

The aim of this plan, which is expected to be approved in 2024, is to incorporate the gender perspective in all stages of research, from the composition of research teams to the content of projects.

Citizen science

2022-2025 Open Science Road Map

In 2023, the Governing Council of the UPC published the 2025 Open Science Road Map, which establishes the University's strategy for promoting open science. The key points include the promotion of open access to publications and research data, the development of suitable digital infrastructure and promotion and awareness-raising in the university community on the importance of open science. Other notable factors are the collaboration with other institutions and the fostering of policies that promote transparency and the reuse of scientific knowledge.

La teva idea és ciència!

During 2023, the project "La teva idea és ciència!" (Your idea is science!). This is a joint initiative between the UPC and the iSocial Foundation, which seeks to modernise social services through citizen science. With the participation of various actors, the aim is to identify and address the needs of social groups with technology solutions, promoting citizen participation and social inclusion to improve the efficacy of services.

Fourth Open Science Meeting at the UPC

"We are faced with a paradigm shift in the way of doing science."

-Rafael Vidal, rector's delegate for Open Science and Citizen Science

Rafael Vidal during the presentation of the Road Map at the conference

In June, the Fourth Open Science Meeting at the UPC was held, organised by vice-rector Jordi Llorca and the rector's delegate for Open Science Rafael Vidal. The event was divided into four blocks and 11 talks, which addressed topics on the current situation in open science, the ethics of research data, the importance of dissemination of scientific communication and the impact of citizen science on people's lives.

You can consult all the presentations on UPCommons.

RDI information systems

New tools and improvements

In 2023, RDI tools and information systems were improved. Timesheets were updated, and a new version of FLUX was developed to replace the previous one. In addition, time and cost forecasting of delivery notes and revenue was undertaken in gRDI, databases of research trips and substantiation of Next Generation funds.

Research Quality Assurance System

The development of an Integrated Quality Assurance System for Research Transfer at the UPC (SAQRA) culminated successfully in the pilot phase. Over 100 people were trained on the SAQRA system, with the support of over 30 document templates to optimise the process. In addition, a website was launched on the project, as part of the UPC Research, Development and Innovation portal, designed for research units that are interested in complying with ISO 9001-2015 standards.

Communication and participation

Advancing in strategic communication

We continue to be committed to effective communication through a multidimensional approach, to clearly project the inherent value of the RDI Area and promote deeper public understanding of the impacts and opportunities emerging from our initiatives. Through this continuous task, we aspire to forge strong partnerships, to boost external perceptions of our area as the epicentre of innovation, and to contribute to the democratisation of knowledge.

New web portal
of the RDI Area

Work has been done on the new public web portal of the RDI Area, which has a space on services and documentation for the UPC community. The portal offers a more practical, visual experience. It provides information on funding calls, job offers, news, events and tips for RDI projects, without needing to navigate between various submenus.

This focus is based on a previous analysis of navigation of the former website, to identify the most visited pages so that this information is more accessible in the new version. Coordination meetings were held with several teams in the RDI Area to create a website with the maximum number of services for teaching and research staff.

New R+D+I menu
on the UPC website

At the same time, the structure and content of the RDI menu on the UPC website were reformulated and updated.

The new menu offers UPC website users all the useful information on research and innovation activities and results at the University and on internal areas for RDI support and promotion.

Another focus is the current situation, with a space exclusively for news, social networks and regular contents on RDI at the UPC, such as the magazine *La UPC i...* and the podcast *Algorrritmes*.
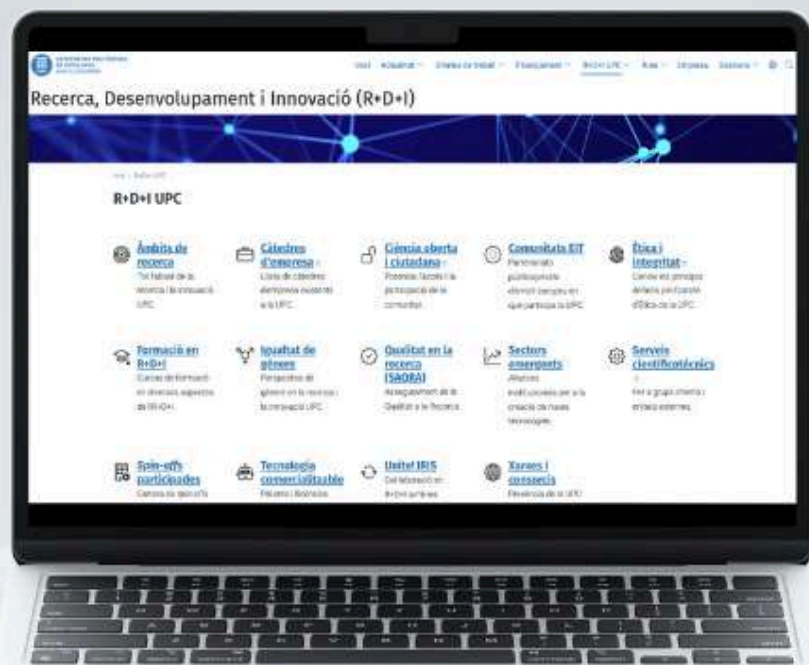
Publication of the series "Consells per afrontar un projecte d'R+D+I" (Tips for carrying out an RDI project)

In 2023, a series of interviews with UPC research staff was posted, with advice on the stages of RDI projects on which the interviewees worked during 2022.

The episodes are on ideation, writing, fund raising, execution, justification and communication.
The series has been viewed around 2,000 times on the UPC YouTube channel and the most viewed episode is on ideation.

Preparation of portfolios on UPC research areas

New portfolios have been designed and published on quantum technologies, sustainable buildings and semiconductors, and existing portfolios have been updated to a new format, with the latest news on outstanding projects.

In addition, the University has participated in the design of lists of research groups in the magazine *La UPC i...*, which takes as a reference the RDI portfolios.

Participation in the 2023 SET Plan Conference

A group of 15 young UPC researchers presented research and innovation projects in the area of the energy transition to the Seventeenth [Pla Estratègic en Matèria d'Energia](#) (SET), held in the facilities of the Maritime Museum of Barcelona on 13 November. This event, which attracted over 200 professionals in the energy field from the European Union, was supported by UPC rector, Daniel Crespo. UPC researchers interacted with attendees through an exhibition of coordinated projects on eight key areas of research and innovation on the energy transition. Participants included representatives of European institutions such as Clean Planet and the European Commission. The conference, under the topic "Energy Research and Innovation for a Competitive Europe", highlighted the importance of reinforcing research and innovation, to increase competitiveness and sovereignty of technology value chains for clean energy in the EU.

Support for the Hydrogen Conference: Opportunities and Strategies

The RDI Area organised a [conference](#) on 8 February at the Barcelona East School of Engineering (EEBE). The event was to celebrate the first year of public activity of the UPC Specific Centre for Hydrogen Research (CER-H2).

An exhibition was designed on UPC initiatives in the hydrogen field. The event was disseminated on UPC RDI social networks under the hashtag [#HidrogenUPC](#). The conference had media coverage, and the presentation of the interactive block was supported by the Mentimeter tool that generated a cloud of words live with public participation. Finally, the University chaired the last roundtable.
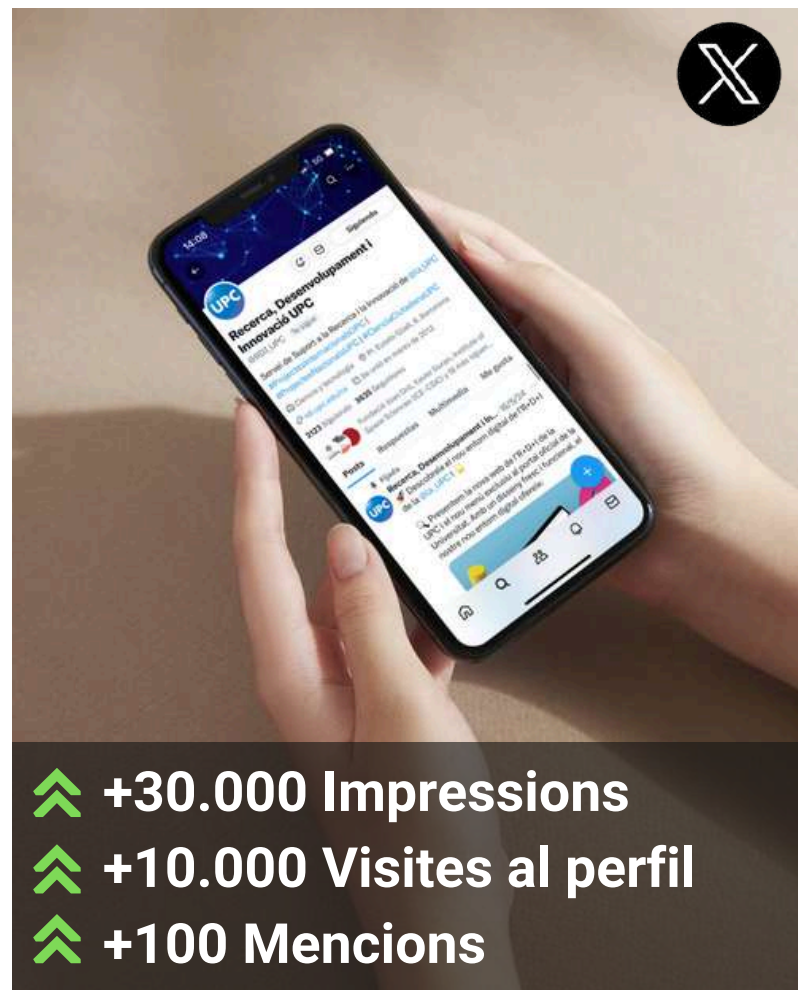
Evolution of social networks

In 2023, the number of followers rose by 40% on LinkedIn, the professional social media network par excellence, up from 1,000 followers at the end of 2022 to 1,400 in December 2023. On X, the social network previously known as Twitter, the total reached 3,621 followers by the end of the year. Even so, LinkedIn is the platform with the largest number of interactions.

+25.000 Impressions
+15.000 Visualitzacions
+400 Reaccions

+30.000 Impressions
+10.000 Visites al perfil
+100 Mencions

News on the UPC website

In 2023, we collaborated with the Communication Service of the UPC to compile news items related to the latest research, development and innovation at the University:

- 17/01/2023 [Nova sèrie audiovisual amb consells per afrontar un projecte de recerca i innovació](#)
- 19/01/2023 [The UPC becomes part of the knowledge and innovation community EIT Manufacturing](#)
- 21/02/2023 [La UPC instal·la un laboratori i una planta pilot de producció d'hidrogen al Campus Diagonal-Besas](#)
- 21/03/2023 [The UPC, leading university in Spain in raising funds for European research and innovation projects](#)
- 30/03/2023 [Els serveis cientificotècnics de la UPC, a un clic](#)
- 11/10/2023 [Unite! Agora: més infraestructures científiques al servei del personal investigador](#)
- 14/11/2023 [El talent jove de la UPC presenta projectes de recerca i innovació energètica en una conferència europea, a Barcelona](#)

Future

Tomorrow starts today

Research, development and innovation (RDI) continue on their march towards the future, unfurling as a driving force that pushes the limits of creativity and deepens the unprecedented intertwining of the human mind and scientific progress. On this journey of discovery, an exciting horizon of possibilities emerges. Technological advances not only enable deeper understanding of the world around us, but also generate new perspectives and offer innovative solutions to the most complex challenges of society. In this way, RDI emerges as a strong catalyst that transforms the current reality and lays the foundations for a promising future that is rich in discoveries.
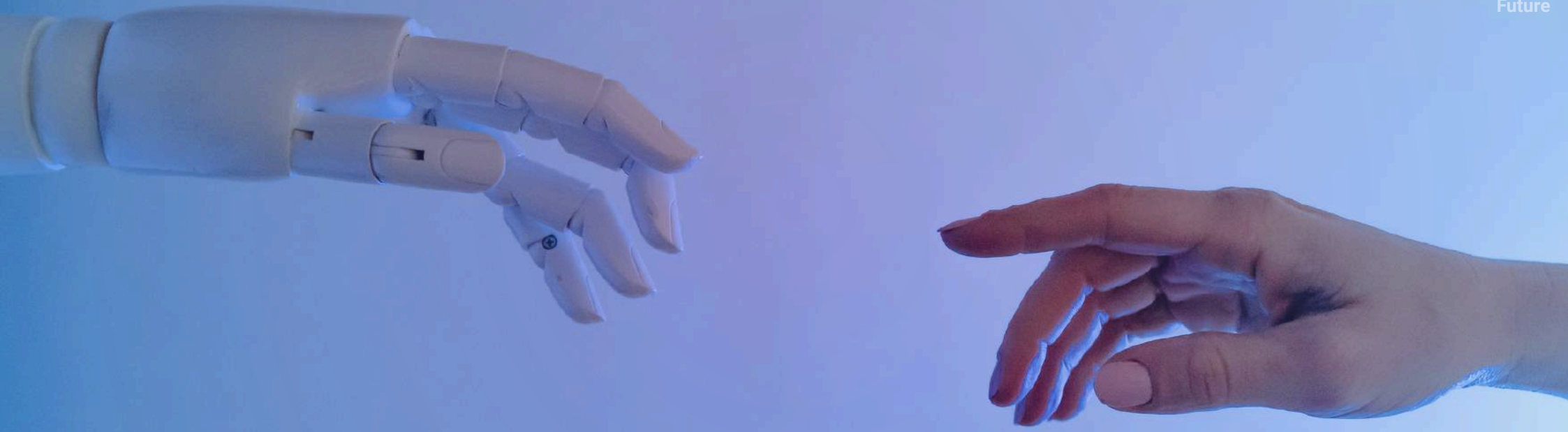
In 2024, challenges must be transformed into opportunities

The next year is ideal to consolidate the wave of funding received in recent years.

Strategic areas

The UPC's challenge is to continue to expand its activity into key sectors for the future of society. The University's potential participation in the European community of knowledge and innovation on **water, marine and maritime resources** is very promising. In this area, it will play a relevant role as a technological partner of companies and will attract new scientific and academic activity. In the last quarter of 2023, in Brussels, the University presented its capabilities, ecosystem and added value to potential European partners.

The **semiconductor** sector is of particular relevance, due to the increasing interest in semiconductor use in artificial intelligence-based applications. Obtaining the CHIP and ENIA chairs opens up opportunities for the UPC to become a leader in RDI in this sector.

Plural and participative RDI

In 2024, a series of initiatives are planned that help to **eliminate gender barriers** in research at the UPC, and foster the creation of new projects that are open to **social and community participation**.

Hand in hand with companies

All of this is carried out without overlooking the crucial role of companies in the transfer of university knowledge and technology to society. In 2024, we hope to create new links and strengthen existing ones, so that industry and academia advance together towards a future in which technology transforms challenges into opportunities.

Glossary

Definition of RDI technical terms, initialisms and acronyms

Glossari

Back office (internal management)
Sections of an institution that are not customer-facing.

Citizen science
Active participation of non-professionals in scientific activities.

Open science
A collaborative and transparent approach that aims to facilitate open access to data, methods and research in order to encourage collaboration.

Competition
An open competition between several people or institutions in the same conditions to choose the best one(s).

Call
Crida de propostes de projectes per rebre finançament.

EBT
A call for project proposals to receive funding.

EPO
Initialism of the European Patent Office

EVR
Catalan initialism for entitat vinculada de recerca (associated research entity).

Hub
A centre or platform where people, companies or institutions come together to collaborate.

Licensing agreement
A contract under which the licensee obtains from the licensor the right to use the licensor's assets, usually of a non-tangible or intellectual nature, in exchange for a financial consideration.

PTGAS (formerlyPAS)
Catalan initialism for *personal tècnic, de gestió i d'administració i serveis* (technical, management, administrative and service staff).

Patent
A legal title that recognises the right to exclusive exploitation of the patented invention and prevents others from making, selling or using it without the holder's consent for the term of the patent.

PCT
Patent cooperation treaty.

PDI
Catalan initialism for personal docent i investigador (teaching and research staff).

Pre-award/post-award stages of a project
Two distinct stages that occur before and after the awarding of a grant..

RDI
Research, development and innovation.

Royalties
Financial consideration paid by a licensee to a licensor for exercising the right to use and commercially exploit a patent, software or knowledge owned by the licensor. Royalties are calculated as a percentage of the revenues generated by the licensee from the exploitation of the licensed industrial and intellectual property rights.

Spin-off
A new entity created within an institution.

Start-up
A company that is based on an innovative idea, but is not created within an institution.

TRL
Technology readiness levels: a method for estimating the maturity of technologies.

Universitat Politècnica de Catalunya

Research, Devolopment and Innovation Area (R&D)

- @RDI_UPC
- Recerca, Desenvolupament i Innovació UPC
- suport.rdi@upc.edu
- rdi.upc.edu
- 93 413 76 22

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