



PUBLIC ADMINISTRATIONS IN THE DIGITAL SPACE: Challenges and Opportunities Through the Metaverse

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ABSTRACT

This study analyses the use of the metaverse by public administrations, its level of implementation, specific public policies currently being carried out, and the associated challenges and opportunities. To this end, a review of the main scientific bibliographic databases was conducted. Specific examples are described, particular cases of its use in relation to democratic improvement are considered, and the substantial immediate costs involved in its development, primarily of a technical, environmental, regulatory and ethical nature, are examined.

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1. Introduction

Throughout the twenty-first century, new forms of communication have continued to emerge in our societies; increasingly innovative software applications enable more immediate communication, the Internet of Things has become progressively more prominent, as have social media platforms (such as Twitter, X, Facebook, Meta, Instagram and WhatsApp). The role of social media as a means of citizen participation became evident in movements such as the

Arab Spring in 2011 (which led to the fall of the dictatorships in Tunisia and Egypt) and the 15-M movement, in which citizens mobilised in pursuit of improved rights. Social media can act as an amplifier of local or national issues, to the point that such debates may acquire a global dimension. Likewise, the experience of following a live political debate on television while simultaneously consulting other perspectives on Twitter (now "X") reflected a scenario that had already moved beyond traditional media (Ricoy-Casas, 2022a). This is also currently the case with other tools such as chatbots, artificial intelligence and the metaverse (Torreblanca, 2024). Communication also involves sharing with particular individuals, communities or groups within a relational system in which public administrations exercise leadership.

If a new model of innovative public management is developed (for example, through the metaverse, gamification or blockchain), it could be linked to open government and aspirations towards direct democracy, but it should always be guided by the pursuit and development of better and more effective public policies and services, greater social impact, universality, the public interest, ethics and legality.

1.1. Identity and Representation of Public Administrations in the Digital Space

According to Jesús Palomar i Baget (2017), "digital identity" or "identity 2.0" refers to the identity that exists within this environment, including social media platforms used to disseminate administrative information and content relating to "aspects of transparency, participation and open government" (Curto, 2023), as well as for other communicative purposes. The representation of public administrations on social media involves a number of particularly relevant circumstances concerning representation and integrity: 1) not only is the institution itself identified, but its representatives are also present online (certain personal comments relating to politics may have a particular impact on the institution and may create confusion between an individual's private opinion and their public position as a senior official within a public administration); 2) information disseminated by political parties in relation to individuals holding prominent positions may be controversial.

Vázquez Alonso distinguishes between two legal concepts, namely "public forum" (spaces under state control in which this freedom may not be restricted on the basis of the ideological content of the opinions expressed) and "government speech" (which limits government responsibility for its ideological discourse to political rather than legal responsibility). Therefore, when the government itself speaks, it cannot be required to do so neutrally, unlike a private user, who may block others regardless of how many followers they have or how significant the debate generated on their timeline may be. The most striking aspect of this case law is that it recognises that this platform may contain sub-forums that can indeed be regarded as public, since, although they are not owned by the State, they remain under its authority and control (Vázquez, 2020). Significant court cases, some of which have been questioned by sections of legal scholarship, have already been decided concerning political opinions expressed even in private forums by prominent members of public administrations (Ricoy-Casas, 2022d). It is therefore important to analyse how these practices are now manifested through new technologies such as the metaverse, drawing on the most recent scientific literature and examining and discussing the challenges and opportunities they present.

3) We are facing the "perfect storm" because "the precision with which politicians can take the pulse of the electorate in the technological age represents a genuine paradigm shift; the combination of *big data*, micro-segmentation and other marketing techniques enhanced by AI and algorithms enables them to deliver personalised messages" (Ricoy-Casas, 2022b), or "tailor-made political programmes" rapidly exploited by "*spin doctors*" (Ricoy-Casas, 2022c), even interfering with privacy and electoral activities themselves in Spain (Ricoy-Casas, 2019). 4) Institutional dissemination is predominantly prioritised over analysis of the use of social media to generate professional interactions within organisations and with citizens, which are closely linked to "open government" in order to create "collective intelligence" (Barragán, 2023; Espinoza, 2023; Gómez, 2023; Kontogianni & Anthopoulos, 2024; Villodre, 2020, 378). According to Bonilla (2024, 13), "open government provides the data and digital government

implements the processes", although the interoperability and administrative effectiveness and efficiency claimed by countries such as Estonia, where a system of "comprehensive digital governance" has been implemented, must not come at the expense of fundamental rights. There have been numerous data-protection scandals, including the "Facebook Files", "Cambridge Analytica", the "Brexit Referendum", and multiple disinformation campaigns in serious situations such as "Covid-19" and wars (Syria, Ukraine), which have forced governments and even the European Union (EU) to adopt specific measures. 5) We are also encountering increasingly technologised and innovative environments such as the metaverse, whose origins and development have already been examined, particularly in the field of political communication (Ricoy-Casas, 2023).

1.2. Progressive Adoption of New Technologies in the Digital Space by Public Administrations, Including the Metaverse

The use of Web 3.0 technology, which represents the third generation of the Internet, has enabled increasingly technologised and innovative environments in which emerging tools are used in virtual settings, such as Virtual Reality (VR), Augmented Reality (AR), Extended Reality (XR) and Mixed Reality (MR). These environments must meet not only the demanding requirements of technology enthusiasts, but also ensure a safe setting in which users benefit, among other things, from ethical principles and confidentiality. Further progress is also required in relation to interoperability between *blockchains* that interact with citizens, companies, organisations and other public administrations (Torreblanca, 2024), since this is an increasingly complex environment that requires specialised technical expertise. Muñoz (2023) explains how the use of this technology (in the case of public *blockchain*) escapes centralised control, despite requiring digital key systems, and also entails risks for public administrations. It is therefore necessary to professionalise the sector in order to provide greater security and reliability and, where required, to establish the role of an "institutional *community manager*" and other specialised technical professionals. Blockchain is a decentralised data ledger that permanently records transactions and events across multiple computers and may be regarded as a basic infrastructure for the development and operation of the metaverse (Lnenicka et al., 2024) (Castellanos-Cortés & Arévalo-Robles, 2024).

The metaverse is a virtual world in which users, through their avatars, engage in interactive experiences without being physically present in that location. It combines virtual reality (VR) or augmented reality (AR) technologies, allowing people to socialise, create, purchase goods and services and even undertake training within these digital realms. Innovative applications and solutions developed in recent years are citizen-oriented and mainly cover areas such as healthcare, education, leisure and business. Only in recent years has greater interest emerged in the field of public administration. The benefits of digital services aimed at the public have attracted the attention of those who were previously less interested in participating in virtual environments or reluctant to engage with the opportunities offered by emerging technologies, within the context of what has already been termed "the transition to Industry 5.0" (De Giovanni, 2023).

2. Objectives and Methodology

In light of the above, it is necessary to be aware of the strengths and weaknesses of some of these new technologies (chatbots, the metaverse, blockchain and gamification), particularly when they are applied by public administrations (PAs), given the negative consequences they could have for our societies. This study focuses on the use of the metaverse by public administrations. For these reasons, an exhaustive bibliographic and documentary review is conducted using the PRISMA methodology and analysing data obtained from Web of Science and Google Scholar. Examples are examined of the implementation of the aforementioned innovative approaches to the identity and representation of public administrations in the digital space, and their challenges and opportunities, principal regulatory and ethical issues, contribution to better governance and relevance to the scientific community are considered. Ultimately, this study seeks to offer recommendations for these environments with a view to improving the quality of our democracies.

2.1. Objectives

The following research questions, which constitute the main objectives of this study, are formulated:

- RQ1.- Effective integration of the metaverse by public administrations (PAs): the aim is to analyse its implementation in public administration, describe specific examples of its use, and consider particular cases in which it has been used in relation to democratic improvement.
- RQ2.- Environmental, regulatory and ethical challenges associated with the implementation of these technologies by public administrations (PAs): what are the main challenges associated with the use of these technologies? How can states effectively address these issues in the face of the seemingly unstoppable implementation of these systems?

2.2. Methodology

To conduct the systematic literature review, the methodological guidelines of PRISMA were followed, covering its three fundamental stages: planning, execution and presentation of results. This made it possible to identify the context previously examined and to determine findings, limitations, implications, gaps and areas for future work in order to address the research questions posed (RQ1 and RQ2) (Page et al., 2021; PRISMA, n.d.). During the planning stage of the review, a comprehensive search strategy was designed to encompass the key terms relevant to the study. Initially, the AND operator was used to combine the term "public administrations" with "metaverse", thereby limiting the scope of the study exclusively to the implications of this specific tool in this field (PAs). No time restriction was established, since the results comprised only one publication from 2017, one from 2021 and the remainder from 2022 onwards, giving a total of 40 results (7 from 2022, 15 from 2023 and 16 from 2024). The findings are therefore concentrated within a three-year period, which is consistent with this type of innovative technological application that is still under development. In this systematic literature review, articles published in journals indexed in Web of Science were selected. Once the results had been obtained (40 publications), duplicate studies and those that did not fall within the scope of the study and/or were not relevant to the research questions were excluded (7). The results were subsequently supplemented with other research and official publications from public and private organisations that fell outside these delimitations and formats. At a later stage, works identified through manual searches in Google Scholar were also used to complement the analysis and reflections, and these are clearly distinguishable within the study.

3. Results

Little attention has been paid to the potential impact of the metaverse on the government sector, as it has been addressed primarily from the perspectives of business, education, marketing and communication.

3.1. Effective Integration of the Metaverse by Public Administrations (PAs)

A distinction can be drawn between countries where the metaverse or metaverses have already been effectively implemented ("metaverse" or "metaverses", since different platforms exist, although there is awareness of the need for interoperability for all of them to succeed) and those where they remain at the project stage, despite involving significant financial investment. Among the former are initiatives such as that launched in October 2022, when the first Metaverse embassy was opened in South Korea (Al-Monitor, 2022). Likewise, "Metaverse Seoul" (the metaverse of the South Korean capital), announced in 2021 and trialled in 2022, is a virtual replica of the city of Seoul that aims to expand and improve public services such as tax advice, youth mentoring, access to e-books and support centre for businesses experiencing difficulties, as well as the creation of a museum and a virtual space on the border with North Norte (Choi et. al., 2022; De Almeida, 2023; Park, 2023; Sung-Eun, 2023; Young, 2023). At the "Corporate Support Centre", businesses can consult experts in start-ups, law, human resources (HR) and other fields (Cryptoflies, 2023). Metaverse Seoul is available on Google Play and the Apple Store. For foreign users, conversations are translated into English (Kshetri, 2024). *Time* recognised "The Metaverse Seoul" as one of the best inventions of 2022 (Heussner, 2022).

In Helsinki, the virtual reality studio ZOAN created "Virtual Helsinki Metaverse" (Kshetri, 2023), while in Norway, the Brønnøysund Register Centre manages numerous public registers, and

Skatteetaten, the country's tax authority, partnered with EY to open virtual offices in the "Decentraland" metaverse (Fortis, 2022). The United States (US) Department of Commerce has established a presence in the metaverse to foster connections and collaboration among a wide range of stakeholders, offering VR experiences to governments, global corporations and the public (Kshetri, 2023). Cities such as Orlando, Las Vegas and Boston have already developed digital twins of their cities (Glickman, 2022). We assume that the strong support shown for technology companies during the early days of Donald Trump's government in 2025 will considerably advance the initiatives described above. China is another example: as early as August 2022, Shanghai established the "Metaverse and Virtual Reality Interaction and Interconnection Research Institute", and metaverse initiatives have been developed in public services, including a virtual replica of a real entertainment venue in Shanghai's Fengxian District, which has a 3D model on the Xirang metaverse platform. This allows people to experience the progress of urban development and, in the future, access government services (Kshetri, 2023; Kshetri, 2024).

Zaragoza City Council was the first Spanish public administration to invest in creating its own NFTs in 2021 for tourism and citizen participation. In 2020, during the coronavirus pandemic, the city's most emblematic event, the offering of flowers to Our Lady of the Pillar, was cancelled, and Zaragoza City Council decided to launch a virtual alternative and create its own metaverse (Fernández, 2022). In Catalonia, the Government of Catalonia, together with the Barcelona Chamber of Commerce, launched "CatVers" in January 2022, a metaverse designed to promote the Catalan language and Catalan culture (La Vanguardia, 2022). The Spanish city of Benidorm is launching a platform to help promote tourism. It is based on a metaverse platform called "Benidorm Land", created by SIX3D, which represents the city virtually and complements it with objects and avatars (visitbenidorm.es). In Valencia (Spain), a virtual tourist information centre has also been created on the Spatial-io Metaverse platform to promote the city (Martí-Testón et. al., 2023).

Other projects have not yet achieved effective implementation, although the budgets allocated to many of them are significant. These include efforts by the Singapore government since 2015 to work with the French software corporation Dassault Systèmes to develop a digital twin of the city-state, known as Virtual Singapore (Kshetri, 2023). Saudi Arabia has launched the National Gaming and Esports Strategy and has made substantial investments in metaverse gaming (Kshetri, 2023). Other countries, such as Romania, are exploring its use for organising events and meetings in virtual environments, including conferences and workshops at public-institution level, as a strategy to provide citizens with a virtual space where they can communicate easily with staff from a municipality or government agency, obtain answers to their questions in real time or pay their taxes in a user-friendly, interactive and immersive 3D environment from a computer or personal mobile device (Aspen Institute Romania, 2024; Zamfir et. al., 2024).

Among the benefits of implementation identified by the aforementioned authors are: 1) public-private partnership initiatives: the metaverse has the potential to reshape local economies through digital platforms, virtual marketplaces (with virtual payment) and innovative business models, which may have a positive impact on economic growth, entrepreneurship and job creation. It could provide a fertile environment for innovation and entrepreneurship. It allows start-ups and SMEs to experiment with new business ideas, test market demand and scale their activities in virtual environments; 2) it constitutes a highly effective channel for the provision of certain government services, such as virtual customer service centres, digital forms and interactive platforms that enable citizens to access information and submit applications. Digital citizen identification cards could ensure secure authentication and access to personalised services; 3) some authors even suggest that it could encourage participation in decision-making processes at any time and from any location, since virtual voting platforms allow citizens to express their views and contribute actively to shaping the future of their community.

4) Some authors have perceived it as a kind of new form of "open government", insofar as real-time information ensures that citizens remain continuously informed about news, events and opportunities relating to the city, thereby fostering a sense of belonging and civic pride. By using the metaverse to improve services and citizen participation, cities can create more inclusive and responsive governance structures based on transparency, accountability and public participation (Maier & Winberger, 2024); 5) it may enable more engaging forms of connection, particularly among younger people; 6) it allows experiences that are not possible in the real world, for example tourism-related experiences for people who do not wish or are unable to travel (tourists can use their smartphone camera and an AR application to experience AR in the real world, which is expected to increase the attractiveness of tourism) (Um et.

al., 2022), while also enabling marketing campaigns to attract visitors; 7) more generally, it allows citizens to immerse themselves in a diverse cultural offering, visit historical sites and interact with local artists and performers from anywhere in the world (Chen et. al., 2024).

8) Before actions and decisions are implemented in the physical world, a digital twin can help simulate them in various sectors, such as retail and real estate (O'Malley, 2022) or architecture itself (Gu et. al., 2023); 9) several authors establish a connection that is expected to develop between smart cities and the metaverse (and its potential to revolutionise smart cities), both because of the technologies they use and because it opens up new possibilities for advanced urban planning and simulation tools that enable a comprehensive digital representation of the urban environment, facilitating joint decision-making among public administrations, planning offices and public institutions (Chen et. al., 2024; Maier & Winberger, 2024; Yaqoob et. al., 2023); 10) in turn, this type of planning, through data analysis, could anticipate future energy needs and strategically allocate resources in order to maximise savings and minimise environmental impact. Likewise, if most services are delivered through these systems, activities requiring the use of urban resources such as office space, transport infrastructure, entertainment centres and other facilities that consume large amounts of energy would be reduced (De Giovanni, 2023; Valeri & Montagna, 2021); 11) real-time monitoring and response systems provide public administrations with up-to-date information on the state and performance of the city, enabling emerging problems to be identified and rapid responses to citizens' needs, thereby directly affecting management itself (for example, decision-support systems for assessing and prioritising sustainable urban transport in the metaverse) (Deveci et. al., 2022); 12) it could contribute to creating a kind of global network of stakeholders that fosters a holistic and innovative approach to data governance (Dia, 2023); 13) educational institutions and universities face the challenge of widening access to education and promoting collaboration among students, teaching staff and researchers. The metaverse could offer a solution by using virtual environments to create innovative learning opportunities (Maier & Winberger, 2024) that are more participatory and dynamic, adaptable to different learning styles according to students' needs (Locurcio, 2022; Pradana & Elisa, 2023) and more accessible (Allam et. al., 2022).

3.2 Environmental, Regulatory and Ethical Challenges of Implementing the Metaverse in Public Administrations (PAs)

There are substantial immediate costs involved in the development of the metaverse itself, which will involve numerous actors (governments, public administrations, private companies, regulatory bodies, etc.), including: 1) interoperability (primarily technical and regulatory challenges), if the metaverse project is to prosper, unless one of the platforms comes to dominate most of the market; 2) some scholars have recently highlighted the need to understand user resistance, a key barrier that can sometimes lead to the failure of innovation, and the determinants of citizens' adoption of metagovernment services are therefore also being investigated (Al-Adwan, 2024); 3) it requires good symmetric broadband connectivity, high speed and low latency, as well as other requirements that enable real-time virtual reality experiences. At present, China clearly leads the development and implementation of 6G, while many countries outside the sphere of the US and the European Union still use 4G, meaning that asymmetries between countries will also arise; 4) it also requires huge data centres and other high-cost, high-consumption infrastructure; 5) it requires various types of devices (software and hardware) that remain expensive; 6) electronic waste will increase (because of the need for new devices and the obsolescence of others). Several authors have identified positive environmental effects arising from the implementation of the metaverse and, consequently, regard it as a sound public policy for governments to implement from an environmental perspective, by reducing activities that require the use of the aforementioned energy-consuming resources. Demand for these and other activities and objects would also be substantially reduced (Valeri & Montagna, 2021) (De Giovanni, 2023).

7) From a social perspective, some scholars consider that the metaverse promotes social interaction within the digital world (Henning-Thurau et. al., 2023; Oh et. al., 2023; Kontogianni & Anthopoulos, 2024; Wang et. al., 2024) and may even have transformative potential for the healthcare sector (Raghu et. al., 2024). Nevertheless, several authors (Gadekallu et. al., 2023; Kontogianni & Anthopoulos, 2024; Vlăduțescu & Stănescu, 2023) have highlighted the potential negative impact of the metaverse on the environment due to constant technological change, increased energy consumption and carbon dioxide emissions. Social science literature is critically exploring how smart-city imaginaries promote techno-

utopian fantasies, regarded "as emblematic of the colonisation of contemporary (urban) futures by vested interests" (Bina et. al., 2020). The growing trend towards contactless lifestyles has been a key driver of the Seoul metaverse (Dong-Hwan, 2023). The significant reduction in real-world social interactions that this may entail, and the possible resulting psychological implications, must also be taken into account.

The devices used to access the metaverse are unaffordable for most users. Not everyone may be able to use the metaverse on equal terms because of the cost of purchasing (Dahan et. al., 2022; Kuro, 2023), devices such as haptic gloves, presence-related costs, broadband, etc., which could create accessibility difficulties and even a new digital divide or exclusion. Age may also be a factor. Users with greater resources may have easier access to government. The Mayor of Seoul acknowledged the existence of a digital divide between older and younger generations (Tan, 2023). This could lead to the marginalisation of certain groups and the neglect of social and cultural exchange, which in turn could result in citizens' alienation and the loss of local culture. D'Agustino (2022) has pointed out that the metaverse may cause addiction and negatively affect mental health: after spending time in an ideal world, the real world may prove disappointing, while metaverse content has the potential to be even more influential (D'Agustino, 2022; Liu et. al., 2024). XR devices have been shown to affect human health in areas such as vision and addiction *adicción* (Rauschnabel et. al., 2022; Villa, 2024). Participation in online activities such as gaming, e-commerce and social media platforms may trigger behavioural addictions (Griffiths et. al., 2016), and the most addictive element of the metaverse lies in its ability to replicate reality (Kim & Kim, 2023), including the creation of our avatar and the emulation of our clothing and physical appearance (Wang, 2023). It constitutes a form of virtual reality in which any virtual interaction can also have a direct impact on the real world (Ifdil et. al., 2023).

Therefore, regular use of the metaverse may blur awareness of the distinction between reality and virtuality, generate anxiety and addiction, and have negative effects on everyday relationships, work performance, etc. According to Usmani et al. (2022), the so-called "Proteus effect" may occur, whereby people who invest a significant amount of time and effort in shaping their virtual identity tend to adopt characteristics of their digital character, thereby leading to changes in their behaviour in the real world. This effect appears to be present within the metaverse and may potentially alter their mental stability. Research remains insufficient in this area regarding how it will affect us physically and psychologically, although the effects of hyperconnectivity have already provided evidence in this regard (Pozos, 2023; Maldonado, 2024).

Information could also be easily manipulated, or users may be unable to discern and verify information (as already occurs in the digital sphere, for example on social media), while freedom of expression could be controlled by companies rather than governments. Indeed, some authors expect the metaverse in China to be highly regulated and subject to country-specific restrictions. For example, video games must be approved by the government before being released onto the market. Content deemed obscene or containing excessive blood and violence is prohibited; a form of user-registration system may be created in an attempt to prevent users from influencing public opinion more broadly; and specific training may even be used to promote the interests and agenda of the CCP (the Government) (Kshetri, 2023).

All of this raises critical questions regarding how digital urban societies will develop, what new cultures may emerge and what governance structures these cultures will require, that is: what guidelines and principles will be applied in the metaverse (through the use of algorithms and artificial intelligence) to profile behaviour and socially classify users in the virtual world. This requires complex regulation compatible with the desired interoperability, a high degree of transparency for users and mechanisms for monitoring outcomes in order to prevent the errors, biases and discrimination to which these new technologies are not immune. Major metaverse actors, such as Meta, have recently shifted their focus from the metaverse towards generative artificial intelligence (GenAI) (Kshetri et. al., 2023), making it even more difficult to control. At the same time, some countries are building the necessary infrastructure in an attempt to overcome technical challenges, but without taking into account critical social and regulatory requirements relating to scalability, interoperability, simplified interfaces for non-technical users, privacy, security, etc. This will further intensify geopolitical tensions between unrestrained economic expansion and the continued development of robust frameworks, a concern in which the European Union has taken the lead.

As Goldberg & Schär (2023) have explained, blockchain- and DAO-based governance should not be regarded as a guarantee of a decentralised governance process. They offer several advantages, while

open standards and infrastructure allow people to vote with their feet and fork the entire project if necessary. As such, a blockchain-based governance system and an ownership layer constitute a necessary but not sufficient condition for neutral metaverse infrastructure. The metaverse and its interaction with smart cities will enable comprehensive profiling of all users. Indeed, as Yaqoob et al. (2023) have explained, virtual reality and augmented reality, the two most popular technologies driving the metaverse, pose several security risks, including social engineering attacks, identity theft and ransomware. These risks stem from the use of facial, voice and video recognition features to verify identities and interact within the metaverse. Our human and civil rights could very easily be undermined under multiple pretexts. Some authors have already identified precedents in the field of public health, for example the fine-grained tracking and tracing technologies used during the peak of COVID-19, according to some studies (Bibri & Allam, 2022; Kitchin, 2020; Sekala et. al., 2020) and, more broadly, the incremental deployment of all technologies that enable so-called "surveillance capitalism" (Zuboff, 2023). Some researchers have suggested that synchronously delivered information is likely to have a greater impact (Gong and Yan, 2023). There are undoubtedly large-scale negative outcomes, including privacy violations, harassment and other unethical, violent or abusive practices, while the 360-degree nature of new environments could increase their intensity and impact (Thorsten Hennig-Thurau, 2023).

There are no well-defined regulations for addressing the dark side of the metaverse, which may make this channel unsafe. These risks may negatively affect responses to metaverse-based government applications, particularly more advanced functions such as voting. Children and other social groups may be exposed to unwanted behaviour that is difficult for governments to detect. Many authors have highlighted the lack of adequate regulatory frameworks for governing the metaverse (Chen et. al., 2024; Dwivei et. al., 2022; Dwivedi, Hughes et. al., 2023). It is a space which, if regulation remains lax, may become conducive to certain unlawful activities. For example, abusive use will be difficult to control and the very perception of the space may increase criminal activity among some individuals who feel a greater sense of impunity. Invasive advertising, disinformation, fake news, post-truth narratives, propaganda, polarisation, identity theft and other offences relating to finance, terrorist activities and gender-based violence may also proliferate. Perhaps for this reason, some authors have referred to it as the "Darkverse" (Dwivedi, Kshetri et. al., 2023). This problem is compounded by the difficulty of enforcing laws because of the virtual nature of the environment and the location of major technology companies in "regulatory havens" (for example, countries such as the US).

4. Conclusions

It is indisputable that many governments and public administrations around the world are experimenting with or using emerging technologies such as the metaverse to enhance state capacities, incrementally transforming numerous processes and procedures. Synergies between the public and private sectors have not always proved successful in the pursuit of effectiveness and efficiency in administrative activities and in all functions serving the public interest, despite the fact that their use could bring enormous benefits in broad areas such as management and open government. The issue, therefore, is not to question technological developments, but rather how they are regulated, how human-centred standards are developed (promoting digital literacy, accessibility and equity — for example, without restrictions of time or location and free from biases related to gender, disability or profession), how respect for fundamental rights is ensured, and what regulatory efforts are made to guarantee this worldwide. The alternative would be an erosion of social and democratic states governed by the rule of law, whose benefits we had considered firmly established. A constant and troubling deterioration in our well-being as individuals and citizens can be observed.

The connection between the metaverse, smart cities and critical infrastructure (systems and networks essential to the functioning of our societies, such as hospitals) must also be taken into account. The rapid implementation and expansion of these systems without sufficient verification across all areas will make them particularly vulnerable. It is also concerning that, despite scientific evidence regarding climate change and the need to transition towards a more sustainable environment (for example, through renewable energy sources such as solar, wind and hydrogen), these emerging technologies may become a new large-scale driver of energy consumption and thus represent a further contradiction within green policies. In reality, they would continue to follow the logic of the synergistic operation of hyperconnectivity, digitalisation, datafication, algorithmisation, platformisation, control mechanisms and commodification, thereby increasing the power of those already powerful (corporate and governmental elites) by eroding democracy, undermining privacy and personal autonomy, and

diminishing civil liberties. Or, as Bibri & Allam (2022) put it: "designed to shape, control, and predict the behaviour of human users to produce docile, submissive, and obedient bodies. We therefore agree that the promotion and use of invasive technologies in the age of surveillance capitalism outweigh concerns regarding human and civil rights".

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