

April 2023. Technology snapshot

Immersive technologies

in Catalonia

ACCIÓ

Regional Government of Catalonia (Generalitat de Catalunya)



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Execution

ACCIÓ Strategic and Competitive Intelligence Unit

Barcelona, April 2023

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1. Definitions and applications

Scope of immersive technologies

Immersive technologies build environments that merge the physical and the virtual worlds to create a digital or simulated reality with a realistic configuration that enables users to explore and interact in a new dimension.

There are different types of immersive technologies:

Extended
reality

- **Virtual reality (VR):** a digital environment that replaces the physical environment of the user.
- **Augmented reality (AR):** digital content that is superimposed over a live flow in the physical environment.
- **Mixed reality (MR):** integration of virtual content and content from the real-world environment for interaction between elements from both.
- **Holography:** creation of a 3D image in a space that can be explored from all angles.
- **Metaverse:** a virtual world that extends the physical universe into the digital environment.

Furthermore, the growing trend of merging the physical world with the digital world has led to new disruptions, such as haptic technologies that focus on touch or olfactory technologies.

The objective of this report is to find out more about the concepts of immersive technologies and discover their differences, their points in common, their potential for application, and the opportunities they generate.



Definition of immersive technologies

VIRTUAL REALITY

A technology that represents a completely new artificial reality that isolates the viewer from the real world with new computer programming technologies, such as virtual reality headsets. VR is generally operated using glasses or a screen worn on the head that completely channel the view so that only what is reproduced is perceived.



AUGMENTED REALITY

Superimposing virtual elements onto the real world. A real world with digital features is created through glasses, a smartphone or other types of device that visually capture the real world.



METAVESE

A completely virtual and totally immersive parallel universe in which it is possible to interact in a similar way to in the physical world. This is a simulated digital environment that can combine AR, VR, blockchain, and social media to create areas in which users, through avatars, can interact in a similar way to how they would in the real world.



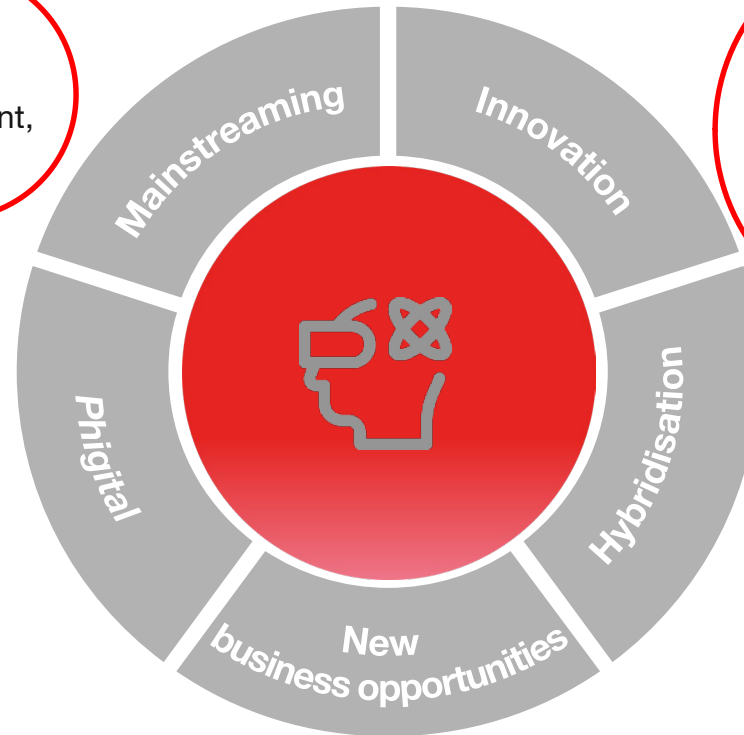
Applications of immersive technologies



The importance of immersive technologies to industry

Virtual reality, augmented reality, and the metaverse have the potential to transform education, training, remote work, entertainment, health systems, and many other industries.

Combination of the physical world and the digital world as a single reality.



Virtual reality, augmented reality, and the metaverse are yet another step forwards in the use of connectivity tools to create immersive, virtual and interactive environments. The technologies are still at an early stage and research and innovation is required, as well as standardisation and interoperability to boost their potential for transformation and impact.

The deployment of these technologies requires the participation of other fields of technology, such as artificial intelligence, blockchain, photonics, RFID, sensors, screens or new materials, as well as the design development of environments and avatars, machinery, and software or 3D models..

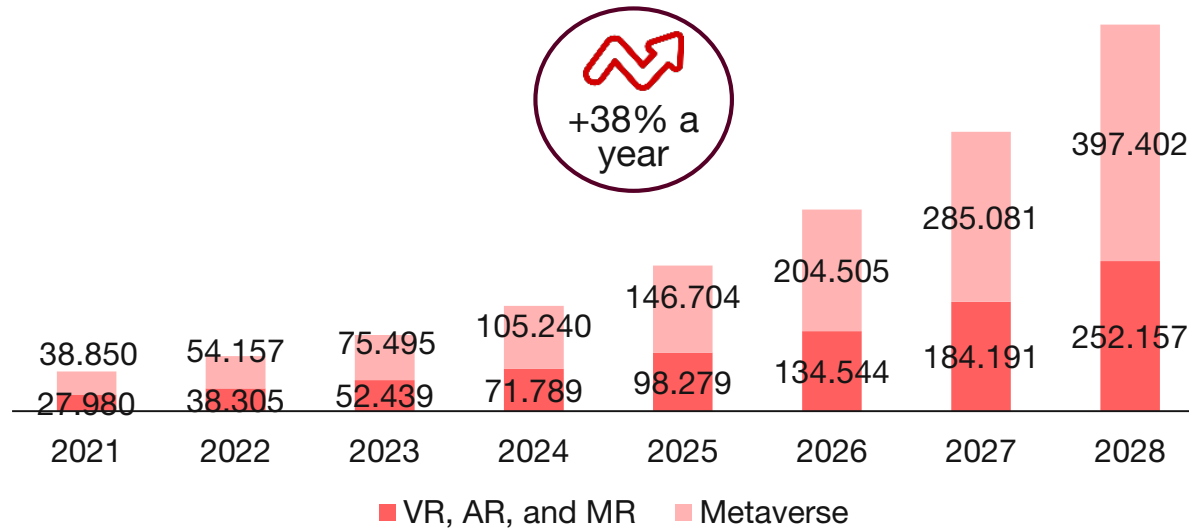
Immersive technologies will transform the way in which we buy, play, feel, work or interact. An understanding of the behaviour and the needs of consumers is required, along with knowing how to become more involved in it to generate new businesses.

Immersive technologies in Catalonia

2. The immersive technology market

The global immersive technology market

Evolution of the size of the global immersive technology market (M\$)



With an annual growth of **38%**, immersive technologies will have an aggregate market value of **\$650 B** by 2028.



It is estimated that the EU has a market share of roughly 20%.

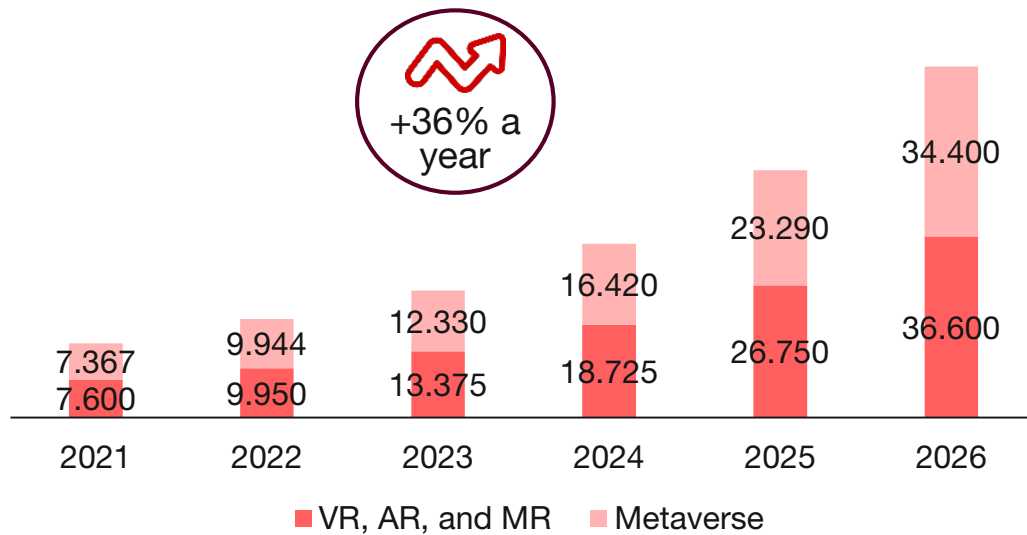


Fully adopting the metaverse might cause its long-term market value to skyrocket even higher.

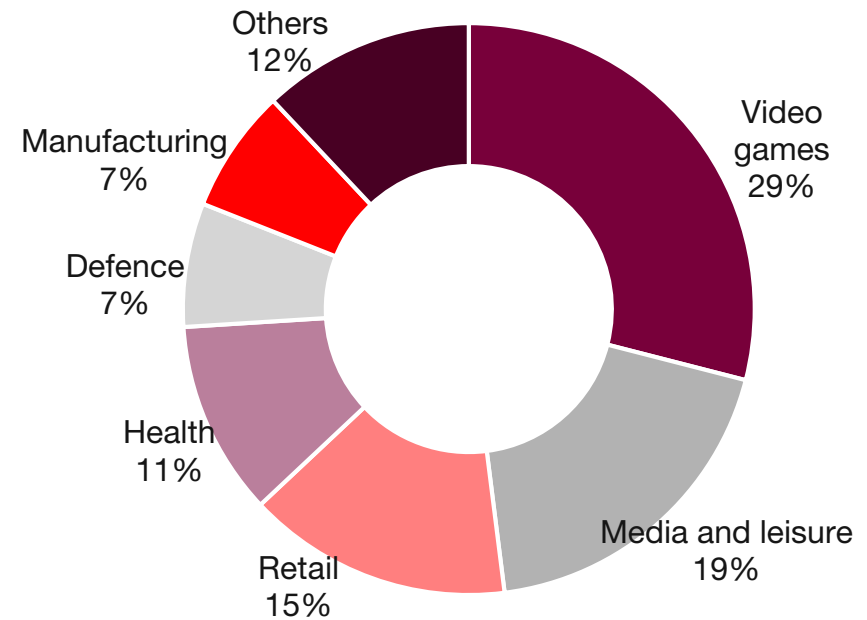
The European immersive technology market

The European immersive technology market **will grow at a rate of 36% a year** to stand at **\$71 B** by 2026. The main sector is that of video games, with 29% of the total.

Size of the immersive technology market in Europe (M\$)

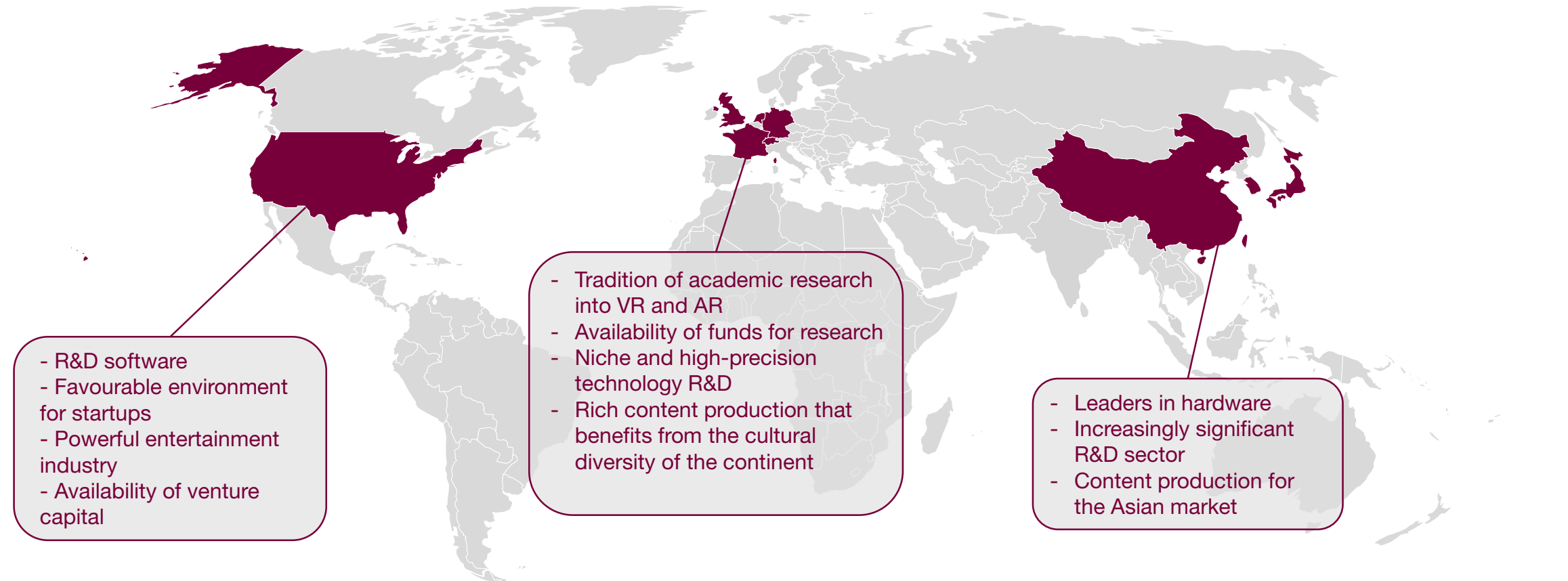


European immersive technology market by sector (% , 2021)



The main global immersive technology hubs

There are **3 key hubs** in the immersive technology value chain: **North America**, **Western Europe**, and **Eastern Asia**. Of these, 7 countries are of particular significance: the **United States**, **Germany**, **France**, the **United Kingdom**, **China**, **Japan** and **South Korea**.



Leading companies worldwide

Virtual reality



Augmented reality



Metaverse



Note: the companies are classified according to their main area of business within immersive technologies; selective list

Sources: CB Insights, Council of the EU, Strategy Analytics, and Deloitte
CataloniaConnects

Foreign direct investment (FDI) in immersive technologies

2022 was the best year of the historical series for immersive technologies, with **64 projects** moving **€2,422 M** and creating **9,104 jobs**. Over the past five years, the United States has been the main country of origin of FDI.

Investment in immersive technologies

Year	Projects	Capital invested (€M)	Jobs created
2018	28	1,552,9	6,029
2019	18	473,1	1,652
2020	19	142,3	589
2021	39	420,9	2,943
2022	64	2,421.7	9,104

Main countries of origin of FDI



Main investor companies



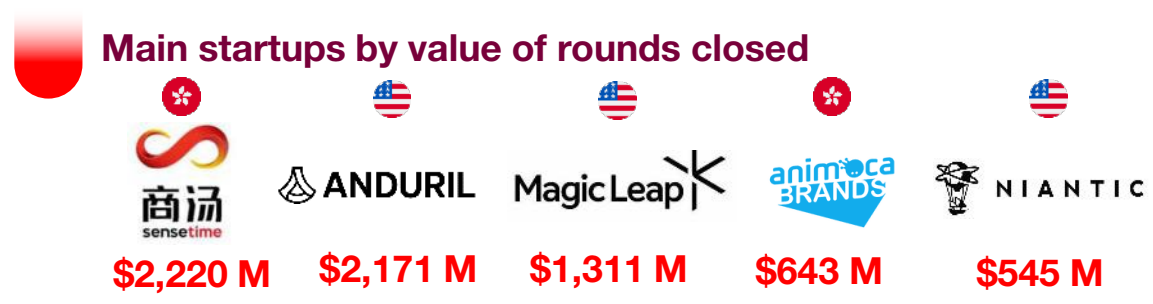
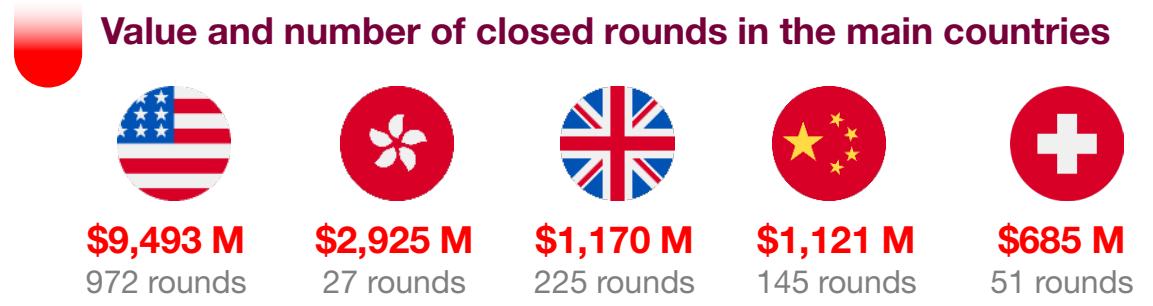
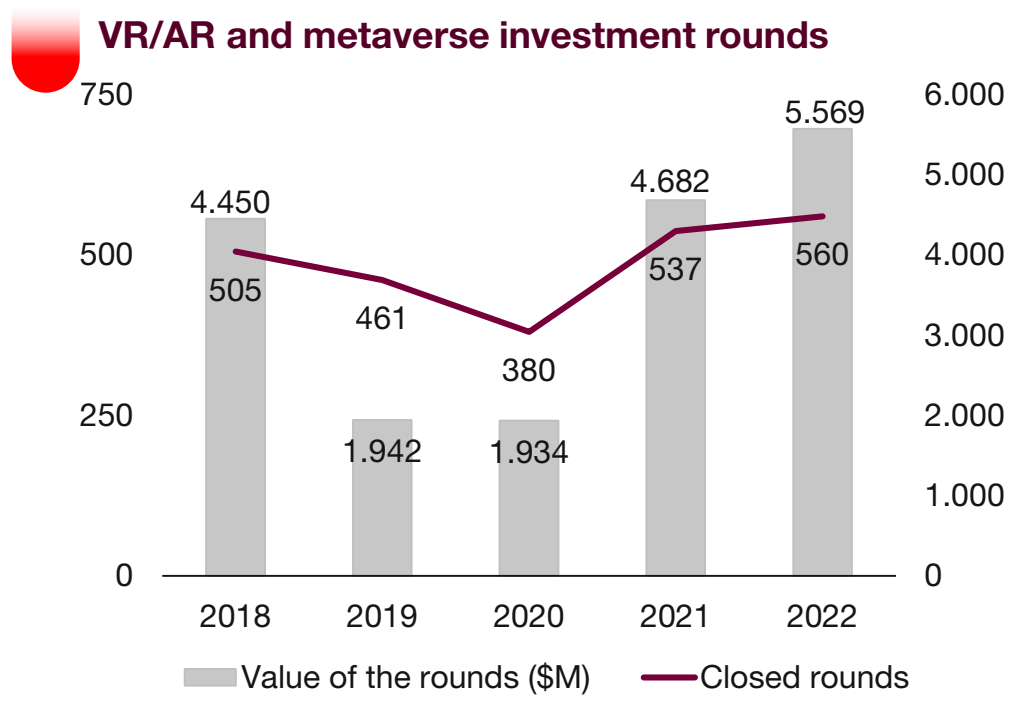
Main recipient countries of FDI



Note: The data refers to the period from 2018 to 2022

Venture capital in immersive technology startups

2022 ended with over **\$5,500 M in venture capital in immersive technology startups** worldwide, the highest figure of recent years. The United States headed the ranking in terms of value and number of rounds closed.



Note: pre-seed and seed investment rounds, and series A-J are included; the data refers to the period from 2018 to 2022

Immersive technologies in Catalonia

3. Opportunities and challenges

Opportunities and challenges

The appearance of **immersive technologies** will lead to major advances in the economy and will revolutionise personal relations as we understand them today. Despite the opportunities of adopting and integrating them into our everyday lives, immersive technologies also involve a series of challenges.

Opportunities

New business model

Impact on the field of health

Secure simulations and entertainment

New forms of leisure and social relations

Reduction in expenses

Challenges

Cost

Improved ergonomics

Low demand

Low supply




Legal framework and ethical issues


Technological improvements required


Immersive technologies in Catalonia


4. Immersive technologies in Catalonia

Mapping the ecosystem of immersive technologies in Catalonia

 **153** companies  **€136.6 M**  **888** jobs


 **90.2%** of the companies are SMEs.

 **58.2%** are less than 10 years old.

 **32.0%** have a turnover of more than €1M and **12.4%** more than €10 M.

32.7% are startups.

 **19.0%** are exporters.

 **10.2%** have women in management positions.

By segment*, **66.0%** of the companies deal in **virtual reality**, **48.4%** in **augmented reality**, **17.0%** in **mixed reality**, and **16.3%** in the **metaverse**. By sector of application*, most noteworthy is **entertainment (39.2%)**, **trade and marketing (37.3%)**, **Industry 4.0 (17.0%)**, **training (11.8%)**, and **health (10.5%)**.



* The companies can be classified into more than one segment/sector of application

Segmentation in Catalonia by technology

Virtual reality

Augmented reality

Mixed reality

Metaverse

Consultancy

Equipment

Segmentation in Catalonia by sector of application

Entertainment



Training



Industry 4.0



Trade and marketing



Health



Consultancy



Equipment



Agents of the immersive technology ecosystem in Catalonia

	Technology centres and research institutes	
	Universities and training centres	
	Associations and facilities	
	Clusters	
	Trade fairs and congresses	
	Institutions and public administration	

CatVers, the leading metaverse in Catalonia

Promoted by CBCat, the Blockchain Centre of Catalonia, and with the support of the Generalitat de Catalunya and the Barcelona Chamber of Commerce, the **CatVers** initiative strives to become the leading metaverse in Catalonia. It includes dozens of organisations, entities and institutions.

The CatVers rooms are available to institutions and non-profit organisations. The goal is to promote the Catalan language and culture in immersive digital environments to prevent them from disappearing from this area.

CatVers is designed as a medium and long-term project, and is expected to be fully built and functional between 2023 and 2024.

It can be accessed from mobile devices, tablets, computers, or virtual reality glasses, which is the option most highly recommended for the full experience.

catvers.land



Entities forming part of CatVers*



* Representative sample

European aids for research activities in immersive technologies

Catalonia has raised over **€55 M in European projects** related with immersive technologies.

Main research data



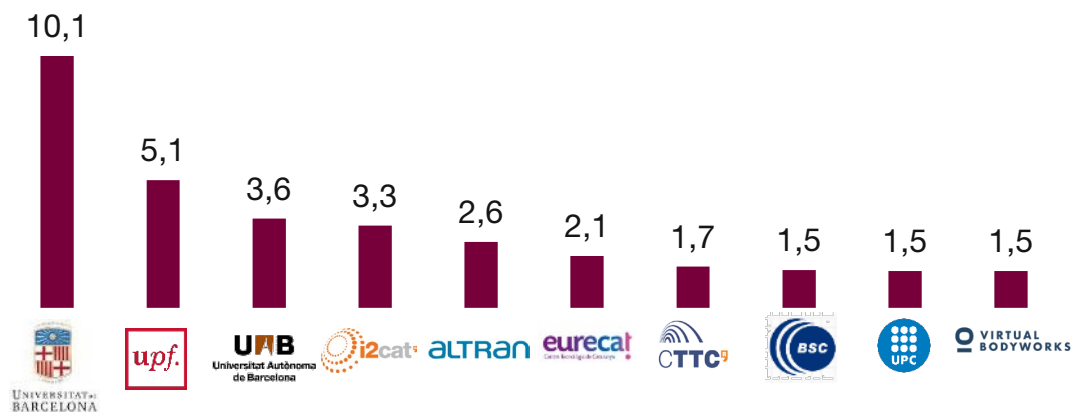
100 entities accumulating a total of **167 projects**.

Over €55 M in funding received.



10 main Catalan entities per funding received in European aids

(€M)



The Catalan universities and vocational training centres offer **training related to the different immersive technology careers.**

Degrees (74)

- Telecommunications Systems Engineering
- Computer Engineering
- Design and Development of Video Games
- Digital Design and Creative Technologies
- Audiovisual Systems
- Multimedia Engineering
- Digital and Computer Interaction Techniques

Master's degrees

- Virtual and Augmented Reality
- Multimedia Applications
- Cognitive Systems and Interactive Media
- Multimedia Creation and Serious Games
- Computer Engineering
- Information and Communication Technologies

Vocational training

- 3D Animations, Games, and Interactive Environments
- 3D Animations, Games, and Interactive Environments, career profile Virtual Worlds, Augmented Reality and “Gamification”
- Production of Audiovisual and Performance Projects
- Development of Multi-Platform Applications
- Telecommunications and IT Systems

Catalan universities that provide immersive technology training



Talent by European city

Barcelona is the **7th European city** with most talent working in immersive technologies, ahead of Stockholm and Madrid.

Immersive technologies professionals per city

	Location	Professionals (%)
1	London	8.5%
2	Amsterdam	7.8%
3	Paris	4.5%
4	Berlin	4.1%
5	Munich	3.5%
6	Milan	3.2%
7	Barcelona	3.0%
8	Stockholm	2.4%
9	Madrid	2.4%
10	Bucharest	2.1%

Main sectors in which they work (Barcelona data)



ICT and industry digitalisation



Video games



Telecommunications

Note: the following jobs are included; AR software engineer, AR specialist, AR designer, VR software engineer, VR development specialist, VR specialist, and VR designer.



Barcelona, 4th EU city in terms of funding rounds closed by startups

- Barcelona is the **4th EU city and the 6th European city** in terms of rounds closed by immersive technology startups, with 15 rounds to a value of \$19 M (2018-2022).
- The Catalan startup to have received most funding is **Amelia Virtual Care**, which has closed 2 rounds to the value of \$6.3 M in the past 5 years.

Startups from Barcelona with closed rounds





Top 10 European cities by value of closed investment rounds in immersive technology startups (2018-2022)



Note: pre-seed and seed investment rounds, and series A-J are included; the data refers to the period from 2018 to 2022

The ISE positions the Catalan audiovisual and immersive technology sector

Since 2021, Barcelona has hosted the largest audiovisual and systems fair in the world.

 **800 exhibitors**
60,000 visitors 

Catalonia, a leading hub in the audiovisual sector.

- 2023 saw the third edition of Integrated Systems Europe (ISE) at Fira de Barcelona, which has a solid background and is a benchmark in the audiovisual sector for professionals, yet it still aims to grow even more. The impact of the fair is between €450 M and €500 M a year for the city, without considering the days of the fair.
- The 73 Catalan companies with a stand at Integrated Systems Europe (ISE) foresee generating over €8 M in turnover over the coming 12 months thanks to the meetings and visits held during the congress.
- Immersive technologies are represented here. This year, the Catalan companies Marvut Technologies and Arthur Holm presented a virtual reality showroom to immersively experiment with their products through the use of virtual reality glasses.



The Department of Business and Employment and **ACCIÓ** have encouraged the participation of 23 Catalan companies with a stand at ISE in 2023.



Top class facilities for the audiovisual sector

The **Tres Xemeneies** project is to join **Parc Audiovisual de Catalunya** (Terrassa), **Neàpolis** (Vilanova i la Geltrú), **Roca Umbert Centre** (Granollers), and **Tecnocampus** (Mataró).

- Located in Sant Andrià de Besòs, **Tres Xemeneies** is to host **Catalunya Media City**, the next Catalan audiovisual and digital hub. This is a public-private initiative that seeks to make Catalonia a technology and training benchmark for the audiovisual sector.
- With an investment of around **€450 M**, it will include the most advanced technology: state-of-the-art sets and UX testing rooms, areas to create interactive content (VR/XR), artificial intelligence, 5G and robotics project labs, sound studies, and a data centre with high connectivity for remote production and editing.
- The **project** will attract **local and international** companies linked to the **audiovisual, video game, and immersive technology** sectors, as well as suppliers, producers, and developers.
- Barcelona will also have a new space for creative industries at **UTE Palo Alto BCN XRLAB**. Located at 22@, it will specialise in the creation of audiovisual projects based on new technologies applied to the areas of culture, communication, video games, leisure, and education.



Immersive technologies in Catalonia

5. Case studies in Catalonia

Success cases



Aumenta Solutions provides augmented reality to increase the productivity of Industry 4.0.



Newtonlab Space has developed a device for the live content projection in 3D.



Smartech Cluster and **Solartys** are developing a metaverse to improve the maintenance of photovoltaic installations.



IDEAL is a digital arts centre that experiments with immersive technologies.



Lavinia and **Univrse** presented Dreams at ISE, a multi-user virtual reality experience.



Eodyne has created a virtual reality device to reduce recovery times in ICU patients.



The **Mental Health Cluster** is heading a project that applies VR to treat neuropathologies.



Virmedex is to launch virCPB, a platform for virtual cardiopulmonary bypass training.



VRi, virtual reality to fight diseases.



Visyon is a leading company in creative solutions in immersive and emerging technologies.



Union Avatars offers tools to manage digital identity in the metaverse through interoperable avatars.



Created by the cluster Secpho, **Koonstel** is the first technological innovation business metaverse.



Futura Space is a creative studio that specialises in immersive technologies.



Onionlab is a company specialising in projection, mapping, virtual reality, and audiovisual content.



Broomx has created ERVI, a space to treat people with autism through the use of virtual reality.



The **Mutuam Group** promotes and collaborates in research projects on virtual and/or augmented reality.



Badalona Care Services is using VR to decrease work-related stress in professionals.

Immersive technologies in Catalonia

Interviews

Interviews with institutions

We would like to thank the following entities for providing the data and information used to draft this report:



Audiovisual Cluster of Catalonia



Mental Health Cluster of Catalonia



Digital Cluster of Catalonia



Koonstel



Newtonlab Space



secpho



Smartech Cluster



Union Avatars

Thank you

Passeig de Gràcia, 129
08008 Barcelona

accio.gencat.cat
catalonia.com

 @accio_cat

 @catalonia_ti

More information about the sector, news and opportunities:

<https://catalonia.com/key-industries-technologies/technologies/immersive-technologies>

