# Ethical and social challenges posed by the future metaverse

# About
# Digital Future Society

Digital Future Society is a non-profit transnational initiative that engages policymakers, civic society organisations, academic experts and entrepreneurs from around the world to explore, experiment and explain how technologies can be designed, used and governed in ways that create the conditions for a more inclusive and equitable society.

Our aim is to help policymakers identify, understand and prioritise key challenges and opportunities now and in the next ten years in the areas of public innovation, digital trust and equitable growth.

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**Note to the English version:**
This document has been written in Spanish and translated into English.

**Digital Future Society**

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# INTRODUCTION

The term 'metaverse' was coined by author Neal Stephenson in his 1992 science fiction novel, *Snow Crash*. Fast forward three decades, and big tech companies are racing to lead the metaverse market, drawing attention and investments from major luxury, fashion and sports brands, among others.

Yet while the concept has been in use since the 1990s, there is still no agreed definition and there is open debate on whether the term should be used in the singular or plural. The word is made up of *meta*, which comes from the Greek for 'beyond', and *verso*, from 'universe'. In general, the metaverse refers to an immersive and continuous 3D world that would be accessed through virtual and augmented reality technologies. In this universe, people would interact through their avatar, to play, learn, work, carry out financial transactions with crypto assets, and other activities.

Despite the potential of the technological components of the future metaverse such as virtual reality (VR) and augmented reality (AR), the metaverse itself – understood as an interconnected 3D universe – does not, as such, exist today. It is still at an incipient stage of development, and with so much media and commercial clamour surrounding it, it can be a challenge to separate the hype from the reality.

Since Facebook changed its name to Meta in 2021 and publicly pledged to make the metaverse its new priority, much ink has been spilled on what that new immersive universe will – or would – look like. It has generated great expectations but there is a lot that we still do not know about what the future metaverse might look like, to what extent it will materialise and what kind of social impact it may have.

We are starting to see the opportunities that VR and AR technologies can offer industry based on the experiences some sectors have already had with these technologies in recent years – sectors such as logistics, design and urbanism, events and video games.

Gamers, for instance, have been playing with avatars in virtual spaces and with virtual reality headsets for years. Currently, almost 100 million people connect daily to play Roblox, Minecraft or Fortnite, some of the major 3D virtual universes existing at present.

VR is also used in industry – in engineering, industrial design and urban planning. For example, Bosch is developing AR applications for use in car repairs.[1] Volkswagen is investing in the development of 3D holograms and the use of mixed reality in its vehicles.[2] These technologies are also used in training for occupational risk prevention, for instance in high-risk environments such as oil rigs.

## The challenges and social impact of the future metaverse

Beyond the deployment of VR and AR technologies in the video games sector and in industry, the social impact the future metaverse may have is more difficult to chart. Will it have mass market uptake like mobile internet devices did? Will we be immersed in the metaverse for hours or use it sporadically? Will future generations use Oculus headsets in schools like now we use tablets and previously we used chalk to write on a blackboard?

What the future metaverse promises – especially the image driven by Meta – is to evolve beyond specific VR and AR applications, and move to an interconnected, immersive universe that never stops. As the already famous ads of the United States company explain, "the metaverse may be virtual, but the impact will be real." A surgeon will "be able to practise as many times as needed in the metaverse before laying her hands on a real patient", and "students will be able to see extinct mammoths" or "watch Marc Anthony debate in ancient Rome".[3] In the future metaverse we will be able to play, shop, learn, work and so on.

If this actually happens and there is mass adoption, what ethical and social challenges would arise? What environmental impact would deployment of the metaverse have? Will women suffer as much harassment as they already do on social media? What will the consequences be for the young and generations to come? Might some teenagers prefer to be in the metaverse than in their own physical reality? What consequences could this have?

An overwhelming amount of material has been published on the metaverse in the last two or three years. Like a media rollercoaster, articles in the press detailing Meta's plans and those of its investors were followed by news of staff cuts in big tech companies and loss of investor confidence. In the technical press there are two clear trends: one refers to the future metaverse as if it were a certainty and the other is more sceptical.

In this document we go beyond the technological narrative, put the issue into historical context and expand its focus by examining the potential ethical and social challenges.

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[1] https://www.boschaftermarket.com/gb/en/diagnostics/solutions/augmented-reality

[2] https://www.volkswagen-newsroom.com/en/press-releases/volkswagen-group-invests-in-leading-technology-company-in-the-field-of-3d-holography-5285

[3] https://www.youtube.com/watch?v=8OIIEnSNwQc and https://www.ispot.tv/ad/1x3M/meta-possibilities-with-the-metaverse

On a technical level, the development of the metaverse also faces important challenges in terms of connectivity, interoperability and the so-called democratisation of technology. As with other major technological developments, long-term financing and public-private collaborations are essential ingredients.

As for the social impact it could have, while it is difficult to accurately anticipate the future impact of something as incipient as the metaverse, we can look back and learn from the experience of the last twenty years with the expansion of the internet, social media, artificial intelligence, the data economy and the attention economy.

Learning from the positive and negative impacts of the ongoing accelerated digitalisation of society can give us clues as to some of the social, ethical and legal challenges of the future metaverse. At the very least, looking back can help us ask the relevant questions that should be answered now, at the design stage of the future metaverse.

To do this, in this document we analyse the potential social impact of the metaverse from an interdisciplinary perspective. One key question is: What lessons have we learned from the digital world in the 21st century and that we should take into account in designing the future metaverse?

To answer this question, we spoke with seven professional experts working in different fields: economics, technology, research into digital violence, environmental consulting, psychology, public regulation and business. Together they provide us with a variety of perspectives on the future metaverse.

- The series opens with an interview with **Cecilia Castaño**, Professor of Economics at the Complutense University of Madrid. From her perspective, it helps to put the development of the metaverse in the historical context of major technological advances.

- The second interview is with technologist **Pedro Lozano**, co-founder of Imascono, a company specialising in the development of virtual and augmented reality technologies. We discuss the metaverse with him from a technical perspective, as well as the ethical and social challenges it entails.

- The third interview is with **Eleonora Espósito**, a researcher and a leading national expert at the European Institute for Gender Equality (EIGE). We discuss the violence present in the online world and how to address the major challenge of gender violence in new immersive virtual spaces.

- We ask **Lluís Torrent,** an environmental expert and consultant for international organisations, about the environmental impact of the construction of the metaverse and how to address this issue.

- **Charo Sádaba**, professor and researcher in communications at the University of Navarra, discusses the impact the future metaverse could have on younger generations.

- The sixth interview is with **Liliana Arroyo,** sociologist and managing director of Sociedad Digital de la Generalitat, in which we review the main regulatory challenges of these technologies and some of the possible solutions.

- And finally, in the interview with **Eduardo Canelles**, chief Metaverse officer at Adigital, the Spanish association of digital companies, we discuss the business opportunities and the conditions necessary for the entire Spanish economic fabric to take advantage of the future metaverse and the technologies that support it.

The document concludes with some final insights.

# POTENTIAL DEVELOPMENT OF THE METAVERSE

**CECILIA CASTAÑO**
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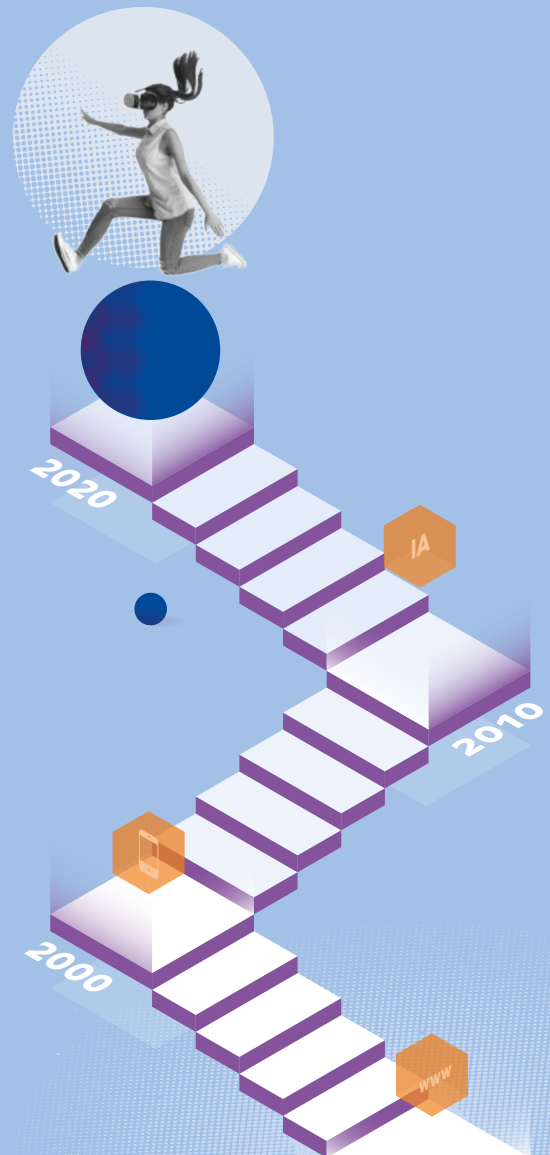
**C**ecilia Castaño is a PhD in Political Science, Professor of Applied Economics and lecturer in the Department of Applied Economics at the Complutense University of Madrid. She was a pioneer in the study of information technology and its effect on the work and employment of women. Through extensive research over recent decades, she has studied the impact of the introduction of digital technologies, including robotics, in different sectors.

It has been 40 years since the first personal computers came on the market when she was at MIT in the mid-1980s. During this time, she has witnessed several great technological advances, including the introduction of robots in the automotive industry, the appearance of the first personal computers in universities in the United States in the mid-1980s, and the emergence of the internet in the mid-1990s.

**Q** **From this historical perspective, do you think the metaverse will develop and have mass uptake?**

**A** It depends. To know if the metaverse will have mass adoption, it would be useful to look at recent history, and ask: What were the successful ingredients of major technological advances? The first is design. This has to be as attractive as possible to the highest number of people. All innovations need adaptations to be incorporated into production processes. In the case of robots, the main limitations are that some processes are performed better by people, and there are clear limits to increasing productivity and quality.

For an innovation to be successful, it must also meet a need even if we are still unaware of that need. For example, the need for communication and exchange of large volumes of information by means not land-based or material but digital, through computers or mobile phones.

Steve Jobs insisted on this aspect of innovation. He applied it to the 1994 Macintosh, which enabled the usual tasks: writing, saving, cutting, pasting, printing, using icons and interactive menus that facilitated human-machine communication instead of the cumbersome instructions of IBM PCs or clones, intended for computer-savvy users only. This was also the case with the iPhone, the first smartphone with a touch screen and no keyboard.

**Q** **Large-scale changes such as these require a large initial investment...**

**A** Yes. Another key element in making these cutting-edge, disruptive innovations a reality is funding. Major technological advances require large amounts of long-term capital, or patient capital, which is usually public in collaboration with private capital. Most innovations that have enabled the impressive development of digital technologies today – microprocessors, liquid crystal displays, touch screens, large memories, GPS – emerged from the enormous theoretical and applied research effort put in place by the Apollo Mission, which took humans to the Moon – a NASA project involving many private companies under public leadership.

However, most current innovations including investments in the metaverse are financed by attracting venture capital funds and investment funds which these days are more impatient, more speculative and seek short-term benefits, they look to make a quick buck.

In the case of the metaverse, the question is: Does it fulfil a need that we have but are unaware of, or, will it be an attractive development but of limited use to certain groups? This will depend on which applications are developed – those more focused on education, training and health or, on the contrary, those focused on leisure and luxury.

**Q** Some describe the future metaverse as a new internet, focused not so much on information, but on experience. Do you think that these beginnings of the metaverse can be compared to the beginnings of the internet?

**A** There are important differences between the beginnings of the internet and what we are experiencing now with the metaverse. The main one is that the metaverse is being promoted by private companies while the internet was a project promoted with public US government and military funds, with the collaboration of scientists from universities and important research centres. The internet existed before the 1990s, with the Arpanet network used by scientists and the military to communicate in the event of a nuclear accident, but it was not a space used in business or by the general public. Like other technological advances, the internet was born of defence requirements in the context of the Cold War, due to fear that the American telecommunications network could suffer an attack and be rendered unusable.

The metaverse is different in this regard. It is not born of a military or public necessity of any kind. And it's being driven by big tech. What we will have to see, as I mentioned, is whether it meets the needs of a large part of the population or not. Video games are the most flourishing digital market today. The younger generations dedicate more than 7 hours a week to them. Lots of teenagers even prefer to interact with their friends via video games. Undoubtedly, this part of the metaverse will develop a great deal – it already is.

**Q** And what needs will the metaverse meet? Who will it be for?

**A** If we look at it critically, drawing inspiration from Neil Stephenson's novel *Snow Crash*, which gave us the meaning and concept of the metaverse, in a world like the present in which meritocracy doesn't function, buried as it is under ever stronger networks of power and influence, and in which social mobility has ceased, for the young generations there are only two options: political contestation or evasion. For the latter, the metaverse is a very attractive option.

It's clear that the growth of the metaverse and the wealth it can generate won't be distributed equally in society, geographically, socio-economically, demographically or in terms of gender and diversity, but will benefit the richest and most powerful companies and people, to the detriment of everyone else.

Since the dot-com bubble in 2001, big tech companies have focused on exploiting our personal data and, in fact, 80% of their revenue now comes from advertising – not from disruptive innovations. All this is possible due to a lack of transparency and a monopoly on data, customers and services, as a mechanism to dominate the market and influence behaviour.

Our digital fingerprints have been transformed into a commodity that doesn't belong to us and is brazenly used to shape our consumption habits as well as our ideas, rights, freedoms, loves and hates. In the metaverse our entire life experience in the digital world will be captured, modelled, influenced and monetised. Let's not forget that visors collect sensitive user data, with retinal tracking and facial recognition, and that there are external cameras that capture our immediate surroundings.

**Q** The metaverse may not see widespread social use, but do you think it is realistic to expect a mass uptake of these applications in the educational setting? Meta's ad says, "students will be able to see extinct mammoths" or "watch Marc Antohony debate in ancient Rome"...

**A** The idea of being able to see extinct mammoths or travel to ancient Rome through an Oculus headset is very attractive. Nevertheless, developing such applications at the moment has a very high economic cost. In addition, schools would have to be equipped with all the necessary devices such as headsets, controls, computers and high-capacity and high-speed communications networks, screens etc. And this could create new divides between schools that have the capacity and purchasing power to invest in these technologies and those that don't. These divides would appear not only among schools in the same city, but also at the state and global levels.

**Q** Continuing on the topic of divides, one of your specialities is the study of employment from a gender-based perspective. Do you think we are facing a new technological development dominated by straight, white men from Silicon Valley?

**A** Definitely. As I wrote in a news article recently, among the twenty richest tech moguls, there are only two women: a widow – Charlene Powel Jobs – and an ex – Mackenzie Scott Bezos. And the percentage of women in the sector is low: it doesn't reach 26% in artificial intelligence, 12% in machine learning, 6% in mobile application development or 10% in metaverse design. Half of them abandon their jobs, citing motherhood as the immediate cause, and the second reason given is behaviour that occurs in the sector.

And in certain companies the day-to-day environment is rife with bad taste jokes and missbehaviour, sexual harassment and devaluation of the capacity of women – particularly if they are mothers – as well as towards people of colour, and the LGBTQi community.

This is a huge problem because if the engineers who design the metaverse are almost all straight, white men, the spaces they design become masculine by default. In addition, the first users of the innovations (men) set the guidelines for future development which leads to unrealistic female body standards in video games, avatars and educational tools. It also leads to gender bias in care and health issues, and hardware (headsets, etc.) designed according to the physical characteristics of men, etc.

Faced with all this, as women we have to occupy these spaces, make ourselves visible and demand to participate in the building of the metaverse to establish standards that are not exclusively male. If we make it a safe and friendly space for women, it will be for everyone.

**Q** What impact would the deployment and maintenance of the metaverse have on the labour market?

**A** Throughout human history, all technological revolutions have destroyed jobs, created new jobs and transformed almost all existing jobs. However, none of the historical declines in employment have been due to technological change, but to major economic and social shocks such as oil and commodity crises, financial bubbles, pandemics and wars.

In recent decades, the increase of mobile internet devices, mobile applications and social media has generated new professions that didn't exist before. There are now thousands of people working as "content moderators" or training artificial intelligence, as well as crowdworkers[4] working through digital platforms such as Amazon Mechanical Turk, from home.

At the other end of the salary scale, demand for highly specialised digital talent is increasing. The important thing is that all jobs in the future – and at present – will require advanced digital skills, specifically artificial intelligence (algorithms, data, networks, programming, hardware) and this is a huge challenge for people and countries.

**Q    What lessons have we learned from the digital world in the 21st century and what should we take into account in designing the future metaverse?**

A    Technological progress has to be social progress, but this is not always the case. A large number of current technological advances (robots, artificial intelligence) are applied with excessive bias towards replacing people and saving on wages, which disregards the fact that human-machine cooperation has better results. The outcome is detrimental to the quality of the products and services offered.

Another important part of the effort of digital giants is focused on offering contents that keep us glued to a screen as long as possible. The best paid engineers are dedicated to this – to developing algorithms that offer us more of the same, but are more addictive. Social networks have no government other than their owners, and their conditions – which are often capricious and disrespectful of truth and ethics – seek to continue doing business with our data.

**Q    Finally, do you think that society in general needs the metaverse?**

A    Every day we face enormous challenges such as the crisis of care, wars and armed conflicts unfolding in many countries right now – poverty, the lack of access to safe drinking water many people face, unequal access to health and quality education. The question is: What need does the metaverse respond to? We have so many social problems to solve in real life, that it is difficult to see the metaverse as anything other than a distraction, entertainment or leisure.

What we need, on the contrary, is for the development of the metaverse to have a positive impact on the real world, to leave behind to future generations a more just and sustainable world than we have now. We need the metaverse to contribute to solving humanity's biggest problems.

We should develop all the spectacular technical advances of the metaverse that appear promising, and counter the power of the large corporations that govern this technological area and intend to govern us with public and supranational regulation.

We need another approach to innovation and technological development, one more focused on people, on the other living beings and planet Earth; an approach less focused on replacing people and more on complementing them; one that prioritises the rights of individuals, particularly women, children, adolescents and young people, as well as marginalised and ethnic minorities, and those with diverse sexual orientations. Less focused on short-term benefits and more on sustained progress in climate, energy and water issues. This requires political will, public-private collaboration, state leadership, and patient capital rather than venture capital.

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[4]  Crowdworkers charge for performing simple tasks in front of a computer, which are often repetitive and unmotivating. They are part of the gig economy which involves several million people worldwide.

# TECHNICAL AND ETHICAL CHALLENGES IN THE DESIGN OF THE METAVERSE

**PEDRO LOZANO**
CO-FOUNDER
OF IMASCONO

I n 2020, Imascono became famous in Zaragoza for making it possible (along with the City Council) to have a virtual Offering of Flowers when health restrictions had suspended the physical event which is extremely popular. It's the biggest part of the Fiestas del Pilar, which is the city's most important event and takes place on 12 October. It is the most important day of the calendar in the Aragonese capital, on which thousands of citizens come to the Plaza del Pilar to make offerings of flowers to the virgin.

In 2020 the virtual event received more than 360,000 virtual visits. In the years following and since, it has become more international – more than 150,000 users from five continents attended and deposited virtual flowers in 2021.

This and other Imascono initiatives, such as the virtual twin they developed for the Telefónica virtual stand at the renowned Mobile World Congress, serve as practical examples of the current state of development of virtual, augmented and extended reality technologies, which are the foundations of the metaverse. They are also a good starting point for considering the technical path forward in the development of the future metaverse.

As we discussed with Lozano, beyond the necessary evolution of hardware and software, in the design of the metaverse, we must also adopt an ethical approach, based on the lessons of the past from the adoption of other technological innovations. With Lozano we analyse the responsibility and role that the companies designing these spaces should play in it.

**Q** **What do you think the main technical challenges are in the design of the future metaverse?**

**A** I believe the main technical challenge is the democratisation of technology[5] for both the hardware and software. A couple of years ago Mark Zuckerberg said the biggest technological challenge of the next decade was to reduce a computer to the size of an arm of a pair of glasses. In fact, Meta is already collaborating with Ray-Ban on the design of a pair of glasses with a pair of cameras that can shoot photos and videos and share them directly on social media.

*Today's mobile devices are powerful, but they don't yet have the ability to hold those 3D environments. What we evolve in terms of hardware and software will allow us to develop more complex experiences.*

Another important aspect is connectivity – increasing capacity. The GSMA, the global telecommunications sector organisation, plays a crucial role in this. The amount of information that moves in virtual environments is several times that of a video call or connecting to Youtube or a social network.

Today's mobile devices are powerful, but they still don't have the ability to sustain those 3D environments. The developments we make in hardware and software will enable more complex experiences and, for instance, access to a three-dimensional and multiplayer video game, even in photorealistic environments, all from a mobile phone. Today, almost all 3D environments are low poly.[6] If we achieve this, we will be able to have much more immersive, much more realistic experiences – and in multiplayer mode – which at present is difficult.

**Q** **Today, immersive environments are highly focused on entertainment and big brands aiming to promote themselves. How do you think these technologies will evolve over the next five years?**

**A** I believe we will see the real impact of the metaverse in five- or ten-years' time. One key factor is that all the big tech companies are investing in it. For example, look at Microsoft's purchase of Activision Blizzard for about USD 68.7 billion,[7] pending regulatory approval. If we put that in context, it is about four times what Facebook paid for WhatsApp, a tool everyone uses these days. Here we can see the real objective extent of the business and growth expected in this sector.

I believe that such environments should try to improve and complement reality. For me, the metaverse needs to offer a hybrid model that enhances today's digital experience. It needs to evolve as a complement to other aspects of life.

I don't see these technologies as something fixed in our daily lives. Ultimately, their uses will be concentrated. They will bring experiences to users, but they won't absorb them.

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[5] The concept of democratisation of technology refers to making it accessible to all at an accessible cost.

[6] Low poly is a very common type of 3D modelling in video games, characterised by low resolution.

[7] In January 2022, Microsoft announced its intention to buy Activision Blizzard, the video game company that owns some of the most successful titles on the market including Call of Duty and World of Warcraft. The regulatory authorities of various countries are still examining the operation, which has not yet been confirmed.

**Q  What influence do Meta and its role have in the metaverse debate in companies such as yours?**

A  The metaverse as such does not exist yet, and none of the projects that do currently exist can be considered the metaverse. There are missing components such as interoperability, which is decisive to the concept. In 2020, when Facebook announced the change to its name and brand, many people associated this with its reputational problem. But, if we look back, we see how Facebook purchased Oculus in 2014. That is, they had been working on it for at least six years and were clear that the future of the social network was through these immersive virtual reality environments.

*I believe that such environments should try to improve and complement reality. For me, the metaverse needs to offer a hybrid model that enhances today's digital experience.*

Evidently, monopolies are not a positive thing, and I don't think the advertising-based business model is the most suitable. But it is true that in the end it is consumers who must decide whether they prefer to pay for a product or service or do it through their data.

All in all, I think Meta's plans have been tremendously positive. Ultimately, we live in a society in which everything is evolving at light speed and it is important that the vast majority of the public is aware that we are beginning to undergo a transformation through this new internet generation. And that it's helping people who had no idea what it was like, to begin to understand this new form of interaction associated with this new 3D internet.

But we have to be aware that the metaverse is not 100% built; we are only seeing a small part of what it will be in the future.

**Q  And what do you think the main ethical and social challenges will be in its design?**

A  We need to face this new generation of internet by learning from the mistakes of the past. This should help us build more ethical, more sustainable and safer virtual spaces, in which we leave behind issues such as fake news and fake accounts. In short, technology is not an end, but a means. It is us humans who are behind it. This is why, above all, we must give special importance to education – the basis of any society. The problems we have in the digital world are a consequence and reflection of those we have in the physical world.

In addition, we need to focus on young people who are the most susceptible when it comes to addictions, especially in the video game space, as is happening with social media.

As designers and creators, we must be aware of our responsibility. Companies are responsible for building an ecosystem based on ethics and values that make us better people rather than bring out the worst in us.

**Q** **In this vein, in the future metaverse, how might we monitor inappropriate or illegal behaviours, such as forms of abuse that have already occurred in certain immersive spaces?**

**A** Artificial intelligence is evolving by leaps and bounds, and I believe that some of the monitoring can be automated. At least an initial filtering and then a real person can analyse the act in question. I think that, bit by bit, those technologies will evolve, and artificial intelligence can be a great help.

**Q** **What other lessons learned in recent years in the digital world do you think should be taken into account when designing and developing these new digital spaces?**

**A** As I said, I believe this type of environment should serve to improve and complement reality. I think the metaverse should offer a hybrid model that enhances today's digital experience. Those of us offering digital services, such as Imascono, are the first to point out that there is nothing like physical human contact. In my case, right now I would like to be doing this interview having a coffee with you, smelling the coffee and enjoying the moment, the feeling and sensation.

But sometimes it isn't feasible and has to be done virtually. And now that the tendency is for more things to be done remotely, the metaverse can function as a digital complement to make it more immersive and real.



*The metaverse is not yet built. We are seeing a small part of what it will be in the future.*

### VIRTUAL REALITY HEADSETS, THE GATEWAY TO THE METAVERSE

Virtual reality (VR) headsets are needed to enter existing immersive spaces such as Horizon Worlds. There are three types of devices on the market: models used with smartphones, those that work as add-ons to computers or games consoles, and those that include all the hardware in the device itself.

The latter category includes the most sophisticated and expensive equipment. For example, Meta's latest model headsets, Meta Quest Pro, cost around EUR 1,800 in **Spain**. The company's previous model, Quest 2, are worth around EUR 400 on the Spanish market.

User interest in VR headsets has clearly increased in recent years. In **Europe**, the number of VR devices nearly doubled between 2020 and 2021, reaching 2.9 million. Market forecasts project this growth will continue reaching 6.3 million devices in 2027, according to a Statista report.[8]

### INCORPORATING A GENDER-BASED DESIGN APPROACH

Devices associated with the metaverse are at an early stage of development. Companies and engineers are testing how to turn technological advances into equipment that adapts to consumers. In this process it is crucial to incorporate a gender-based and egalitarian approach.

Why are most smartphones usually too big for a woman's hand or trouser pockets? Why do many voice recognition systems understand male recordings better than female ones?

Under the concept of *one-size-fits-men*,[9] author Caroline Criado Pérez has detailed what happens when digital technologies are designed and produced without taking the female population into account. The causes of these design shortcomings are, among other things, the absence of women on engineering teams and insufficient testing of innovations and prototypes on non-male users.

In fact, in the field of virtual reality, problems of this kind have already occurred. Several studies suggest that dizziness associated with the use of VR headsets is more common among women than men. In 2020, an investigation pointed out how certain female physiological characteristics had not been taken into account in the equipment design.[10]

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[8]  https://www.statista.com/forecasts/1331908/vr-headset-market-volume-europe

[9]  A detailed explanation of Criado Pérez's ideas and this concept can be found in her book Invisible Women (Seix Barral 2020).

[10]  https://www.frontiersin.org/articles/10.3389/frobt.2020.00004/full

# GENDER BASED VIOLENCE IN THE FUTURE METAVERSE

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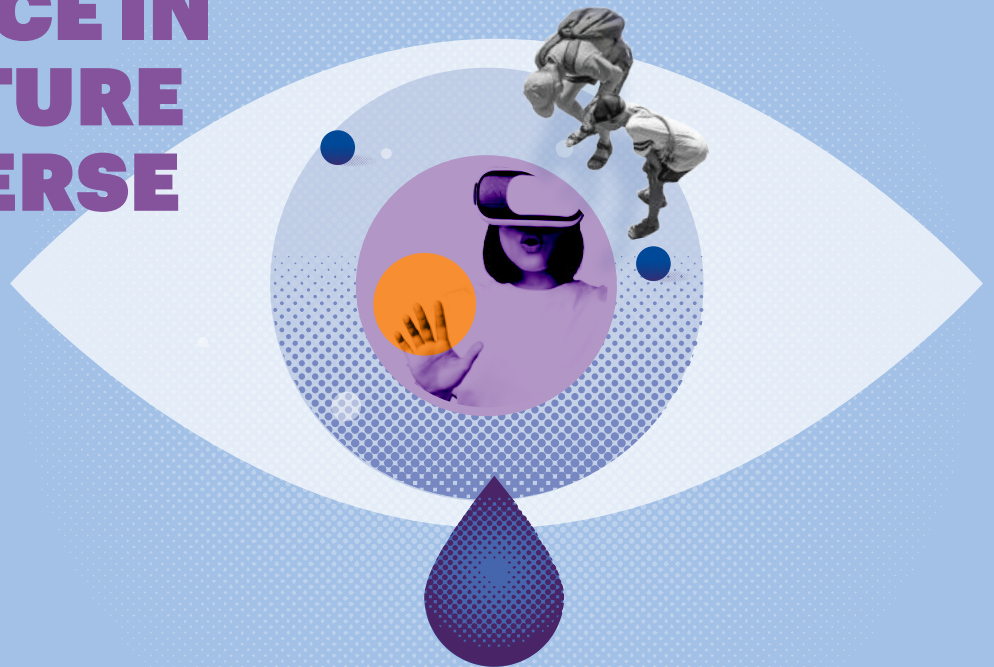
Commercial videos about the future metaverse present an idyllic and safe context, made up of different environments in which to work, play and buy through an avatar. But, as has been happening in other digital environments for years – from social media to gaming – violence has already appeared at this initial phase of the metaverse.

Digital violence can occur in different forms: harassment, hate speech, threats, dissemination of illegal content, etc. And it can target different groups – women are one of the most common. A study by the European Parliament estimates the economic cost of gender-based digital violence at up to €89.3 billion, based on its impact on the quality of life of the victims, among other things.[11]

The announced immersive nature of these new technologies opens up the challenge of how to analyse and address digital violence. For a better understanding, we spoke with **Eleonora Espósito**, a researcher at the Institute for Culture and Society (ICS) of the University of Navarra and a leading national expert at the European Institute for Gender Equality (EIGE). With her we scrutinise the violence present in the online world and look at how to address this challenge in the new immersive virtual spaces.

[11]  https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662621/EPRS_STU(2021)662621_EN.pdf

**Q** **What types of violence exist in the digital world?**

**A** It's very difficult to classify them. Firstly, because it is an evolving world; secondly, because of a linguistic issue: it's difficult to translate the different terms into the 24 languages of the European Union and retain their meanings from a conceptual, statistical and legal point of view.

For example, in online bullying, there is a distinction between cyber-harassment and cyber-stalking. They have several aspects in common, but the latter is often considered more serious because the victims feel targeted by an obsessive interest and come to fear for their lives. Online bullying itself is a form of abuse in which the victims (and often the perpetrators) are minors. Two other categories are hate crimes and imaged-based abuse, which is posting images without the victim's consent.

*Establishing where online and offline violence begin and end is part of the legal challenge. Twenty years ago we had a clear idea of what was online and what was not. Now it's not so clear.*

Another interesting distinction can be drawn between digital violence, which can begin and end in the online world, and technology-facilitated violence, in which tools such as GPS, Bluetooth, the Internet of Things, etc. are used to inflict violence in the physical world. Normally, however, when we talk about all this violence, we are usually referring to a continuum between online and offline.

Establishing where both scenarios begin and end is part of the legal challenge. Twenty years ago, we had a clear idea of what was online and what was not. But I think now the distinction is not so clear. The COVID-19 pandemic accelerated the process and increased our dependence on digital tools in our daily lives.

**Q**  **What are the forms of violence against women in digital spaces?**

**A**  For us, the benchmark is the Istanbul Convention,[12] which establishes five main forms of violence: physical, psychological, verbal, sexual and socio-economic. They almost never occur in isolation: when there is one, there are others, though to different extents and proportions. All these forms of violence can take place through digital technologies or be facilitated by them.

Forms of online violence against women are often underestimated. They are considered a negligible phenomenon with no real impact. The virtual sphere remains a lawless world, a wild west. One example is online exhibitionism or sending sexual images to women – one of the most common forms of sexual harassment.

It is considered playful, innocent, harmless, a joke. In reality it's a form of sexual harassment. Very often the women themselves don't realize it is an outright form of sexual harassment because that kind of violence is so normalised that sometimes, as victims, we don't realize what's happening. If you are a victim of online violence, you aren't always sure what your rights are, or even know that you have a right to online safety. That is to say, I believe that online violence is considered less serious than offline violence, that is the perception.

**Q**  **And what particularities can gender-based violence have in immersive virtual spaces?**

**A**  We already know that these immersive or mixed reality social experiences can take online violence to new heights. Post-pandemic several studies indicate that social distancing increased digital forms of violence against women and children: online harassment, non-consensual pornography and child pornography. This leads us to believe that violence in the physical world is being substituted with violence in the online world.

Virtual reality immerses the person in an all-encompassing digital environment and the sensory experience is intensified: unwanted touching in the virtual environment can feel real. Until now, for instance on social media, we have had the dimension of the word, of comments, of incitement to hatred, and the dimension of representation by images. Now a third dimension is being added to the mix which is immersion in this physical sensation.

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[12]  The Council of Europe Convention on preventing and combating violence against women and domestic violence:
https://rm.coe.int/168008482e

**Q  How can we address these forms of violence?**

**A**    That's the challenge. How do we protect women in these environments? Once again victims are being blamed. In cases of violence in the metaverse, people have asked: Why didn't that woman turn off the computer? Why didn't she take off the virtual reality headsets?

An important point is that when you are a victim of violence, you often don't know what to do, and so often our reaction is to freeze. You're so shocked to be suffering a gang rape in the metaverse that you don't even think you can take off your headset.

**Q  Meta has developed a tool for the metaverse, which is a kind of bubble an avatar can activate if they feel threatened...**

**A**    This feature was announced following reports of harassment. So it was a kind of an afterthought;

not something planned in terms of safety by design. The paradox of the metaverse is that it is sold as a place where you can feel invincible, be anyone you like and change what you look like. Instead, it may leave many people, especially women, in a very vulnerable position.

The bubble tool was also criticized as the equivalent of telling women that if they don't want to be harassed on the street they should stay home. Is this limit on personal space enough to protect users? If it is made to work well and can be activated quickly, it will be a useful tool. But it won't change the culture of harassment and abuse in online environments.

Whether the metaverse will be a safe space in the future will depend on how companies train their moderation systems and their automated and artificial intelligence systems. It will also depend on whether we are able to detect and eliminate hate speech and misinformation in real time.

*The paradox of the metaverse is that it is sold as a place where you can feel invincible, be anyone you like and change what you look like. Instead, it may leave many people, especially women, in a very vulnerable position.*

## VIOLENCE IN THE METAVERSE: THE CASE OF NINA JANE PATEL

At the end of 2021, Nina Jane Patel, a consultant and founder of a company that develops educational solutions based on the metaverse, entered Horizon Worlds, the immersive space created by Meta. According to her account on her blog,[13] in less than a minute several male avatars approached and "gang raped" her avatar, while taking photos.

"While I was trying to escape, they were yelling at me saying, ´Don't pretend you didn't love it' and, ´Go masturbate with the photo'", Patel says.

In Horizon Worlds, if users remove their VR headsets, they automatically exit the metaverse. In addition, there is the option to activate a virtual protective barrier. But Patel says she completely froze in fear. "It was surreal. It was a nightmare."

"Virtual reality is designed so that the mind and body can't differentiate between online experiences and reality. In a way, my physiological and psychological response was as if it had actually happened," says the businesswoman.

Patel explains that the impact of this experience was compounded by shock at the comments she received on her blog. Several users reproached her with comments such as "Don't choose a female avatar, it's easy to fix" or "Don't be stupid, it wasn't real."

## SAFETY CONCERNS FROM THE PRODUCT DESIGN STAGE

More and more voices are demanding that technological products and services incorporate principles of user safety into their designs – an approach called safety by design.

A couple of years ago the **Australian** Government started an initiative intended to help technology companies "minimise online threats by anticipating, detecting and eliminating online harms before they occur."[14] This initiative is based on three fundamental principles:

**Responsibility lies with the service providers.** That is, users are not solely responsible for their own safety when using a digital platform. Providers should make every effort to understand the potential harms they may cause, how to assess these, and how to address them in the design of their services.

**The empowerment and autonomy of users, as well as their dignity, are of central importance.** Therefore, products and services must be aligned with the best interests of users.

**Transparency and accountability.** In addition to proving that they are operating according to their safety principles, companies must clearly explain to users what steps they will take to address these risks. They must also regularly publish information on the effectiveness of such measures.

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[13]  https://medium.com/kabuni/fiction-vs-non-fiction-98aa0098f3b0

[14]  Learn more about the Australian Government initiative at https://www.esafety.gov.au/industry/safety-by-design

# THE ENVIRONMENTAL IMPACT OF METAVERSE TECHNOLOGIES

**LLUÍS TORRENT**
ENVIRONMENTAL EXPERT
AND INTERNATIONAL
CONSULTANT

**Digital Future Society**
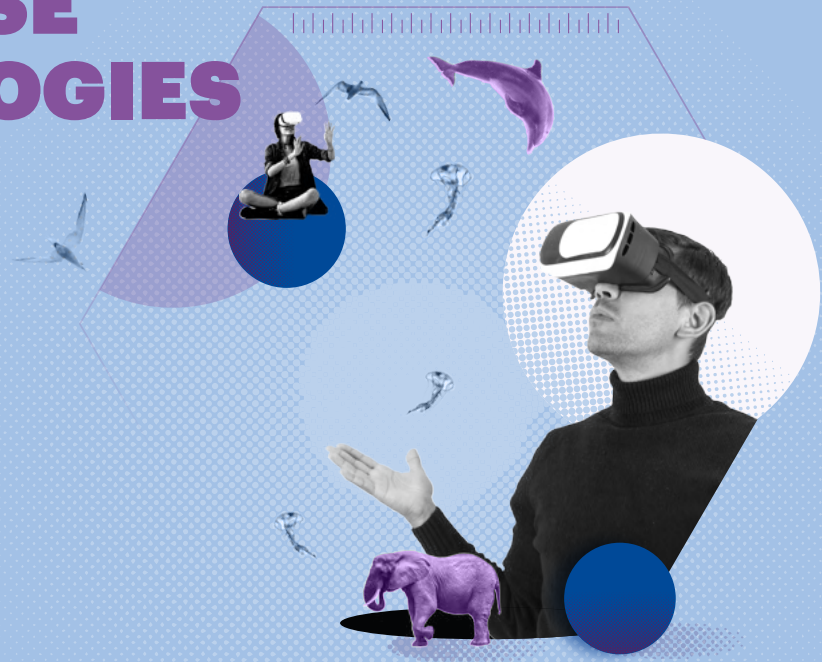
**C**oncern regarding the environmental impact of emerging technologies is a relatively new issue. But growing numbers of voices are warning of the need to be aware of the ecological and climate footprint of technological innovations in order to design products and implement policies committed to the planet.

The metaverse is no exception. As **Lluís Torrent** points out, the entire life cycle of these products and services must be taken into account in the construction of immersive virtual reality spaces, while at the same time there must be a focus on eco-design, the circularity of devices and on reducing electronic waste.

Torrent, an environmental expert and consultant to companies and organisations such as the European Commission and the United Nations, is also the author of Digital Future Society's report Emerging Technologies: Risks and Opportunities in the Climate Decade,[15] which reviews the main challenges of these innovations. In this interview we ask him about the environmental challenges related to the building of the metaverse and how they should be addressed.

[15] https://digitalfuturesociety.com/report/risks-and-opportunities-of-emerging-technologies-in-the-climate-decade/

**Q** **What are the main environmental impacts of technologies such as the metaverse?**

**A** When we talk about the environmental impact of the metaverse, we always think of data centres because that's where all the information is stored and processed. However, there are several levels of processing: at the data centres where the information is stored, in the infrastructure networks that transmit information and data, and the devices that display the information. Energy is consumed at each of these levels in addition to the use of materials that sometimes come from conflict zones. Waste is also generated at each stage.

Nevertheless, there is balance in all this. These technologies have negative impacts, but they also bring benefits. There is a kind of dilemma between energy consumption and electronic waste generation, because what happens in data centres is that every time a new server is released, it is usually more energy efficient. At the business level, data providers are interested in consuming as little energy as possible because it is a significant operating cost. So energy savings are prioritized and every two or three years the servers are renewed and the old ones discarded, or, in the best case scenario, reused. The economic savings are significant, but it causes a problem of waste. And there is the question – what is the priority, reducing waste or consuming less energy? The new models consume less, but if I have to replace the one I already have, I will generate waste…

So options such as reusing should be evaluated. Servers that are still very good can go to another level of consumption in other types of centres that aren't as cutting-edge.

*These technologies have an impact, but they also bring benefits. There is a kind of dilemma between energy consumption and electronic waste generation. This is what happens, for example, with data centres.*

**Q** **Growing these technologies on a large scale would require much higher data processing capacity than we now have. How should we take into account the environmental impact of that leap?**

**A** Video streaming, gaming, virtual and augmented reality and the metaverse, increasingly seek to offer very high-definition graphics. A 4K video is three to five times larger than a high-definition video, and an 8K video is three to five times larger than a 4K video. Doubling resolution sometimes involves multiplying by five the amount of data, and therefore the size of the files.

But there is a marketing strategy behind it, too. Until a few years ago, when consumers needed something companies would produce it. Now it's a bit the other way around: tech and mobile companies say, "I want people to consume this thing" and then they create the need for it. It's the opposite of what is encouraged in the circular economy and in degrowth, which is a very strong movement that's opposed to green growth, which proposes that unlimited growth can be achieved if it's done sustainably.

This paradigm is starting to become a little obsolete, because it is being shown that it's no longer useful. Instead, the regeneration paradigm is gaining momentum. This basically seeks not only to repair the damage we cause, but to place even higher value on our ecosystems.

**Q Where are we now in terms of the transformation to greater energy efficiency in data processing?**

**A** Today, there is a lot of social pressure regarding the technology industry's environmental impact, and large companies have realized this. A few years ago, for instance, Greenpeace published a ranking of green phones, and several companies did terribly. Since then, some have introduced very strong sustainability policies. Consumer pressure works.

*Today, there is a lot of social pressure regarding the technology industry's environmental impact, and large companies have realized this.*

There are many ads regarding zero emissions. But to what extent are the plans realistic? There are companies that have their own infrastructure for developing solar or wind energy; however, others make agreements with third parties to offset their impact in some way. So in other words, I admit that I have an impact, but I pay someone else to compensate for it.

Of course, there is a shift in focus towards regeneration. That is, the commitment to repair the impact of the past in some way. I think Microsoft is one of the few companies – if not the only one – with a commitment to zero carbon emissions: it has committed to calculating its emissions since its year of incorporation, and offsetting them.

Nevertheless, it is true that sometimes it's difficult to know when it's greenwashing and when it isn't. Making an announcement or verbalising a commitment is very easy, but then you have to prove you are fulfilling it. That's the approach of the Danish Government (see the second information box on page 27).

**Q What positive impacts can these immersive virtual spaces have? For example, it is often said, that virtuality reduces travel, physical journeys.**

**A** Yes, no doubt. Information technology has many positive aspects, even in environmental terms. Interaction with other participants in the metaverse will, in the future, in theory, enable us to hold meetings with other avatars preventing the need to physically attend.

Plus there is replacing existing technologies. A typical example is how a mobile phone can replace a large number of objects: an alarm clock, a camera, a phone, etc. One country that achieved this was Sweden, where it was demonstrated that the ICT sector reduced its energy consumption thanks to the substitution effect of replacing devices: where previously you had ten devices consuming in parallel, now you have one.

When a new technology appears, there is usually a boom in production of that device. Just look at the cases of smart phones, smart watches and smart speakers. This means that energy consumption rises, but at some point the curve reverses due to improvements in consumption and efficiency. It's possible that augmented reality, mixed reality and virtual reality technologies could also go in that direction.

**Q   What seems clear is that these technologies will require new types of hardware. What does this mean?**

A   If there is another concern aside from the issue of energy, it's waste. There is a huge problem that many people don't know about, and that is e-waste (waste from electric and electronic equipment). The United Nations Environment Programme literally talks about a "tsunami of e-waste" – already in the pre-metaverse era. As we said before, maybe we'll have fewer devices in the future. Or, on the contrary, our homes will be full of them. We also need to think about useful life. How long will devices last? Will they last two or three years because the business strategy is to release a new model every six months and have people change their devices? This has a significant impact in terms of waste.

Meanwhile there is a paradigm shift towards trying to reduce e-waste. This will be very difficult, because as a matter of free competition, what government can tell people not to get a new model every year or every six months? They will say you are holding back competition and economic growth. But what they are starting to ask for is, first, to ensure a product can be repaired, and that if it breaks down it isn't thrown away. You have to take responsibility for it. It's called extended producer responsibility.

And programmed obsolescence – which is not a myth, it actually exists – must cease to exist. I can't deliberately produce a product that has an expiry date; it has to last as long as possible. But in the end these virtual realities are accompanied by hardware. And the hardware is probably going to come with updates and a million other things that will cause that explosion. So the issue of waste and the consumption of raw materials required needs particular attention.
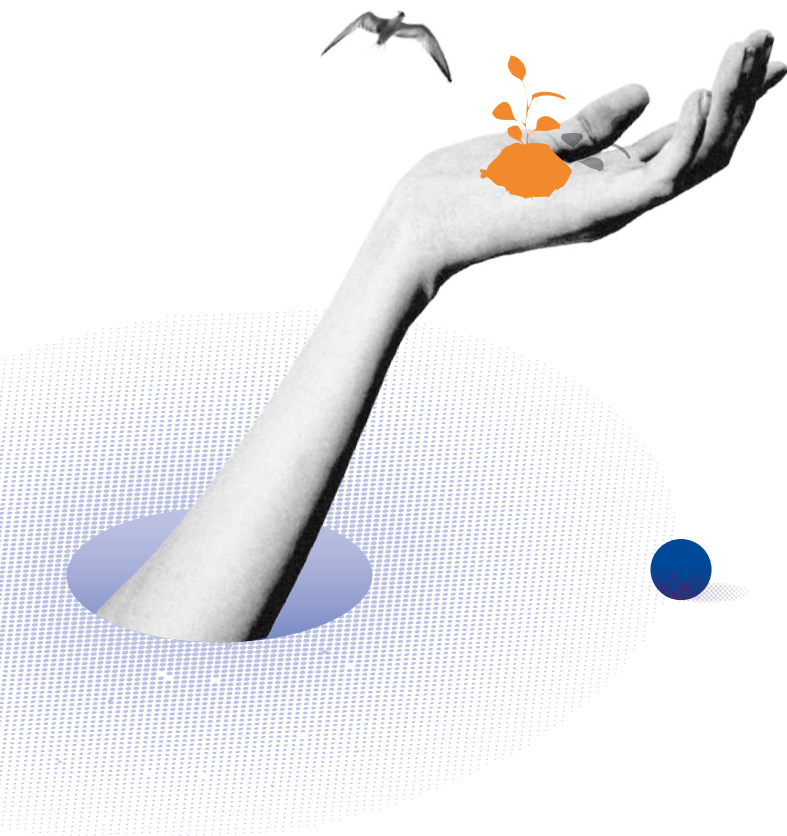
## HOW CAN WE MEASURE THE IMPACT OF DIGITAL TECHNOLOGIES?

Measuring the environmental impact of digital technologies is no easy task. Lluis Torrent points out that it requires taking into account the complete life cycle of products and services, "from the initial design stage with people working on computers in an office using energy that can generate pollution, to the end of the product's useful life, which involves managing the electronic waste," he explains.

Use of a technology such as the metaverse (or others), also requires examining the different degrees of use of resources (see image on the right).

"First, we need devices for end users, such as headsets that allow them to enter the virtual world. These require telecommunications networks to transmit the data. And finally, it requires centres that manage the data with servers, distributed networks or fixed centres," Torrent says.

COMMUNICATION NETWORKS

DATA CENTER

DEVICES FOR END USERS
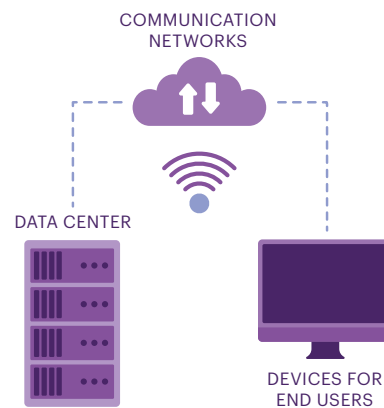
## PUBLIC MEASURES AGAINST GREENWASHING

Greenwashing is a form of deceptive marketing used by many companies to increase their profits or improve their public image. They promote the false idea that their products or services are environmentally friendly, when in fact they are not.

In recent years, several countries have adopted public policies to curb this practice. In **Denmark**, since 2014, any company promoting a product as green, sustainable or environmentally friendly is required to provide reliable evidence to prove it, such as reports detailing the life cycle of that product or service. If they don't, they face fines.

In **Australia**, in October 2022, the financial market regulator imposed the first fine on an energy company for giving misleading information on several of its projects.[16]

In **France**, in 2021, new legislation was adopted to ensure that all digital products incorporate detailed and rigorous information on their ecological footprint.[17] This includes mobile operators, who are required to specify the amount of data transmission of their services and the associated emissions.

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[16] https://www.theguardian.com/environment/2022/oct/27/australias-corporate-regulator-issues-first-fine-for-greenwashing

[17] Full information on the French law at https://www.vie-publique.fr/loi/278056-loi-15-novembre2021-reen-reduire-empreinte-environnementale-du-numerique

# EFFECTS OF THE METAVERSE ON UNDERAGE USERS

**CHARO SÁDABA**
PROFESSOR AND RESEARCHER
IN COMMUNICATIONS AT
THE UNIVERSITY OF NAVARRA
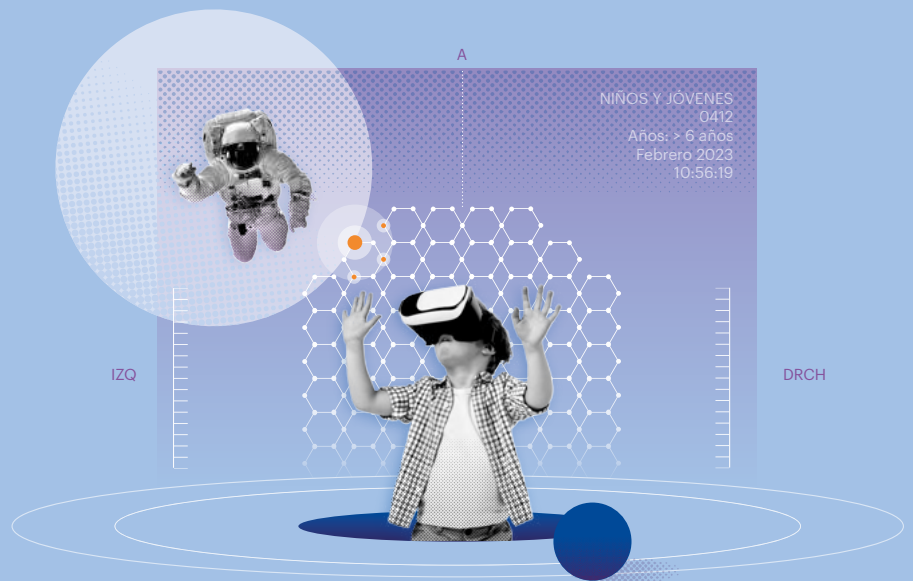
T he metaverse is in full development so its large-scale deployment – if industry forecasts are met – will happen in a few years. Another factor in favor of its success is the fact that the younger population frequently uses existing virtual spaces linked to the world of video games.

The immersive characteristics of these technologies need to be taken into account when assessing their potential positive and negative impacts on the youngest users. It is also useful to look at the lessons learned regarding this group's relationship with other digital media and services.

**Charo Sádaba**, professor and researcher of communication at the University of Navarra, points to the importance of helping young people become aware of and empowered in the use of digital technologies.

Sádaba has also worked as an independent expert for the European Commission on projects to build a better and safer internet for children. With her we analyse the main challenges of the future metaverse for the youngest users.

**Q  What impact can immersive reality experiences have on young people?**

A   It is very important to distinguish the age of the users we are talking about. Some child development specialists point out the potential harmful effects of these immersive experiences on children under six years of age or in children between six and eight years of age, when the cerebral cortex is still developing. At those ages, children are also learning to distinguish between fiction and reality, and between the physical and the online world. We have to make sure that hyper-realistic immersive experiences don't hinder this stage of growth.

Otherwise, in later years, they can have a certain detachment from their immediate physical reality. In the sense that I like my metaverse room much more or the look that my avatar has, while the reality of my neighbourhood is what it is. Or maybe I can't afford to have certain things. The virtual world can generate a certain disaffection with respect to physical reality.

At the same time, much has been said about the educational potential of the metaverse. For instance, it would allow children to enter the crater of a volcano through an immersive classroom experience and watch the lava, the magma... And, while it isn't there yet, at least in that regard it sounds wonderful, right? But you have to be careful because the development of the person has its stages and limits and it is prudent to respect those.

*One of the challenges is facing the divide between the person and what happens on screen. And our responsibility for our actions in the digital environment.*

Another challenge is the divide between the person and what happens on screen. And our responsibility for our actions in the digital environment. On social media, for instance, we too often see hate speech that many people wouldn't commit in the physical world. So maybe we have to reverse the detachment that sometimes occurs between ourselves and the consequences of our digital actions, especially when it's through an avatar.

**Q  Then how should we think about responsible use of virtual spaces by the youngest users?**

A   The public discourse around minors and their digital presence has changed over the last 20 years. From the mantra of Online Safety we've transitioned to a Better Internet for Children in which children feel empowered to use these technologies. For instance, for years research has been emphasizing that time of use is not the most important indicator when identifying risky behaviours or harmful situations. The "What for" is more important than the "how long".

An adolescent can spend just five minutes on Instagram and create havoc when replying to a message she has received. Meanwhile longer periods of use, for instance in the case of video games, does not necessarily have to have a negative effect as long as it's put in the context of the other aspects of life.

Families are becoming more aware of this, but it is true that controlling the time of use is easier and apparently more objective. Nevertheless, we must continue to ensure spaces of trust and conversation where they can comfortably talk about things they find in the digital environment.

**Q  What will be the implications of the gradual reduction of physical contact and social interaction if young people abuse these virtual spaces?**

A  The capabilities or skills we don't develop end up atrophied. The human body adapts to the practical use that is made of it. So, in a normal scenario with social interaction, (excluding isolation for other reasons), these social skills need to be put into use in the classroom, in the school playground and around the neighbourhood. One of the issues I often address with families and educators is the digital diet, that is, a healthy combination of physical and digital spaces.

**Q  In relation to these challenges, can we expect differences in user experiences for young people according to their gender?**

A  I think it's reasonable to think so. It's true that girls develop relational skills before boys do, for instance. A few years ago we conducted a study on the use of technologies by children and adolescents between six and 18 years of age, and one thing that caught our attention was that, at age 10–12, girls practically lost interest in video games. Meanwhile, the boys remained interested at significant levels.

*The public discourse around minors and their digital presence has changed over the last 20 years. From the mantra of Online Safety we've transitioned to a Better Internet for Children.*

Girls preferred to take advantage of the relational aspects that technology offered them to talk, socialise with their friends, share things, etc. Later, after adolescence, young women's interest in video games returns, but to a lesser extent than it does for boys.

**Q** **What can be done by developers to create healthier virtual spaces for the young?**

**A**  I think the challenge is to ensure users are as aware as possible of their habits. Children and minors are different. Their free will isn't fully developed so it's easier to manipulate them. But, for example, these recent developments in controlling screen time, when the system warns that you have been connected to a social network for fifteen minutes and asks what you want to do, I think these are good measures.[18]

As I said, however, it's not the only determining factor. If you spend all your time on it you won't be able to spend any time doing other things that are also necessary. The silent mode that Instagram has just announced for children, which will stop them from receiving notifications and messages at night so as not to disturb their rest – I think this is also a step in a healthy direction.

Is it enough? No. Because I think that what is not right is the model based on user attention, which directs a lot of money to technology companies so it's not easy to change. And this is where the importance of public institutions and governments comes in.

**Q** **Many young people have their first sexual experience through the internet. What are the implications if these experiences take place on an immersive virtual reality platform?**

**A**  This is an enormous social challenge. In the case of young people, this type of consumption – which is hyper realistic – can undoubtedly affect their future and health. There is evidence that simply viewing images gives expectations that are then frustrated when they have a real sexual interaction with another person. It can be worse still if the experience is also immersive, as it can lead to enormous frustration, or lead us to think that we are not who we thought we were.

We might not be brave enough as a society to open up this debate because it seems to have too many moral implications and we don't want to appear prudish. And I sincerely think there is an issue of objectifying the other person and that it undermines healthy development.

[18]  Find more detailed information on these initiatives see page 32.

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## SCREEN TIME CONTROL AND OTHER INITIATIVES FOR RESPONSIBLE USE

As Sádaba points out, time spent is not the only factor that defines good or bad use of digital tools among young people. But excessive, and above all irresponsible use of these technologies can lead to problems.

In recent years, several technology companies have deployed applications designed to enable digital awareness. One example is the Digital Wellness tool[19] for Android phones, which provides information on how often users unlock their device and their usage time. Another is Sleep Time Mode, which pauses notifications and phone interactions.

For Apple devices, there is a special setting called Screen Time,[20] with a similar functionality, which can be configured to limit children's screen time.

Sádaba points out two other interesting initiatives from the public sector focused on the digital well-being of the young. Since 2021, the Children's Code has been in force in the **United Kingdom**.[21] This regulation requires applications and other services aimed at children to be designed with the highest privacy standards by default. This means collecting only data that is strictly necessary for its proper functioning, for example.

In **Norway** the authorities have been calling on influencers and brands since 2021 to clearly indicate which images have been retouched.[22] The objective is to combat unrealistic aesthetic standards among young people that can have harmful effects on self-esteem and self-image.

## THE METAVERSE IN EDUCATION

Education is one of the sectors in which immersive spaces can have a more immediate practical application. Various companies and organisations are working on creating immersive educational experiences that give students a different way to approach a historic event or a large museum that's located thousands of kilometres away, for instance – all this using virtual, augmented or mixed reality technologies.

As Sábada indicates, these initiatives can serve as an interesting complement to analogue teaching methods, which remain essential for comprehensive training of students.

Along these lines a Spanish company from Seville called **Educaverse** has developed its own metaverse in which schools can generate and host different types of content.[23] Content such as 3D classrooms, immersive events or training programmes, and virtual fairs or congresses specialised in a certain subject.

The platform also allows developers and other companies to create and distribute their own educational content, as well as monetise it among interested learning institutions.

[19] https://support.google.com/android/answer/9346420?hl=es-419

[20] https://support.apple.com/es-us/guide/iphone/iph24dcd4fb8/ios

[21] https://ico.org.uk/for-organisations/childrens-code-hub/

[22] https://www.stortinget.no/no/Saker-og-publikasjoner/Saker/Sak/?p=84478

[23] https://educaverse.org/

# REGULATORY CHALLENGES OF THE FUTURE METAVERSE

**LILIANA ARROYO**
SOCIOLOGIST AND MANAGING
DIRECTOR OF SOCIEDAD DIGITAL
DE LA GENERALITAT

**T**he metaverse is still an incipient space under construction. But its hybrid nature –it combines technologies whose maturation process has accelerated in recent years, such as artificial intelligence, blockchain and virtual reality, among others – as well as the ethical and social challenges it poses, require that from now on we think about possible responses from public authorities.

At the same time, we are talking about a technology for which innovation is being driven by large private companies, which in turn are often driven by private interests. Hence the need to think about regulatory solutions that are "coordinated and at different levels of government," says **Liliana Arroyo**.

Arroyo, PhD in Sociology and specialist in digital social innovation, is co-author of the book Welcome Metaverse? Presence, body and avatars in the digital age (Ned Ediciones 2022). Since December 2022, she has also been general director of Sociedad Digital de la Generalitat de Catalunya. With her we review the main regulatory challenges of these technologies and some possible solutions.

**Q  What do you think are the main challenges for public governance of these spaces?**

A  The first is that this innovation is being driven by the private sector, sometimes in legal limbo, sometimes not; at least not regulated yet. Then there is the cross-border nature of these immersive spaces. So which legal frameworks apply?

I'm thinking, for instance, of the case of journalist Nina Jane Patel, who within a minute of entering was gang raped by five male avatars.[24] She connected from one place, the platform company was in another and the avatars were from five different countries. So what legislation applies there?

**Q  Do you think that specific standards will be needed to regulate these types of immersive virtual spaces?**

A  I believe that lessons learned, for example, in terms of protecting user data, are a good basis. We are now debating whether we need new digital rights or need to protect human rights in the digital age.[25] But I do believe that specific regulations will have to be developed – different experiences come from the immersive and, depending on the extent of immersion, involve different senses.

One example is the debate surrounding neurorights. Work is being done on technologies that can communicate directly with our neural system, without our conscious awareness. There are a number of implications in terms of privacy, autonomy and capacity for action, so we will need to develop specific regulations, given the idiosyncrasies of the issue.

**Q  How can we address the cross-border aspect of public governance you mentioned?**

A  Interoperability has a lot to do with driving competitiveness. So, it's good to raise it at the governance level, because depending on the focus, it will mark the way forward.

For example, Europe attempted to facilitate interoperability in terms of data protection to favour a single market that would discourage vendor lock-in, the phenomenon of being trapped by a supplier, which means you can't take your data with you. I think this could be interesting in the case of the metaverse. But, for me, this is a second step. First, we need to define how to govern it.

In the case of interoperability, I think that common benefit has to be the focus, otherwise, with these technologies you can have data marketing with a higher degree of sensitivity and detail that is much more invasive than we've seen to date.

*Specific regulations will have to be developed*
*– different experiences come from the immersive*
*and, depending on the extent of immersion,*
*involve different senses.*

[24]  Find a more detailed explanation of this case in the interview on digital violence.

[25]  The term 'digital rights' is a concept still under construction. It includes issues such as the right to privacy, freedom of expression online and safe internet access, among other things. The Spanish Government describes its Charter of Digital Rights as "a framework of reference to guarantee the rights of citizens in the new digital reality" and to face "the challenges posed by the adaptation of current rights to the virtual and digital environment".

**Q** **What can be done by the public administration and authorities to prevent big tech companies from monopolising the development and design of these technologies and their infrastructure?**

**A** I think the government needs to move forward at different levels. To begin with, it should probably do this at the level of public procurement for innovation, to foster the development of technologies for uses linked to the needs of the population.

With public procurement, criteria and requirements can be included that can favour one ecosystem or another. Only large supplier companies can bid on some of these contracts because of their capacity, price competitiveness, etc. So we also need to include criteria on the standards and values of these companies, which are often not incorporated in the bid specifications.

*I think the government needs to move forward at different levels. And, to begin with, it should do so at the level of public procurement for innovation, favouring technologies that meet the needs of the population.*

My proposal would be to encourage a specific ecosystem so that, in whatever territorial scope, there would be access to public funding based on certain criteria and requirements. I think this is the great lever of change the government can have.

**Q** **What kind of model should the public sector promote when designing these immersive spaces?**

**A** I would propose Carissa Veliz's model.[26] Ultimately, the basic problem is the attention economy[27] and the fact that it is permitted to organise information based on the exploitation of human vulnerabilities and miseries, so that we spend more time in an application.

The aim is that the attention economy does not dominate the playing field. Vélez proposes prohibiting the sale of personal data. Data should only be used for the common good and by public administrations. Attention cannot be exploited as a resource.

**Q** **And what can be done by the public authorities in issues such as planned obsolescence of hardware?**

**A** I think regulation is important here. Things like green bonds don't work. I don't think being able to pay to pollute is a good idea.

Regarding hardware (headsets, gadgets, etc.), the best option might be to encourage networks of reuse. Or make sure the parts manufactured are made based on the five R's: reduce, recycle, reuse, repair and recover. That is to say, it should follow very modular logic: if you wreck a two-millimetre piece, you don't change the entire device.

There is also the issue of data centres, of course. I would apply minimalist principle for data and gadgets. In terms of resources, use as little as possible, collect as little information as possible and occupy as little space as possible.

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[26] Carissa Veliz, Professor of Philosophy and Ethics at Oxford University, is the author of Privacy is Power: Data, Surveillance and Freedom in the Digital Age (Debate, 2021).

[27] The attention economy or data economy is the business model based on the monetisation of the personal data of users of digital services, and encourages them to spend as much time as possible on a platform or application. This model has been the most common in big tech companies in recent years

**Q** **How can the public administration itself participate in the metaverse to get the most out of it?**

**A** I think there is still a lot of work ahead in everything to do with improving citizens services. In two ways: building much more empathic and humane dimensions of contact with citizens, and better understanding the reality of the diverse societies we serve from government, so we can understand what the daily reality is like for the people we govern for as public decision makers.

We can't drop our guard as this can lead to new divides, which could affect, for instance, those that have been made invisible in the analogue system but are not yet invisible in the digital system.

That is, I see enormous potential in terms of citizens services, but also a significant hurdle to get there without furthering digital divides.
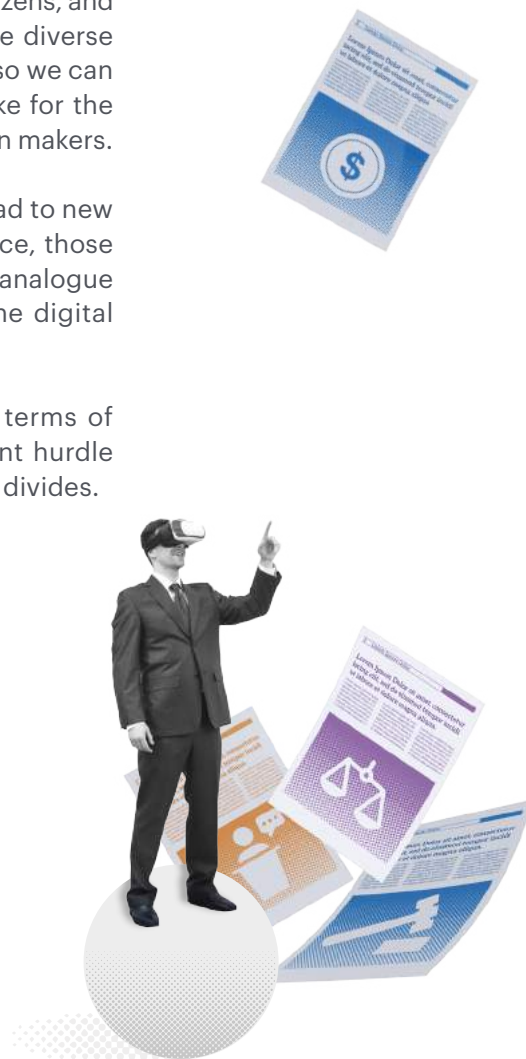
## BUILDING COMMON STANDARDS

No one knows for certain what the metaverse will be like in a few years. But all actors in the sector are aware of the need to establish common principles and standards. That is, standards that lean towards potential interoperability between the different existing immersive virtual spaces.

In the summer of 2022 the **Metaverse Standards Forum** was created,[28] a forum to discuss technical principles and global standards for these immersive technologies. This entity seeks to create a meeting place for technology companies and standards organisations experienced in developing these types of norms,

such as the World Wide Web Consortium (W3C), a key community in the development of current web standards.

The United Nations is also heading in the same direction. In January of this year, the International Telecommunication Union (ITU), the agency specialising in telecommunications, set up a specific working group to agree on technical principles for the metaverse.[29] Its objective is to develop a roadmap to facilitate the interoperability of metaverse services and applications, in addition to ensuring their quality and ensuring the security and protection of the personal data of users.

## THE EU'S POSITION REGARDING THE METAVERSE:
### PEOPLE, TECHNOLOGY AND INFRASTRUCTURE

Europe is also beginning to think about how to govern new immersive technologies. In her latest letter on the State of the Union, the President of the European Commission (EC), Ursula von der Leyen, included an "initiative on virtual worlds such as the metaverse" among the key lines of action for 2023.

Likewise, the European Commissioner for Internal Market, Thierry Breton, established which principles should guide Community regulation in this field[30]:

**People.** In line with recent digital regulations, the Commission wants the private spaces of the metaverse to be developed according to interoperability standards: "No individual private actor should have the key to the public square or set its terms and conditions."

**Technology.** Europe-based companies leading the development of immersive virtual reality technologies. The aim is to promote and boost this ecosystem with initiatives such as the Industrial Coalition for Virtual and Augmented Reality,[31] a space for dialogue between the private sector and legislators, and a way to channel public and private funding into the industry.

**Infrastructure.** The Commission is aware that these technologies will require a large amount of data exchange that will increase pressure on existing infrastructure. This is why it calls on "all market players who benefit from the digital transformation to make a fair and proportionate contribution" to this challenge. At the same time, it commits to a "broad reflection and consultation on the vision and business model of the infrastructure we need".

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28   https://metaverse-standards.org/

29   https://www.itu.int/en/ITU-T/focusgroups/mv/Pages/default.aspx

30   Full statement by the European Commission at https://ec.europa.eu/commission/presscorner/detail/es/STATEMENT_22_5525

31   https://digital-strategy.ec.europa.eu/en/policies/virtual-and-augmented-reality-coalition

# BUSINESS OPPORTUNITIES IN THE FUTURE METAVERSE

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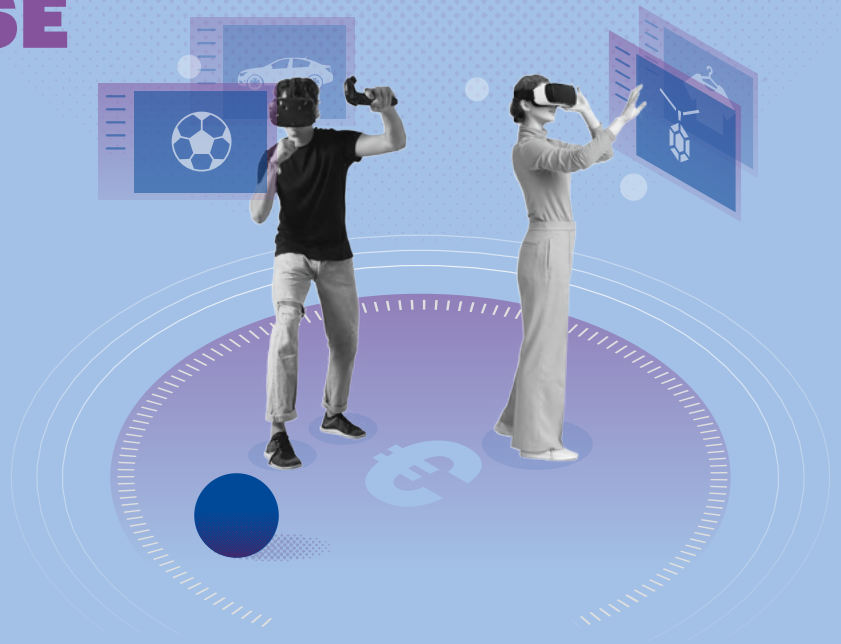
**F**or months big tech companies have been announcing millions in invest-ments in the development of the metaverse. At the same time, sectors such as entertainment, real estate groups and renowned fashion and luxury firms have launched their own immersive virtual spaces to attract customers and boost their brand image.

But, aside from the push by large corporations, the challenge posed by these technologies is to incorporate all kinds of companies and economic actors into this wave of innovation. The aim is that business opportunities do not remain in just a few hands, but extend to the maximum possible number of actors.

**Eduardo Canelles**, is a specialist in marketing and digital transformation, and di-rector of the metaverse development strategy at Adigital, the Spanish association of digital companies. We discussed how to create the conditions for the entire Spanish economic fabric to take advantage of these disruptive technologies.

**Q** **What is the potential impact of the metaverse on the Spanish economy?**

**A** There are still no clear data on its impact on the economy of Spain. We can, of course, speak in general terms worldwide: in 2021 it generated a turnover of USD 450 billion. And consultants' projections for 2024 are more than USD 800 billion. These same consultants, when projecting for 2030, according to the parameters used, put it at between USD 2.5 and USD 5 trillion.

Keep in mind that the metaverse is being driven by all the big tech companies, which these days dominate the main stock indexes with the highest market cap ever reached. Just imagine the market, sector and technologies powered by all these companies.

**Q** **Are these figures linked to big tech companies' investments or do they cover other areas?**

**A** If we talk about the investments of big tech companies in recent months, we're looking at around USD 300 billion. This includes the 20 billion invested by Meta in the creation of Horizon Worlds and the USD 14 billion Lenovo has announced it will invest to lead the metaverse.

**Q** **However, today the existing metaverse spaces are mostly related to entertainment and major brands…**

**A** Evidently, sectors such as fashion and video games are among the first to adopt the metaverse. But they are not the only ones. In education, the impact has been overwhelming. In fact, in Spain there are some remarkable experiences that are already succeeding.[32]

*The metaverse is being driven by big tech companies which today occupy the main stock indexes with the highest market cap ever reached.*

Another sector in which it can have a lot of impact is training in occupational risk prevention. Imagine workers who are training to act in a hostile environment. If we reproduce that environment, and completely control it, we can instigate incidents in real time and imitate the real world in that hostile and dangerous environment.

Once you are in an immersive environment such as the metaverse, within three minutes your brain can't differentiate between avatars and humans; between real and virtual environments. Therefore, all this practice in a controlled environment allows the operator to gain expertise as if they were experiencing it in the real world.

The field of healthcare or training in the technical professions are other fields with many possibilities.

**Q** **How can the conditions be created for all types of companies – not just big tech – to take advantage of these innovations?**

**A** At Adigital we run immersive sessions with companies for them to take their first steps in the metaverse and understand the technologies used in these immersive virtual spaces.

Keep in mind that, currently few professionals specialise in them, so companies are having to train them. We know that the metaverse is being built; but the cities in which we live are also being built and this doesn't prevent us from living in them.

One aspect that will facilitate adoption is the entire standardisation process that has already begun. This is why we have the Metaverse Standards Forum,[33] the international body working to define these standards.

Remember that many of the things that are happening now also happened at the start of the internet. As with the World Wide Web, common internet standards were established and no single corporation could control it; now work is being done in the same direction.

As for the ease of adoption of these technologies by different types of companies, we should bear in mind that there are already tools in the metaverse that facilitate the creation of these virtual environments with very little technical

knowledge, such as the platform Spatial.[34] Companies have to be aware that this is a good time to understand what the metaverse is, its competitors and their dynamics, the funding required, etc. In short, train now for when tough competition for markets, sectors and the public arrives.

**Q** **How would you evaluate the role of the Meta group in the development of these technologies?**

**A** Mark Zuckerberg's explanation of his project changed the dynamics of the metaverse and put it under the spotlight for companies, the market and users.

At Adigital we formed a national working group including Meta, Microsoft, Telefónica, Utopia Voyager and the business school ISDI. And, really, the dynamics and the level of influence of each one is completely equal. Not one of them dominates the discourse.

*Companies have to be aware that this is a good time to understand what the metaverse is, its competitors and their dynamics, and the funding required.*

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[33] More information on the Metaverse Standards Forum on page 37.

[34] Spatial is a platform that allows brands and organizations to create their own virtual spaces in 3D format.

In addition, in the metaverse there is a lot of collaboration rather than competition among companies. We know of the agreement between Teams and Microsoft to organise meetings in Horizon Workrooms, for example. While Meta is one of the main drivers, I don't really believe that communication or discourse is being monitored by it.

**Q** **Looking to the future, what lessons do you think we have learned in building the current internet and what should we apply to these technologies?**

**A** The first is that this time the regulations must somehow advance the implementation of immersive digital media. In the development of the internet, regulation has always lagged far behind. Institutions, governments and others have to make an effort to keep up with the development, through institutions such as Adigital or the Metaverse Standards Forum.

For instance, in Spain it is very difficult for a company to register a trademark as a digital asset; in the United States, a change has already been implemented in product registration classifications to allow this. Interoperability between virtual spaces and the current policy on cookies took too long to develop.

However, we must also learn from successes. In the early days of the internet, the standardisation process allowed that space to be adopted by everyone without supervision from any single large corporation.

At the same time, we shouldn't be afraid because there are companies really pushing the metaverse, because in the end, what they are pushing is a specific virtual world within the metaverse. In the metaverse we can talk about virtual worlds – even galaxies, that will form the metaverse. Within these virtual worlds there will be users, companies, institutions, etc. These are the lessons we should apply.

## FACEBOOK'S JOURNEY TO META

In October 2021, the parent company of the social networking site Facebook announced a name change and with it a change of global strategy. Facebook Inc. became Meta.

Mark Zuckerberg, founder and CEO of the group, thus consolidated his clear commitment to virtual and hybrid reality technologies. The year 2014 was decisive in that strategy. Then, the US company acquired Oculus VR, a leader in the development of VR devices, for USD 2.3 billion. Two years later Facebook released the Oculus Rift, the first helmet-shaped viewfinder used to access virtual reality spaces.

The second half of 2010 also coincided with a series of scandals that severely damaged the company's public image, while its social network gradually lost users.

The commitment to immersive technologies was made clear by Zuckerberg himself in a letter to his staff two years ago: "From now on, we'll be metaverse first, not Facebook first. Over time, you won't need to use Facebook to use our other services."

The same year Facebook became Meta, Horizon Worlds, a mix of immersive social networking and online multiplayer video games, was released.

In October 2022, the group launched Meta Quest Pro, its latest VR headset to hit the market.

## PUBLIC AID TO FINANCE THE METAVERSE

While the development of the metaverse is being promoted primarily by the private sector, public administrations also wish to play a dynamic role in these innovations.

In summer 2022, the **Spanish government** approved a package to finance experimental development and industrial research projects associated with the metaverse.[35]

The plan's objectives include promoting the implementation of audiovisual production tools and innovative digital content, and creating new virtual workspaces and establishing collaborations.

The government awarded a total of EUR 3.8 million in grants to 22 projects that integrated virtual reality, augmented reality and extended reality technologies, mainly in the sectors of audiovisual production and video games.

The bid specifications included the requirement that at least 25% of the implementing staff of each project be made up of women.

[35] https://portalayudas.mineco.gob.es/contenidos-inmersivos/Paginas/Index.aspx

# CONCLUSION

At the time of writing these lines, there is news that the European Commission plans to hold a public consultation on the development of a "vision for emerging virtual worlds (e.g. metaverses), based on respect for digital rights and EU laws and values",[36] which goes to show how topical the issue is.

Until two or three years ago, the word 'metaverse' was barely used outside the context of science fiction literature and cinema. It is now used increasingly often, yet there remains a lack of knowledge of its meaning. Some define it as the new internet. For others it is nothing more than an advanced version of the virtual reality and video games we already have. A large part of the population remains unaware of the term.

It is difficult to foretell whether or not Mark Zuckerberg's vision will come to fruition: that is an interconnected, unstopping 3D universe in which people will be able to interact, play, buy, work, do sports, attend concerts and travel to ancient Rome. The stream of articles written on the subject includes utopian visions of an idyllic environment along with dystopian narratives.

In recent years, the same technology companies have spread many messages about what users will be able to do in the future metaverse. From what is already known of virtual and augmented reality technologies **the future metaverse could offer important opportunities** to industry such as in the fields of health, education and training, employment in general, and planning and design activities in the construction industry.

Today, virtual reality technologies allow real situations to be reproduced and experienced first-hand, which is very useful in activities such as **prevention of occupational risks**, treatment of phobias or care for patients on chemotherapy. They can also be very useful to raise awareness of different social issues.[37]

Nevertheless, although the future metaverse could offer significant opportunities, we should also be prepared for the social challenges that can arise. The following are some key insights drawn from the seven interviews conducted for this document.

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[36] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13757-Mundos-virtuales-metaversos-una-vision-de-apertura-seguridad-y-respeto_es

[37] See, for instance, the Meta VR For Good project. The purpose is to see through the eyes of someone who suffers a bad experience or is discriminated against, such as the black population in the United States, war refugees, people with a physical or mental disability or those who live on the street. https://about.meta.com/es/community/vr-for-good/

The first is based on the words of Pedro Lozano: "**There is nothing like physical human contact**." Periods of mobility restrictions and social distancing during the COVID-19 pandemic served as examples of what happens when limits are placed on human interaction. Being able to connect on screen prevented many long hours of solitude. At the same time, we are social beings, we need physical human interaction. There is evidence that lack of face-to-face contact creates problems in social relationships and can lead to serious mental health problems. In-person interactions in the physical world bring benefits that cannot be substituted by any parallel virtual universe, however realistic an experience.

Yet digital worlds are often ascribed ideal qualities. We are seeing this now with the metaverse. In the future parallel universe, we can supposedly be a better version of ourselves, create communities, be more connected. But, while it is true that the metaverse could facilitate communication among people in different physical spaces, **we must be wary of idealising the alternate digital world**. Just as it happens in the physical world, the world of gaming and video game spaces **are not free from violence, harassment, discrimination or racism**. On social networks, people say things they wouldn't say in the real world. It is reasonable to anticipate that the pattern will repeat in the metaverse.

In addition, **immersion** is posited as one of the great advantages of the future metaverse, but it can also **add a new factor to the violence**. If it is already problematic to moderate social media, in the metaverse, where the actions of avatars will also have to be judged, how will we do this in real time, given we won't always have enough context to understand every gesture?

Another lesson learned from video games, social media, audiovisual content platforms, and the endless amount of content available on the internet (you can scroll ad infinitum) has to do with the issue of addiction – a problem that particularly concerns the new generations. The current business model is based on the attention economy. If future metaverse applications are built **on the same business model, the same addiction problems can be expected**. To avoid this, we will need alternative business models to the current one of extraction and accumulation of personal data and exploitation of screen time.

The pandemic left behind proof of many revelations, including evidence that our societies are caught in **multiple divides. One significant example is the digital divide**, which became very clear when schools closed and teaching took place done remotely via the internet. To be able to actively participate in the metaverse, it will require both hardware and software, connectivity and digital capabilities. Today, however, almost 40% of the world's population still does not have access to the internet. How will the metaverse impact this divide?

**Another divide** that clearly pervades society and the technology industry is **gender**. The video games field, the main engine of global entertainment, is dominated by men – only 16.5% of people directly employed in the sector in Spain are women[38]. In 2019, only 2% of the 520 companies in Spain were established by women.[39] All this despite the fact that the number of female players exceeds 42%. The data beginning to emerge on the construction of the metaverse reflect the same pattern: there is already a broad base of female users, but few women in positions of power and leadership. A recent study by consulting firm McKinsey indicates that women represent half the users of the new virtual worlds but represent a very small minority of the high-level positions leading the debate on the new standards for the metaverse.[40] **Only 8–10% of the companies that are members of the Metaverse Standards Forum and the Open Metaverse Alliance for WEB3 (OMA3) are led by women**. It's a similar percentage to that of women-led Fortune 500 companies, which is 9%.

As for the impact the metaverse could have on business, at present the technology is mainly being driven by big tech firms. But the Spanish business fabric mainly comprises small and medium-sized companies: 95.5% of companies in Spain do not exceed 9 employees.[41] In the last decade, these SMEs have had to create an online presence, establish cybersecurity measures and adapt to the use of ICT and e-commerce. The drive to digitalisation is highly conditioned by the availability of funding, as well as the degree of training.[42] Providing services in the metaverse and monetising them would mean new investments and may result in new divides. For now, both in our country and globally, the companies backing this new space the most are **major brands (from the entertainment and fashion sectors) and tech startups specialised in VR and AR**.

Finally, one of the possibilities offered by the future metaverse is the ability to work through an avatar, **reducing economic costs and the environmental impact of travel**. This positive aspect, however, may be **counterbalanced by the large amount of data and energy consumption** required by the technologies underpinning the metaverse. The last two decades have shown us that technological development has both beneficial and harmful effects in the fight against global warming: blockchain uses vast amounts of natural resources and energy, as do video streaming, gaming and augmented reality technologies, which seek to offer ever-higher image resolution.

[38] https://www.infolibre.es/cultura/brecha-genero-instala-industria-videojuego-gamers-son-mitad_1_1193063.html

[39] https://www.ulpgc.es/sites/default/files/ArchivosULPGC/noticia/2020/Ene/estudio._genero_gamers_y_videojuegos_1.pdf

[40] https://www.mckinsey.com/featured-insights/diversity-and-inclusion/even-in-the-metaverse-women-remain-locked-out-of-leadership-roles

[41] https://www.ontsi.es/sites/ontsi/files/2021-09/digitalizacionpymes2021analisiscomparado.pdf

[42] https://espanadigital.gob.es/medida/plan-de-digitalizacion-de-pymes-2021-2025

Increasingly more energy-efficient servers are helping to reduce consumption. But, in turn, renewing servers every few years generates more waste. According to the United Nations, in this technological age we are experiencing a "tsunami of e-waste", that is, disproportionate generation of waste, in addition to the use of materials that sometimes come from areas of armed conflict. To this mountain of electrical and electronic waste will be added the headsets, controllers and sensors of the future metaverse, which will need hardware but, above all, software.

In closing, throughout history, technological development has brought major advances, while at the same time it has led to social challenges and unexpected negative impacts. In the early 2000s it would have been difficult to foresee that today we would pay by mobile payment apps such as Bizum, have videoconference meetings with people on the other side of the world or use a tool such as chatGPT. But it would also have been difficult to imagine that social media would contribute to the polarisation of society, the deterioration of the mental health of adolescents or be used as a tool of violence against women.

There is much we can learn from the events of the 21st century so far, especially in terms of the growth of the internet, development of digital technologies and applications, use of mobile internet devices, and interaction on social networks. We must remember and apply these lessons in the development of this new universe that is the metaverse. We had no warning signals when the first wave of social media burst into our lives, but we do now at the start of this second wave.[43] How we go about facing the social challenges it entails, and avoid or minimise the negative impacts of the future metaverse is in our hands.

[43] https://medium.com/predict/the-trouble-with-life-in-the-metaverse-7382ca8f1ddd

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