GENEVA GRADUATE INSTITUTE

TECH HUB

INTERNATIONAL GENEVA IN THE METAVERSE

RISKS AND OPPORTUNITIES

Authors:
Haore Hadi
Margherita Vazzoler

In a partnership with:
Tech Hub, IHEID

Under the supervision of:
Pedro Dos Santos Maia
Jerome Duberry

Table of Contents

Acknowledgements

This report was co-authored by Haore Hadi and Margherita Vazzoler as a partnership between the Geneva Graduate Institute (IHEID) and the Tech Hub Initiative, who we sincerely thank for allowing us to contribute to their research work. We would like to express our earnest gratitude to the following individuals and organisations for their invaluable contributions and support throughout the research and writing of this paper:

We are deeply grateful to our tutor, Pedro Dos Santos Maia, for his guidance, expertise, and continuous support throughout this project. His insightful feedback and encouragement have been instrumental in shaping the direction of our research. At the same time, we want to extend our recognition and gratitude to Prof. Jerome Duberry, our academic supervisor, whose support, constructive feedback, and competence have greatly contributed to the direction and quality of this research.

We also extend our heartfelt appreciation to the interviewees who generously participated in our study: Mr. Konrad Seifert (Simon Institute for Longterm Governance), Ms. Melissa Kiehl (ICRC), Mr. Federico Mantellassi (GCSP), COO Flora Fang (Highstreet) and Dr. Alexander Barclay (Cantonal Digital Delegate, Geneva). Without their willingness and cooperation, this research would not have been possible; we thank them for sharing their time and insights.

List of acronyms and abbreviations

ICRC: International Committee of the Red Cross

UN: United Nations

AI: Artificial Intelligence

COO: Chief Operating Officer

CEO: Chief Executive Officer

IR: International Relations

3D: Three-Dimensional

VWs: Virtual Worlds

XR: Extended Reality

VR: Virtual Reality

AR: Augmented Reality

MR: Mixed Reality

IoT: Internet of Things

DeFi: Decentralised Finance

NFTs: Non-Fungible Tokens

DAOs: Decentralised Autonomous Organizations

ITU: International Telecommunication Union

WIPO: World Intellectual Property Organization

GDP: Gross Domestic Product

GMP: Gross Metaverse Product

IOs: International Organization

VARA: Virtual Assets Regulatory Authority

UAE: United Arab Emirates

KSA: Kingdom of Saudi Arabia

NGOs: Non-Governmental Organisations

Executive Summary

The rapid developments in technology have led to profound changes and advancements in the social, economic, and political spheres setting a new landmark in industrial revolution. New and emerging technologies such as Artificial Intelligence (AI) and immersive technologies have played an instrumental role in catalysing these transformations: they have unleashed a set of unprecedented opportunities and fundamentally changed the way humans work, live and interact with one another. By harnessing these opportunities in an effective and ethical manner, both the public and the private sectors can navigate this evolving landscape and build a future that can be sustainable, inclusive, and beneficial for the good of mankind. In this report and in partnership with the Tech Hub, two Master's students from the Geneva Graduate Institute for International and Development Studies unlock the opportunities associated with one of the newest immersive technologies, the Metaverse, with the ultimate goal to present a well-informed set of recommendations for actors in International Geneva. This is meant to empower them to effectively leverage the Metaverse to its fullest extent, enabling individuals to transcend physical boundaries and interact in virtual realms. This report presents new avenues for humanitarian work, communication, and administrative services drawing from the experiences of three selected case studies that include the International Committee of the Red Cross (ICRC), the Capital of South Korea, Seoul, and the Emirate of Dubai in the United Arab Emirates.

Key Takeaway Recommendations

- ***International Geneva should foster networks for a common definition of Metaverse through multi-stakeholder collaboration:*** A common understanding and definition of the concept of Metaverse and its related technologies is crucial for good governance in terms of clarity, accountability, communication, and learning. With a standard definition, it becomes easier to coordinate efforts, allocate resources effectively, and work towards shared goals. Moreover, it enables consistent decision-making and actions across different levels and departments of governance, ensuring that policies, regulations, and actions are aligned with the desired outcomes and fostering accountability.

- ***Geneva can propose a set of values for the worldwide Metaverse community that can reflect international values***: The Metaverse bears the potential to be a tool for more accessible exchanges of information, as it is emotionally more salient and could be able to reach new levels of empathy building. This shift requires careful consideration of the values, principles, and ethics that govern the design, operation, and regulation of the Metaverse, and these considerations must be carried out by representatives of many different sectors, including and especially the humanitarian sector.

I. Introduction

The term Metaverse is a portmanteau word combining the Greek prefix 'Meta', which denotes 'transcending' or 'surpassing', and the word 'Universe'. Although the concept of an alternate virtual reality has existed for a long time, the first recorded usage of the word 'Metaverse' can be traced back to Neal Stephenson's dystopian novel from 1992 titled "Snow Crash". The author envisioned the Metaverse as an online world where individuals could immerse themselves and communicate with each other through their virtual representations, also known as 'avatars'. In other words, in the Metaverse, individuals are enabled to transcend physical barriers and engage with each other in a virtual realm[1]. The first phase of the Metaverse is considered to be the virtual world platform "Second Life", introduced in 2003, which offered to its users the ability to construct avatars and engage in activities such as commerce, building, and socialising in a persistent 3D virtual environment. Several prominent organisations, including NASA, Harvard University, Reuters, the Swedish government, and Burning Man, established a presence in "Second Life" over time. Despite over 50 million users having tried it, the platform has dwindled in popularity, with a peak of approximately one million users and around half a million monthly users for the majority of its existence[2].

Nonetheless, partially due to the rebranding of Facebook in 2021-2022 as "Meta", increasing attention and hype have been revolving around the concept of a further development of the internet integrating physical and digital experiences, even and especially from actors outside of the gaming industry - who are leaders in the development of virtual ecosystems. Despite the fact that an exhaustive, commonly recognized definition of 'Metaverse' still has to be formulated, international organisations, private companies and more recently governments and the public sector are exploring possible ways to be present in the Metaverse and deploy new technologies to more efficiently administer public services, engage residents, and boost business or downtown activity[3]. Examples come from the city of Seoul, heavily relying on Metaverse apparels to promote

[1] Breia (2022)

[2] Lamb (2022)

[3] When referring to "boosting downtown activity" in the context of the Metaverse, it means using virtual reality and augmented reality technologies to revitalise and stimulate economic and social interactions within virtual urban environments. In other words, by creating engaging and immersive experiences in the Metaverse, downtown areas within the virtual world can attract more users, businesses, and activities, fostering a vibrant and

global tourism and the image of South Korea worldwide, and to improve public services for its citizenry. The city of Dubai, as shown by the recent heavy investments in the sector[4], also aims at being one of world's leading Metaverse economies and a primary hub for the worldwide Metaverse community. International organisations like the ICRC (International Committee of the Red Cross)[5] make regular use of their own versions of Metaverse platforms for activities mostly related to virtual trainings in humanitarian emergencies or exhibitions for the public's education, but are increasingly discussing and experimenting with emerging Metaverse technologies to be engaged with in innovative ways for outreach, accessibility and efficiency in communications.

Given that there is no common definition of "Metaverse" yet among the many established by a saturated literature, what is the understanding of the concept at the basis of a city's or organisation's Metaverse-development? How much does one's own definition of Metaverse impact its practical applications? What are some possible ways of drawing from these experiences to anticipate and benefit from Metaverse technologies in the context of Geneva, in terms of sustainable and adaptive regulations?

In partnership with the Tech Hub, a transdisciplinary and horizontal initiative that supports all departments and research centres of the Geneva Graduate Institute in their efforts to reflect on the social, environmental, and economic dynamics that frame and construct the development of technologies, as well as their regulation and governance[6], we want to investigate the various implications unfolded by the immersive nature of the Metaverse for the public sector and good governance, as well as the different uses of such technologies for international organisations. The analysis' findings and recommendations are to be directed to International Geneva, more specifically the Canton of Geneva, and to the broader body of international organisations, NGOs,

bustling virtual community that mirrors the concept of a real-world downtown area -including virtual shopping, entertainment venues, social gatherings, cultural events, and various other activities that contribute to a lively and thriving virtual downtown. Adapted from Moura et al., 2020.

[4] Dubai Metaverse Assembly, 2022. More on this will be elaborated in the case study section below.

[5] The term "international" is hereby used to generally indicate the presence of the ICRC worldwide; it is important we mention this, in light of the fact that the ICRC, according to international law, is neither an international organisation nor a nongovernmental organisation, but rather a hybrid and independent humanitarian organisation. Source: ICRC official website

[6] Tech Hub official website

and so on, constituting its international and multidisciplinary hub (like the ICRC). Specifically, the overall objective of this paper is to elucidate the diverse definitions and interpretations of the Metaverse in the literature and in practice, as well as to shed light on the technologies associated with it. Such a conceptual framework serves as a basis for the understanding of our analysis built upon three case studies: the use of Metaverse technologies in the city of Seoul, South Korea, in the city of Dubai, UAE, and in the humanitarian sector, represented by the ICRC in Geneva. An overview of the literature together with a breakdown of several interviews with practitioners from various fields will serve as building stones to help us understand the limitations and potentialities of the Metaverse, to understand whether International Geneva and its actors should be present in the Metaverse and what are the opportunities, implications, and the challenges ahead. We structured this paper with the final purpose of elaborating recommendations useful for the production of effective and robust policies in the context of International Geneva and the Canton of Geneva, but eventually we welcome propositions from different stakeholders to adapt and tailor such recommendations to their activities or build on this report to conduct further (needed) research.

Concerning the structure of this report, after this first introductory chapter, the second chapter will unfold our conceptual framework: after a recap of the broader role of technology in international relations, an overview of different authors discussing the Metaverse and its different applications and technologies is provided, followed by an overview on digital humanitarianism and the humanitarian applications of the Metaverse in International Geneva. Our methodology, namely the criteria of selection of the sources, typologies of sources consulted, interview planning and challenges we have faced, is presented in the third chapter. Building on these concepts, we then dive into the three case studies, the ICRC, Metaverse Seoul and Dubai in the fourth chapter. Finally, our conclusive analysis is highlighted in the fifth chapter, providing a critical evaluation of the information gathered through the interviews and also highlighting our proposed recommendations.

II. CONCEPTUAL FRAMEWORK

2.1 The Metaverse: a literature review

This section presents the material we gathered in our preliminary literature review expanded and adapted for the scopes of this paper. It digs into the role of technology in International Relations and proceeds to depict the definitions, more or less technical, of Metaverse and the various technologies it is built upon; hence, it explores some relevant points of the literature on digital humanitarianism, in conjunction with definitions of International Geneva. All this contributes to the framework for the delineation of research gaps and related research questions, consequently opening the way to the illustration and analysis of our case studies.

2.2 Technology in International Relations

In order to understand the set of technologies that allowed the development of the Metaverse as we see it today, a brief overview of the role of technology in international relations is necessary. Recent years have witnessed great advances in both physical (e.g., engineering, robotics) and digital (e.g., artificial intelligence, machine learning) aspects of technology[7], given that we understand technology as a "branch of knowledge dealing with the mechanical arts and applied sciences" which applies such knowledge for practical purposes[8]. Since the inception of the discipline of IR in the second decade of the twentieth century, technology has been of central concern to the field[9]. On these bases, various theorists of international relations belonging to different school of thoughts attempted the conceptualization of technology according to their understanding of international relations. For the purposes of this paper, we will adopt a more constructivist view of technology, thus delineating it as an influential factor within the international system that is embedded in social layers, meaning that any technological impact is engaging with the social context it is presented in. Currently, these great and unprecedented advancements in technology are subjects of major debates because of their potential impact and application in various areas of public policy. Among these debated technologies, the concept of Metaverse and the technologies that enabled its functioning are receiving special attention and

[7] Hoijtnik and Leese (2019)

[8] Adapted from Oxford English Dictionary (2012)

[9] Giacomello, Moro, Valigi (2021)

'hype' from both the private and public sector. Generally, these technologies can be included in the so-called "emerging technologies", which is a term referring to both describe new technologies or the continuing development of existing ones[10]. On this note, our literature review aims at identifying themes, patterns, and gaps around the Metaverse "myth" narratives, as well as try to address eventual inconsistencies on what are the digital technologies and tools associated with it.

2.3 Metaverse, immersive technologies and Virtual Reality: definitions

Defining the concept of the Metaverse is the first step to understanding how it is structured: we hereby compare several definitions of the term and what revolves around it, trying to structure an understanding of the concept that can then serve as a basis for future research and to be able to steer it in directions that are useful for International Geneva and the Canton of Geneva. A definitive description and understanding of the Metaverse is yet to be established, as there is no unanimity on its precise meaning. Over time, diverse interpretations of the Metaverse have emerged, indicating the challenges in defining it. As an example that shows how it is still something that is being envisioned rather than achieved, we can glimpse at Meta's (previously Facebook) own definition: "The Metaverse is the next evolution of social technology toward a future of expanded identity and presence. It is an ecosystem of seamlessly interlinked spaces, tools and applications that will enable new ways to interact, innovate and grow beyond the limits of current physical reality."

The Metaverse is a concept being explored in both the academic and the more technical-business worlds, making it relevant to mention how leading companies such as Microsoft view this concept: Microsoft's CEO, Satya Nadella, indicated that the Metaverse represents a novel platform for the current era, characterised by the ever-closer interweaving of the digital and physical realms. This platform enables the integration of real-world elements into virtual environments and enables the integration of real-world elements into virtual environments or the incorporation of digital features into the real world. What matters most is the ability for individuals to bring their human aspect into the Metaverse, empowering them to select how they interact with this new domain and with whom they engage. At this point, several authors make use of more or less similar definitions; they reiterate how the concept is not new, and how the term was coined in Stevenson's 1992 novel Snow

[10] Adapted from Rotolo, Hicks, Martin (2016)

crash; however, if some authors define it as a term that " an interconnected web of social, networked immersive environments in persistent multiuser platforms (…) merging physical reality with digital virtuality", or Narin (2021) who states that it is "a concept used to describe 3D (three-dimensional), VWs (virtual worlds) in which people interact with each other and their environment without the physical limitations of the real world.", others put a stress on how 'abstract' this concept is, such as Lee, Braud, Zhou, Wang, Xu, Lin, Kumar, Bermejo, and Hui (2021) who state that the Metaverse is a "hypothetical synthetic environment linked to the physical world". Similarly, Allam (2022) defines the Metaverse as "an inspirational or a hypothetical term for a futurist digital world that, as depicted by its creators and advocates, is immersive and feels tangibly connected to the everyday objects and to the real lives and bodies of humans." Correspondingly, Bibri (2022)'s definition articulates it as "an idea of a hypothetical aways-on 3D network of virtual spaces where people can socialise, interact, connect, learn, work, shop, play, and many more thanks to the convergence of data-driven technologies and immersive technologies." Moreover, in 2020, the famous leading Metaverse theorist Methew Ball, whose articles and essays influenced Meta's Metaverse vision, tried to avoid a rigid definition, opting for a broader perspective and defining the Metaverse as the following: "The Metaverse is a massively scaled and interoperable network of real-time rendered 3D virtual worlds and environments which can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence, and with continuity of data, such as identity, history, entitlements, objects, communications and payments.". The analysis of various sources highlights that mostly, although there is no universally stated definition, the Metaverse is a concept that has been broadly recognized more or less in similar terms by the majority of the scholars.

After giving an overview of the general definitions of the Metaverse, it is fundamental to see what technologies are considered to be the pillars upon which it is and will be further built. Based on the hypothetical assumption that one day we will have universal internet access, in this paper we stand by a holistic understanding of the Metaverse as a virtual universe owning perpetual, shared, concurrent virtual spaces, blending the physical and digital thanks to the convergence between the Internet and Web technologies, and Extended Reality (XR).

Mainly, scholars agree that those contained in the list below are the key technologies on which this Metaverse is built:

Artificial intelligence (AI): refers to theories and technologies that enable machines to learn from experience and perform various kinds of tasks. The use of AI in the Metaverse involves leveraging artificial intelligence technologies to enhance virtual environments, user interactions, and content generation: it enables advanced features such as intelligent agents, realistic simulations, personalized experiences, and efficient data processing within the Metaverse ecosystem[11].

Blockchain: a distributed database, in which data is stored in blocks, instead of structured tables. Blockchain technology plays a crucial role in the Metaverse by providing a decentralised and secure infrastructure for digital asset ownership, transactions, and governance. Through blockchain, users can have verifiable ownership of virtual assets, facilitate peer-to-peer transactions, and establish trust and transparency in the Metaverse ecosystem[12].

Computer vision: it plays an important role in XR applications and lays the foundation for achieving the metaverse, allowing XR devices to recognise and understand visual information of users' activities and their physical surroundings, thus helping build more reliable and accurate virtual and augmented environments.

Network: by design, a metaverse will rely on pervasive network access, whether to execute computation-heavy tasks remotely, access large databases, communicate between automated systems, or offer shared experiences between users. To address the diverse needs of such applications, the metaverse will rely heavily on future mobile networking technologies, such as 5G and beyond.

Edge Computing: to date, the most widely adopted metaverse interfaces are mobile and wearable devices (AR glasses, headsets, smartphones) because they allow convenient user mobility; edge computing solutions allow to offload the intensive computation required for the Metaverse to load, usually too heavy for these mobile devices.

User Interactivity: techniques that enable users to interact with digital entities in physical environments.

[11] Lu, Zhang, Wang, Huang, & Zhang, 2021

[12] Zhang, Chen, Wei, & Zhang, 2021

Extended Reality (XR): Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR)

IoT & Robotics: Internet of Things and robotics enable computing devices embedded in everyday objects to connect, send and receive data online.[13]

Scholars have presented different frameworks for understanding the technologies associated with the Metaverse, based on the scopes of their research. For example, scholars like Kye, Han, Park and Jo delineate four types of the Metaverse in the context of educational applications. Conversely, Mystakidis (2022) characterises the Metaverse as "being based on technologies that facilitate multisensory interactions with virtual environment, digital objects and people" which fall under the umbrella term Extended Reality (XR). These technologies include Virtual Reality (VR), Mixed Reality (MR) and Augmented Reality (AR).
And finally, Lee, Braud, Zhou, Wang, Xu, Lin, Kumar, Bermejo, and Hui (2021) put together perhaps the most exhaustive framework for the understanding of the Metaverse that separates Ecosystems and the technologies described above, aiming for a holistic understanding of the Metaverse. Two of their explanatory tabs are illustrated below, for reference:

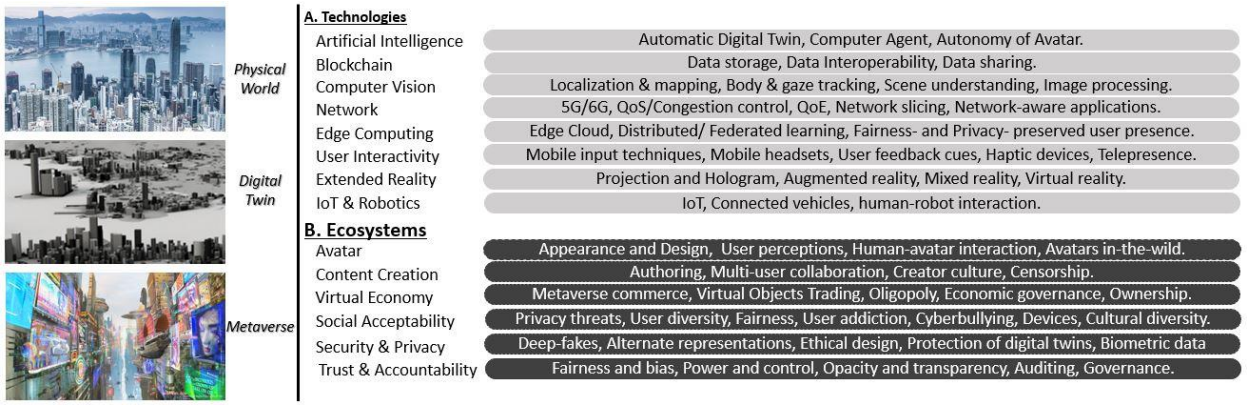

Fig. 1. Connecting the physical world with its digital twins, and further shifting towards the metaverse: (A) the key technologies (e.g., blockchain, computer vision, distributed network, pervasive computing, scene understanding, ubiquitous interfaces), and; (B) considerations in ecosystems, in terms of avatar, content creation, data interoperability, social acceptability, security/privacy, as well as trust/accountability.[14]

[13] All the definitions above are adapted from Lee, Braud, Zhou, Wang, Xu, Lin, Kumar, Bermejo, and Hui (2021)

[14] Direct quote from Lee, Braud, Zhou, Wang, Xu, Lin, Kumar, Bermejo, and Hui (2021), page 3

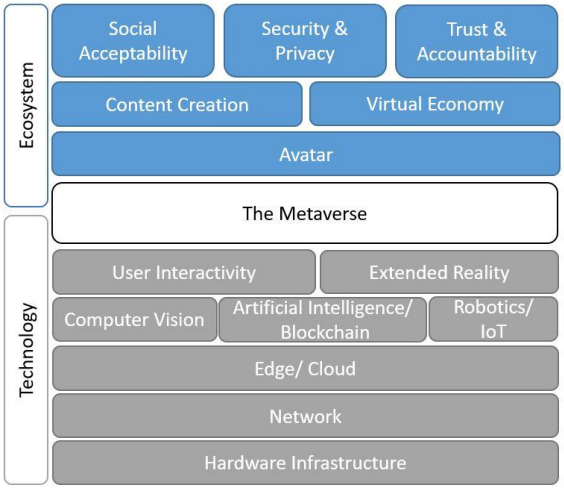

Fig. 2. The fourteen focused areas, under two key aspects of technology and ecosystem for the metaverse. The key technologies fuel the 'Digital Big Bang' from the Internet and XR to the metaverse, which support the metaverse ecosystem.[15]

Lastly, we shall consider the so-called Web2 and Web3 technologies: these concepts represent different stages in the evolution of the internet and associated technologies, each introducing distinct changes and implications. Web2, as the prevailing model of the internet, exhibits a centralised structure with a limited degree of user agency and control over their online experiences[16]. It is possible to affirm that Web2, as the current stage of the internet, has laid the groundwork for the development of the Metaverse; in fact, the concepts, technologies, and user experiences of Web2 serve as the foundation for the immersive and interconnected virtual world of the Metaverse. Web2's emphasis on user-generated content, social interactions, and data-driven platforms has paved the way for the collaborative and interactive nature of the Metaverse[17]. In other words, Web3 encompasses the visionary notion of a decentralised internet, challenging the status quo of Web2 and representing a shift from a predominantly 2D web to a 3D spatial computing environment that encompasses various virtual and augmented reality experiences[18]. Built upon distributed ledger technologies like blockchain, Web3 aims to redefine the relationship between users, data, and online platforms. It introduces concepts such as decentralised finance (DeFi), non-fungible tokens (NFTs), smart contracts, and decentralised autonomous organisations

[15] Direct quote from Lee, Braud, Zhou, Wang, Xu, Lin, Kumar, Bermejo, and Hui (2021), page 5. Refer to this document for a broader and more complete explanation of their framework.

[16] Adapted from Sheridany, Harrisy, Weary, Cowell Jry, Wongy, and Yazdinejadz, 2022, and Nath and Iswary, 2015

[17] Luo & Qi, 2021

[18] Palm, 2021

(DAOs). By employing cryptographic principles, Web3 fosters trustless and transparent interactions, allowing individuals to exercise greater control over their digital identities, assets, and transactions. Crucially, the concept of the Metaverse intersects with Web3, reflecting an immersive and interconnected virtual realm where individuals can engage in a variety of experiences, social interactions, and economic activities. The Metaverse, when contemplated as a communal, enduring, and expansive cyberspace, surpasses the confines of particular platforms or applications, amalgamating virtual reality (VR), augmented reality (AR), blockchain technology, and other progressive advancements. It is the objective of Web3 and its forthcoming advancements to facilitate such integration, thereby envisioning a more cohesive and integrated tapestry of interactions within a meticulously actualized digital cosmos. For instance, Nath, Keshab, and Raja Iswary (2015) explore the trajectory of the internet beyond Web3 and discuss the challenges and possibilities that lie ahead as the internet continues to evolve. While Web3 represents a decentralised paradigm, Web4 is envisioned as a future stage characterised by cognitive capabilities, artificial intelligence integration, and enhanced user experiences. This source underscores the ongoing evolution of the internet and highlights the need for continued research and development in the field. Meanwhile Thompson, Avni et al. (2022) delve into the cooperative aspects of Web3. The authors emphasise the importance of collaboration, inclusivity, and community governance in the development of Web3 technologies; they argue that a more cooperative approach can mitigate the challenges of Web2, such as data centralization and power imbalances. This source underscores the significance of collective participation and shared decision-making in shaping the future of the internet, very important when considering the initial stage, where the Metaverse currently finds itself in. In this context, Sheridan, Dan et al. (2022) deepens the discourse towards the market implications of Web3, exploring the challenges and opportunities that Web3 presents from an economic standpoint. They discuss decentralised finance, digital identity, and the potential for new business models within Web3. This source highlights the transformative potential of Web3 technologies in various sectors and emphasises the need for market adaptation. Drawing from these academic sources, it becomes evident that Web3 and the Metaverse embody a paradigm shift in the internet landscape. Web3's decentralised nature, facilitated by technologies like blockchain, empowers users with greater control over their data, digital assets, and online experiences. The convergence of Web3 and the Metaverse creates a powerful synergy that enhances collaboration within the digital realm, meaning that, through

decentralised technologies, smart contracts, and blockchain-based systems, Web3 enables more trust, transparency, and equitable participation than its predecessor, facilitating the development of cooperative socio-economic systems. This, coupled with the immersive nature of the Metaverse, where users can engage in shared experiences and co-create content, fosters a dynamic and inclusive digital environment that promotes collaboration, creativity, and meaningful interactions. These technologies offer unprecedented possibilities for user-generated content, user-driven economies, and peer-to-peer interactions. By leveraging blockchain's inherent properties, such as transparency, immutability, and decentralisation, Web3 provides the foundational infrastructure for secure asset ownership, digital scarcity, and novel economic models within the Metaverse.

2.4 Digital Humanitarianism: transforming humanitarian response in the digital age

The use of the Metaverse by international organisations in Geneva such as our ICRC case study, or the United Nations for instance[19], makes sense if justified, in this research, by a broader context of humanitarian-oriented literature. In this understanding, within the broader discourse of digital technologies in international relations, the concept of digital humanitarianism has emerged: also referred to as 'digital humanitarian response' or 'digital humanitarian action', it can be defined as a transformative approach to humanitarian response that leverages digital technologies and data analysis techniques to address humanitarian challenges and provide assistance during crises. It operates information and communication technologies (ICTs) to collect, analyse, and disseminate data, enabling faster and more efficient responses in emergency situations. A brief overview of this emerging phenomenon is useful in order to understand what these organisations decide to base their digital strategy on, i.e., why the Metaverse could be one of the tools from which they can (and, in some cases, already are) benefiting the most. In particular, since they are mostly establishments that do not have profit as their main objective, but focus more on human experience and intercommunication, it is relevant to gather information both on practical applications and uses and on the literature supporting such actions - present and future.
Thus, digital humanitarianism represents a paradigm shift in humanitarian response, driven by the increasing availability and ubiquity of digital technologies, as well as the growing need for timely and accurate information in humanitarian operations. It encompasses a wide range of activities,

[19] For instance, refer to UNITAR's website https://unite.un.org/techevents/virtual_reality, or the UN SDG (Sustainable Development Goals) campaign at https://unvr.sdgactioncampaign.org/

including data collection, analysis, visualisation, crowdsourcing, social media monitoring, and mapping. According to Meier (2015), digital humanitarianism involves the use of big data and social media data to gather real-time information about disasters or conflicts. Social media platforms such as Twitter, Facebook, and Instagram are monitored to identify and map affected areas, assess needs, and mobilise resources. Meier's book, "Digital Humanitarians: How Big Data Is Changing the Face of Humanitarian Response," provides valuable insights into the field and its applications: the applications in real-world scenarios are increasing, and Crowdsourcing platforms are an example: they play a significant role by engaging volunteers globally in crisis response efforts. Furthermore, Ushahidi[20] and OpenStreetMap[21] enable individuals to contribute to mapping affected areas, reporting incidents, and providing vital information for aid organisations. Such platforms harness the collective intelligence of a global community, facilitating a more comprehensive understanding of the situation on the ground. In other words, predictive analytics can help identify vulnerable areas at risk of disease outbreaks, enabling proactive intervention and resource allocation. Duffield (2013) explores the transformation of humanitarianism in the digital age[22], discussing the implications of digital technologies, including the rise of digital humanitarianism, and raising critical questions about the role of technology and its impact on traditional humanitarian practices. Furthermore, data analysis techniques, such as machine learning and artificial intelligence, are crucial in digital humanitarianism. These technologies can analyse large datasets and extract actionable insights, aiding decision-making and resource allocation. Predictive analytics, for instance, can identify areas at high risk of disease outbreaks or prioritise aid delivery based on population needs. Always Duffield (2016) emphasises the importance of recognizing the complexity of crises and the limitations of digital solutions, offering

[20] Ushahidi is an open-source platform that enables the collection, visualisation, and mapping of crowdsourced data in real-time. It is primarily used for crisis response, citizen journalism, and social activism, allowing individuals and organisations to report incidents, share information, and collaboratively address pressing issues. From Oluoch, P. O., Okeyo, G. O., & Wario, R., 2018

[21] OpenStreetMap (OSM) is a collaborative mapping project that allows users to create, edit, and share geographic data and map information. It serves as a free and open alternative to traditional proprietary mapping platforms, empowering individuals and communities to contribute to the creation of detailed and up-to-date maps. OpenStreetMap is used for various purposes, including navigation, urban planning, disaster response, environmental monitoring, and humanitarian efforts. From Haklay, 2010

[22] Referring to his work “Disaster-Resilience in the Network Age Access-Denial and the Rise of CyberHumanitarianism”, 2013

a critique of digital humanitarianism, and raising concerns about power imbalances, techno-solutionism, and the potential erasure of local knowledge and agency. He urges a critical examination of the underlying assumptions and unintended consequences of digital humanitarianism, and only a few years later, in his paper 'post-Humanitarianism', he challenged traditional humanitarian practices and emphasised the influence of digital technologies on aid delivery and governance. Thereupon, Mellado Dominguez's review highlights Duffield's book as a comprehensive exploration of the digital consequences shaping the field. In a nutshell, digital humanitarianism represents a transformative approach to humanitarian assistance utilising digital technologies, data analysis, and crowdsourcing to enhance the effectiveness and efficiency of responses to crises. Meier's work provides valuable insights into the field, while Duffield's research raises critical questions about the impact of technology on traditional humanitarian practices. Examples of organisations actively involved in promoting and advancing digital humanitarianism are the Digital Humanitarian Network[23] and initiatives by OCHA[24], among others; these examples can be well connected to the context of International Geneva, as further elaborated below.

2.5 International Geneva and the humanitarian applications of immersive technologies

Geneva is a city of recognized international influence, bringing together "a wide range of expertise in environment and sustainable development, health, humanitarian action and law, human rights, migration, labour, economics, trade, science, telecommunications, peace, security and disarmament: it is a centre of global governance and an operational hub of multilateral diplomacy.[25]" Birthplace of the Red Cross and home to an impressive number of International Organizations, acting as an important centre for international mediation and negotiation as well as

[23] The Digital Humanitarian Network (DHN) is a global network of volunteers and organisations that harnesses the power of digital technologies to respond to humanitarian crises. The network utilises social media, crowdsourcing, and other digital tools to collect and analyse data, coordinate relief efforts, and provide support to affected communities. The DHN was established in 2010 and has played a significant role in disaster response and recovery operations worldwide. Reference: Digital Humanitarian Network, https://www.digitalhumanitarians.com/

[24] The Office for the Coordination of Humanitarian Affairs (OCHA) leads and coordinates international humanitarian efforts to save lives, alleviate suffering, and protect the rights of affected populations in times of crises. OCHA initiates various programs and initiatives, such as the Humanitarian Data Exchange (HDX), the Humanitarian Response Plan (HRP), and the Central Emergency Response Fund (CERF), to enhance the effectiveness and coordination of humanitarian response. Reference: Office for the Coordination of Humanitarian Affairs, https://www.unocha.org/

[25] Geneve Internationale official platform

a relevant academic and intellectual hub[26], "Geneve Internationale", according to the official site of the Office of International Geneva, can be defined as the ensemble of these prominent organisations, institutions, foundations etc., that increasingly want to operate as a united front in tackling global challenges. Notably, the Office of International Geneva is attached to the International Affairs Directorate of the Department of Finance, Human Resources and External affairs of the Republic and State of Geneva and it forms part of the State of Geneva's efforts to support and promote International Geneva. Strongly committed to humanitarianism, Geneva houses 39 international institutions, 750 NGOs, and permanent representations of 179 member states. Moreover, as a significant centre of global governance, the city hosts over 4,000 meetings annually, attracting around 366,000 delegates from all continents, including prominent figures from governments worldwide[27]. A fact worth mentioning is the definition of International Geneva coined by the official website of the Swiss Confederation: in fact, as brought to our attention by Mr. Mantellassi during an interview[28], "Geneve Internationale" embodies the significant international humanitarian commitment made by Geneva and the Swiss Confederation itself[29]; in other words, Geneva is referred to as an instrument, "the most significant platform for Swiss foreign policy" that symbolises the core values of the Swiss population[30]. As much as we believe it is true that many of the ongoing international activities in a city like Geneva can mean an involvement and/or a representation of Swiss interests and diplomacy, we realise that a deeper discussion on the issue is out of the scopes of this report; for future research reference, it would be an interesting take to be explored, along with its related unfolding; here however, we will stand by a broader and less politically-dependent understanding of Geneve Internationale, as elaborated above. Finally, for the purposes of our research, we identify the State and City of Geneva to be a fundamental tassel of International Geneva; hence, this report will focus on the use of Metaverse technologies used by Geneve Internationale – in particular the by the International Committee of the Red Cross, alongside 'external' case studies, in order to anticipate and benefit from said

[26] Adapted from Geneve Internationale official platform

[27] Paragraph adapted from the official website of the Swiss Confederation

[28] More on Mr. Mantellassi's and the other interviews will be elaborated below, in Chapter V

[29] Direct citation from the official website of the Swiss Confederation

[30] Adapted from the official website of the Swiss Confederation

technologies in the context of the Canton of Geneva in terms of sustainable and adaptive (future) regulations.

III. Methodology

To understand the concept of the Metaverse, to answer the questions on what are the opportunities and what roles International Geneva can play in this domain, and to provide recommendations on the opportunities and challenges associated with this technology to International Geneva, a mixed-methods approach was followed throughout the research process. This consisted of four phases: these complementary phases served as a foundation for gathering and analysing data used in this project, as well as in creating a robust contextual understanding throughout the research process. The first phase involved desk research: the sources examined during the desk research included peer reviewed academic papers, articles from the official websites of the concerned institutions and organisations, press releases from the official website of government portals, technical reports and articles from well-known tech companies and journals, as well as the most recent news on the above-mentioned themes.

The second phase of this project included the identification of a research gap. The authors of this research report observed a significant absence of scholarly literature concerning the adoption and utilisation of the Metaverse technology by International Geneva. Hence, the authors aim to tackle two main questions in this report:

1. What role can International Geneva play in the development and implementation of Metaverse technology? and
2. How can the actors within International Geneva benefit from this emerging technology?

For this purpose, three case studies were selected. During the third phase of the project, the authors decided to select three case studies to draw conclusions and recommendations, to garner a nuanced and comprehensive understanding of the Metaverse in terms of its development, application, and objectives by different actors. The three case studies include the capital of South Korea Seoul, the Emirate of Dubai in the United Arab Emirates and the International Committee of the Red Cross (ICRC). The selection of these three cases was primarily driven by the availability of sufficient information and access to relevant sources. These cases were chosen given the fact that they provided a greater amount of accessible information in comparison to other potential cases. For

example: governments of China, Kingdom of Saudi Arabia, and Shanghai have also started investing and developing their Metaverse strategies, however, the Metaverse strategies of the governments of Seoul and Dubai were at a more advanced stage giving accessibility to a larger number of resources and information.

The first case study examines the utilisation of the Metaverse by the International Committee of the Red Cross (ICRC), to understand how this technology is used by humanitarian organisations and how international organisations in International Geneva can benefit from the opportunities presented by the Metaverse. By uncovering the ICRC's approach, we aimed at highlighting the different ways in which this technology can be employed in the context of international cooperation and humanitarian work. The remaining two case studies focus on the capital of South Korea, Seoul, and the Emirate of Dubai, with the purpose of shedding light on the diverse strategies that governments can adopt with respect to the Metaverse to achieve different objectives.

In the fourth phase, a total of five semi - structured interviews were conducted with practitioners and researchers concerned with the Metaverse technology, whose profiles were the following:

- Interviewee 1: Ms. Melissa Kiehl, from the ICRC innovation team: the information provided by this interviewee helped to obtain an insight into the application of the Metaverse within the field of the humanitarian sector.
- Interviewee 2: Dr. Alexander Barclay, Cantonal Digital Delegate: this interview was specifically aimed at understanding how the Canton of Geneva can benefit from the experiences of other cities in the Metaverse and how policymakers can tackle the predictable risks and challenges that come with Geneva's presence in the Metaverse.
- Interviewee 3: Ms. Flora Fang, COO of High-street: through this interview, we wanted to obtain insight to the successes and failures in the Metaverse global market and to understand to what extent the private sector influences the way Metaverse and the governance of this technology are defined.
- Interviewee 4: Mr. Konrad Seifert from the Simon Institute for Longterm Governance.
- Interviewee 5: Mr. Federico Mantellassi from the Geneva Centre for Security Policy

These final two interviews helped to understand how policymakers can better prepare for the policy and governance process around and within the Metaverse.

Furthermore, the set of the questions posed to the interviewees were divided into two halves, the first half of the questions were posed to all the five interviewees which included the following:

- What is your understanding of the Metaverse and how would you define it?
- How would you define International Geneva?
- What role can International Geneva play in this domain?

The second half of the questions were dependent on the interviewees' professional capacity. The questions ranged from the use of the Metaverse within their own organisation, challenges, and risks to questions on hypothetical scenarios to better understand what governments should take into consideration before establishing a presence in the Metaverse.

During the course of this research project, several limitations were faced, which included the following:

- Lack of scholarly literature pertaining to the selected case studies, in particular the case studies of Seoul and Dubai;
- Inability to obtain interviews and limited primary data on the above mentioned two case studies; (These limitations were overcome by relying heavily on the official governmental websites of these two cities and Dubai's Mega event known as the Metaverse Assembly);
- The Metaverse technologies are still in the development phase and there is considerable lack of consensus regarding its definition. Researchers, practitioners, and policymakers have expressed various viewpoints on what constitutes the Metaverse. Hence, this became the foundation for our recommendations list calling on the importance of formulating a common definition of the Metaverse by all the stakeholders in International Geneva.
- From a gender perspective, limitations of length and time, together with the lack of literature on said matter in the context of International Geneva, did not allow us to explore feminist perspectives on the role of technology in global affairs; furthermore, out of five of the interviews conducted, only two involved women, and only one of them involved a woman in tech (namely, COO Fang). This was not by choice, we conducted interviews with all the people who responded positively to our invitations; however, we are of the opinion that a feminist perspective, driven by the following questions:

"Technology/Metaverse designed by whom? For whom? And with what interests in mind?" is one of many other interesting but necessary lines of research to follow in order to achieve a real holistic understanding and good governance for the Metaverse.

- In the light of the short time available to carry out the research and the limited number of words to write, we did not go in depth about discourses on the good governance and sustainability of the hardware required for current or future performance in the Metaverse. It is well known that hardware and components necessary for the proper functioning of these technologies require physical space, large amounts of water for cooling, and various materials whose production and recycling are not always clear. Ergo, we consider the choice to not fully integrate these discourses, for reasons of length and time, as a possible limitation to the research elaborated here, and hope that future research trails will be directed towards investigating the environmental impact and sustainability of the hardware components of the technologies that make up the Metaverse.

III. CASE STUDIES

For the purposes of this research, the following section will explore the uses of the Metaverse as employed by an International Organization based in Geneva, the International Committee of the Red Cross. Following, the two cities of Seoul and Dubai and their uses of the Metaverse will be explained. The case studies are presented in this order to guide the reader through a summary of the key uses, conceptualizations and benefits these entities attributed to the Metaverse; given that International Geneva is constituted of international organisations and the Canton and City establishments, an overview of such implementations can be useful to think about how the latter can eventually incorporate more of the beneficial aspects and further develop the VR tools that have been employed so far[31].

[31]As per the Cantonal report on the Canton's digital policy, p. 39, in the original French: "L'administration cantonale a eu recours à des outils de réalité virtuelle (VR) dans le cadre d'actions de formation et de sensibilisation pour lutter contre le harcèlement. En déployant ce type d'outils immersifs dans des services particulièrement concernés, l'État veut se montrer exemplaire dans la lutte contre le harcèlement." Contribution of Dr. Barclay (Cantonal Digital Delegate)

4.1 Humanitarian organisations: the ICRC

This section aims to summarise the uses and applications of immersive digital technologies in the humanitarian context, taking the International Committee of the Red Cross as a practical example. Recent events such as the covid-19 pandemic have accelerated and promoted the use of computer-mediated virtual environments for communicating, videoconferencing and video lectures, gaming, and so on. Among the various applications of the Metaverse and its technologies that are relevant to those working in the humanitarian field is the concept of immersive humanitarian visualisation, described as "data visualisations designed to promote human welfare and/or to make remote and hidden human suffering more salient[32]". These visualisations can be applied to different tasks, one of the most common ones being events and exhibitions to raise public awareness on humanitarian issues. Organisations like the International Committee of the Red Cross or the United Nations have tailored immersive technologies related to virtual environments in the metaverse to their humanitarian purposes: in fact, the ICRC is active in promoting innovation within its structure and practices by implementing new modalities for carrying out humanitarian work across the globe. In the early 2010s, inspired by the gaming industry, an early discussion on the possible use of virtual environments and gamification to "better convey messages and potentially increase respect for International Humanitarian Law[33]" led to the establishment of the ICRC Virtual Reality Unit, which employs computer-generated environments as "a way to educate, communicate and advocate respect for IHL.[34]" Following, the ICRC developed an app (available only for devices operating with iOS) called "Enter the Room" (2018) using the latest in augmented reality tech to allow the spectator to immerse in an urbanised battlefield situation which would, as stated by the ICRC former President Peter Maurer, "give people new insights into the realities of war"[35]. Taking a step back, this purpose was first portrayed in the ICRC's immersive virtual reality movie "The Right Choice" (2018), representing "the first use of interactive VR by the humanitarian sector that gives the viewer an active role in shaping the story of civilians trapped in a war zone." In fact, the

[32] Adapted from Dragicevic, 2022

[33] ICRC website, VRI section

[34] ICRC website, VRI section

[35] Enter the room, ICRC

movie places users "next to a Syrian family trapped in urban warfare. (…) Through polling of users, the ICRC aims to better understand people's perception of urban warfare and see how VR can influence behaviour and build empathy for those affected by war. The VR film produced for Google's Daydream platform is downloadable on smartphones from the Google Playstore and the iOS Apple Store.[36]" These immersive technologies allow the user to experience a personalised, interactive approach that is believed to be impactful in someone's perception of such events, and perhaps, a factor for behavioural change. Similarly, a year later, the ICRC released another virtual reality project, presented in Bangkok in 2019 and titled "*New tools to serve humanitarian activities*": this innovative product gathered gaming designers and developers to build a gaming virtual reality simulating situations of fieldwork in harsh conditions, such as refugee camps or conflict situations. Participants, with the help of a VR headset, can choose different engagement options (solo or multiplayer) and get a hands-on idea of what it means to be affected by war and humanitarian crises. In addition to educational experiences, the ICRC's Virtual Reality Unit, in a collaboration with their Security and Crisis Management Support Unit and with the funding of the Norwegian Red Cross, in 2021 launched one of the first remote multiplayer virtual reality (VR) training programmes, the "VR Field Security Experience". The VR scenario simulations include various aspects of a field trip, from the pre-departure briefing to incidents at armed checkpoints. There is no fixed scenario, and it's up to the users to choose their character, get organised and communicate, as well as discuss the security risks; this flexibility renders the security training opportunities "somehow limitless[37]". As mentioned above, many innovations in the application of digital technologies in the humanitarian sphere have been incentivised, other than the rapid advancement in the available technologies, by the COVID-19 pandemic forceful remote work. The ICRC and the national Red Cross movements are increasingly challenging the traditional ways of thinking about and learning from digital environments, as shown by the usage of a digital twin in virtual reality as a replacement for traditional, in-person training.
Shifting the purposes of softwares and hardwares produced by the gaming industry from entertainment to useful communication, education and trainings for humanitarian activities is a strategy that sees the ICRC as a pioneer, but in International Geneva there are several other actors

[36] ICRC 'War at the front door', 2018

[37] ICRC and Norwegian Red Cross, from ICRC's blog

working with this kind of technology enforcement. On the 24th of March 2023, the ICRC's Delegates for Cyberspace met CERN (*Conseil Européen pour la Recherche Nucléaire*, European Organisation for Nuclear Research) specialists for the first of a series of "knowledge-sharing sessions on using free and open-source technologies to support the vital humanitarian work they carry out across the globe. These technologies are being explored as a means to pursue neutrality, impartiality and independence of humanitarian action in a digital environment.[38]" This new collaboration partially shows the ICRC's strategy to advance in the development of innovative virtual environments to implement best practices in their work, but it also raises a number of questions and risks to be tackled; being "at the heart of open science movement, underpinned by sharing open data and creating open tools[39]", CERN's principles of neutrality, impartiality, independence, openness, data protection, and cybersecurity are very much aligned with those of the ICRC and this kind of collaboration paves the way towards collective strategies in Geneve Internationale to ensure a shared understanding of technologies and their management, from organising virtual trainings to assessing the risks and impact of a VR war experience, fostering the exploration of ICRC's principles and action in the digital space, and perhaps, in a future Metaverse. The ICRC aims to leverage the Metaverse to extend its reach and provide access to protection, assistance, and accurate information. As mentioned above, the ICRC has already developed its own VR unit, complete with a virtual world and avatars, and is exploring its potential uses, starting with training its staff; they are actively working on how to stabilise it. However, the ICRC is virtually open to other collaborations to improve such technologies and their relative applications within the organisation, the interviewee said. All in all, the ICRC aims at a constant improvement of efficiency, effectiveness, and transparency of its deliverables, and the Metaverse is considered a viable set of tools to foster these kinds of enhancements.

4.2 Cities' applications

To propose recommendations on whether or not the Canton of Geneva should be present in the Metaverse, it is crucial to gain an understanding of the national metaverse strategies adopted by various governments worldwide, as well as the underlying reasons for their implementation. Such

[38] CERN and ICRC, from ICRC's blog

[39] CERN and ICRC, from ICRC's blog

an analysis would provide valuable insights and inform the recommendation-making process regarding the potential presence of the Canton of Geneva in the Metaverse. In pursuit of this objective, our preliminary literature review has involved a comprehensive examination of the Metaverse strategies that have been adopted by four different national governments: China, South Korea, the Kingdom of Saudi Arabia (KSA) and United Arab Emirates (UAE); however, for the purposes of this paper we will be analysing the cases represented by the cities of Seoul, South Korea, and Dubai, UAE. By studying the Metaverse strategies of these countries, we aim to gain a deeper understanding of the various approaches that governments have taken towards this emerging technology which in turn will help us to draw useful insights.

4.2.1 Metaverse Seoul

On 16 February 2023, the Seoul Metropolitan Government (SMG) launched the initial service phase of SMG's virtual municipal world known as the Metaverse Seoul, a platform that is considered first of its kind globally. The platform was launched after having undergone a successful beta testing period which involved multiple administrative services including education, economy, and tax affairs[40]. The Metaverse Seoul was named as one of the best inventions for the year 2022 by TIME Magazine[41].

Metaverse Seoul represents a new concept of administrative services designed to address the recent social changes such as digitization, information and communication technologies and mediated communication. Seoul was the world's first local government to develop a comprehensive roadmap dedicated for implementing its Metaverse platform with the aim to include services from all sectors of the municipal administration. The plan encompasses three phases as follows: the introduction phase (2022), the expansion phase (2023-2024) and the application phase (2025-2026). Following the completion of these three phases by 2026, Seoul aims to have all the administrative services present in the Metaverse including culture, tourism, education and economy[42]. Furthermore, the Metaverse Seoul will also include other services such as a corporate support centre, a fintech lab,

[40] SMG, 2023

[41] TIME, 2022

[42] Naqvi, 2023

a youth mentoring counselling room, Seoul's top ten tourist attractions and tax services[43]. The initial phase of Metaverse Seoul was implemented in early 2022 where a platform for administrative services was introduced for five areas which included education, economy, administration, tax and communication.

The main purpose of Metaverse Seoul is to provide various public services with a focus on three core values which are considered the driving forces for the platform "to establish a hyper-realistic community space of creativity and communication that is accessible to all users for augmented experiences.[44]" Each of the values prioritise a specific agenda.
The Values include the following:

The Freedom Value: This value focuses on building a community space that encourages users to freely and creatively express themselves and communicate with one another. For example: within the Metaverse Seoul, there is a virtual replication of the physical office of Seoul's mayor allowing citizens to freely exchange greetings and interact with the mayor, submit their opinions and lodge complaints on the municipal administration through a special opinion proposal box and receive feedback. All the spaces of Metaverse Seoul are also visible on a world map, allowing users to easily access, experience and explore new administrative services.

Inclusion Value: The inclusion value prioritises accessibility with the aim to enable users to interact with one another as avatars without any discrimination or barriers. The avatars allow users to integrate into the virtual world and fit in irrespective of the user's physical appearance, age, and real-life circumstances with the aim that the bridge between real and virtual world can generate an opportunity for creating value. For example: local and foreign users can visit Seoul's top 10 tourist destinations regardless of the user's location or time.

Connection Value: The third value of Metaverse Seoul focuses on developing a virtual world that offers an immersive experience of the real world and enables citizens to enjoy public services. For instance: citizens can have their official documents issued, lodge civil complaints and pay local taxes within the Metaverse. Students are also able to meet with their mentors in a virtual room for

[43] Naqvi, 2023

[44] SMG, 2023

youth mentoring consultations, where participants can transform into avatars and use six distinct spaces. "The avatar-based virtual counselling room has the advantage that adolescents, who were previously burdened with face-to-face counselling, can consult in a stable emotional state at any time, in any location, by assuming the form of an avatar.[45]"

Although there are no regulations or legal framework in place around Metaverse Seoul, the city, in partnership with the Seoul Digital Foundation (SDF), jointly published a 'Code of Ethics' for Metaverse Seoul. The Code of Ethics is founded upon three fundamental principles which include: social fairness, respect, and connection with reality. There are also technical safeguards implemented in Metaverse Seoul to prevent inappropriate behaviour such as the prohibition of physical contact between the avatars and reporting misconduct[46].

4.2.2 Dubai Metaverse Strategy

In recent years, the United Arab Emirates has been referred to as a "Test Bed" for new and emerging technologies, and its largest emirate Dubai is referred to as world's "Crypto-Capital"[47]. Dubai's Metaverse Strategy was announced by the Crown Prince in July 2022 with the aim to make Dubai one of world's leading Metaverse economies and a primary hub for the worldwide Metaverse community. "The strategy aims at leveraging real-time data, using machine learning and IoT, and employing AI simulation and blockchain to enhance human thinking processes. Technology pillars of the metaverse strategy are data, network, cloud, and edge computing that focus on real-world data obtained, validated, stored, processed, and managed. Other pillars include promoting the full deployment of 5G networks to enable edge computing and provide on-demand computer system resources. Edge computing allows data to be collected, stored, and processed locally via smart devices and local networks, instead of the cloud.[48]" The Strategy also seeks to develop global standards for the purpose of building secure and safe platforms for users and cultivating regulations and Metaverse infrastructure to facilitate and expedite the adoption of these

[45] SGM, 2023

[46] SGM, 2023

[47] Dubai Metaverse Assembly, 2022

[48] UAE Government Portal, 2023

technologies. The strategy's key pillars prioritise the following: augmented reality (AR), Virtual reality (VR), extended reality, mixed reality, and digital twins[49].

In Dubai's Metaverse Strategy four key sectors have been identified to benefit the most from the Metaverse[50]. These four sectors include the following:

1, Government services: aiming to build a Metaverse collaborative alliance between government and private entities to create the Metaverse ecosystem and a roadmap for Metaverse service migration. An example of such services includes the enhancement of the services provided by Emirates airlines which has constantly been at the forefront of embracing and adopting new technologies. The airline's A350 aircraft were recently configured by leveraging the Metaverse through virtual and augmented realities. By initiating this step, the COO of the airlines, Adel Al Redha had emphasised that Emirates airlines was able to avoid unforeseen surprises and increase clarity and transparency in their operations. "We used metaverse, virtual reality and walked into the aircraft and looked at every detail, every gap in the aircraft, whether it is in the galley or with the seats. We have configured an aircraft and what we see there today is exactly what we'll see in 2024". Furthermore, Emirates airlines announced their plans at the Dubai Metaverse Assembly event in September 2022 and indicated they plan to hire and train 4,000 cabin crew members in the Metaverse by mid-2023[51]. Al Redha explained that Emirates Airlines are continuously evolving their onboard services ranging from how customers are served to food. And that without the Metaverse, the airlines will not be able to provide these types of training to its cabin crew members in an efficient manner.

2. Tourism: aims at scaling up the Emirate's tourism sector and organising Metaverse events. In addition to establishing a Metaverse tourism taskforce. An example is the medical tourism sector. Following the announcement of Dubai's Metaverse Strategy in July 2022, Medcare Women and Children Hospital officialised its presence in the virtual world on 11 October 2022. As was stated by DM Healthcare's Deputy Managing Director, Alisha Moopen, "We are delighted to unveil UAE's first hospital in the Metaverse today. Medcare Women & Children Hospital will set the

[49] UAE Government Portal, 2023

[50] Dubai Metaverse Assembly, 2022

[51] Adel Al Ridha as cited by Staff Writer, 2022

benchmark for immersive virtual patient experience – an element that we will bring to life across Medcare Hospitals and Medical Centres network through further introductions. At Aster DM Healthcare, we constantly strive to advance the health services that we provide by embracing advanced technologies… in line with the UAE's leading position on the global health map. Medicare's introduction in the Metaverse is a steppingstone in this direction." The CEO of Medcare Hospitals and Medical Centers, Shanila Laiju indicated that they anticipate in the long run for the traditional services via "telemedicine" to be replaced by Metaverse interactions, giving patients the opportunity to receive a more collaborative and tangible medical service.

3. *Education:* with the aim to host educational training programs and cultivate talent through the Metaverse education accelerator. On 5 October 2022, one week after the Dubai Metaverse Assembly, Dubai's Chamber of Digital Economy in partnership with the (SEE) Institute launched the Future of the Digital Economy: Business in the Metaverse Training Academy which is designed as a specialised training program aimed to enhance practical knowledge and equip digital startups with tools necessary to build in the Metaverse and utilise Web3 for their benefit[52]. The CEO of the SEE Institute, Jasmine Locke has stated, "In the Metaverse program, the student will learn about crypto wallets, NFTs, building communities around Web3, and the best digital practices in 2022 and how they will pave the way to a more sustainable society.[53]" By November 2022, the Chamber announced that the Metaverse academy had received 153 applications coming from 27 countries. "We are encouraged by the strong interest in this initiative, which reflects a growing business interest in the metaverse and confidence in Dubai as a digital economy hub.[54]"

4. *Retail and real estate:* creating a digital twin for the Emirate and enabling a worldwide immersive shopping experience by implementing friendly Metaverse policies in the retail and real estate sectors. Dubai's Metaverse strategy is also coupled with a strategy focusing on governance and regulation. Dubai has set up a regulatory authority known as "Virtual Assets Regulatory Authority", or 'VARA', with the aim to address the challenges and explore the opportunities[55].

[52] Dubai Chamber Official Website, 2022

[53] Chamber official website

[54] Khalid Al Jarwan, 2022

[55] Dubai Metaverse Assembly, 2022

Hence, in 2022, Dubai's VARA became world's first virtual asset regulator with a headquarter in the Metaverse through the acquisition of land in the sandbox, "Dubai's VARA MetaHQ is a strong vote of confidence in the global virtual asset industry, and signals that the UAE is ready to play an important role in supporting its safe growth. We are proud to be the first open metaverse platform of choice for Dubai, bringing together government and business to jointly experience the possibilities of Web3 to create a sustainable new economy.[56]"

Through its Metaverse Strategy[57], the Emirate seeks to achieve the following:

1. Foster innovation and amplify the economic contributions of the Metaverse through development and research collaborations and partnerships. Furthermore, to promote dynamic ecosystems with incubators and accelerators that can attract businesses and projects to Dubai.

2. Nurture talent and invest in developing future capacities by allocating the required sources in Metaverse education targeting content creators, developers, and users utilising digital platforms within the Metaverse.

3. Develop Web3 technology and its associated applications with the purpose to establish new governmental work models and drive progress in key sectors including education, tourism, healthcare, retail, remote work, and the legal sector.

Following the announcement of its Metaverse strategy, Dubai held its first mega Metaverse event on 28 and 29 September 2022. The event hosted more than 600 technology experts in addition to 40 technology companies including Meta. 40,000 participants also joined the event virtually. It is anticipated that by 2030, the Metaverse will add 4 billion USD to Dubai's annual GDP and lead to the addition of 40,000 jobs in the country's workforce[58].

[56] Borget, 2022

[57] UAE Government portal, 2023

[58] Dubai Metaverse Assembly, 2022

V. CONCLUSIVE ANALYSIS

This section intends to critically assess the information we have gathered while conducting interviews and researching our selected case studies: it is the analytical framework that helped us build the policy recommendations, as illustrated below.

a. The importance of a common definition and conceptualization of the Metaverse

One of the most relevant differences we found when moving from desk research to a more empirical investigation in dialogue with experts in the field, as well as by closely looking into the selected case studies, certainly concerned the definition of the Metaverse concept. After all, without a 'universal' definition, everyone internalises concepts in their own way, often biassed by the field in which they are to be used. This is why we asked all our interviewees to give us their idea and understanding of the Metaverse concept, which differed not only from each other, but also from the academic definitions previously analysed. As Dr. Barclay (Geneva Digital Delegate) explained, "at this stage, 'Metaverse' is mainly a marketing term that has been used by the firm Facebook but renamed itself 'Meta' in the process of a big technological and financial bet by the company's largest shareholder and CEO, but despite seeing the emergence of virtual words in training and construction, we're not yet at a stage where we have one virtual world or virtual worlds that are interoperable, where you can move from one to the next." Mr. Seifert (Simon Institute), too, thinks of the Metaverse as a concept, an idea that is not concrete; he envisions it more as "an infrastructure that people can use similarly to how we currently use WebEx, or where people can collaborate, exchange, meet in slightly more engaging ways than we are currently doing. I think, of course, the ambitions are larger for this; yet, there is a lot to be defined, and a lot of the ideas behind the general concept are essentially entirely unrefined and open to interpretation." Similarly, Mr. Mantellassi (GCSP) stated that "there isn't really a definition of what the Metaverse is, and I think it's because it's still something that doesn't really exist, that we have a tendency to consider it as a technology, but that don't think it is." According to him, it is sort of "an application of applications"; in other words, it can be interpreted as "a combination of different technologies and applications into a sort of cohesive whole which builds a sort of continuous virtual environment that is both in the present and embedded in the physical", a next step in societal digitalization, or

a “next step of the internet”. Notably, in consonance with this holistic interpretation, the Metaverse can be an “evolution of our relationship with the digital.”

COO Fang (Highstreet) also affirms that everybody has a different idea of Metaverse, as shown by the fact that “so many projects or so many products are claiming to be a Metaverse, but when they really it's just like a game, like a very small game”: the Metaverse needs to have its own lore and reach a broader audience with fewer and fewer physical restrictions in accessibility. Ms. Fang and Mr. Mantellassi brought to our attention the fact that the Metaverse can be conceptualised as something innovative and ground-breaking in terms of physical barriers, accessibility, and efficiency; although some terminology and technologies already exists, a real conceptualization is still fuzzy because it is hard to imagine such a virtual extension that allows us to engage with few to no physical barriers. As Mr. Mantellassi explained, he does not think of the Metaverse as a place or platform one logs in to, but rather a virtual or holographic continuation of our reality that requires us to “think beyond imagination in terms of space and shape of things”, hence why thinking of the Metaverse solely as a ‘game’ or platform is misleading, and a big role is played, in fact, by AR and VR technologies. Building on this, Ms. Kiehl (ICRC Innovation Unit) explained her optimistic, almost idealistic view of the Metaverse, defining it as a “digital twin to troubleshoot our problems and solve them in ways it’s not possible now.” In her view, it is a way to expand reality and access each other in a non-aggressive and more intimate way. In connection to the other case studies, for the city of Seoul, the Metaverse at this stage is viewed as a communication tool that can be leveraged for administrative services, "it will be an important communication tool for citizens in the new normal. It is an inclusive administrative service that everyone can take advantage of without any time and space obstacles.[59]" On the other hand, Dubai’s government has not provided a specific definition for the Metaverse, however, they see this technology as an opportunity with a lot of added value, “even though the concept of the Metaverse is not completely understood by most people, the value it can add is clearly evident to both governments and businesses.[60]” Hence, although the ICRC, Seoul and Dubai view and define the Metaverse in

[59] Se Hoon, 2023

[60] Belhoul, 2022

different ways, it is evident that all the three actors are convinced that there are a lot of potentialities and opportunities that come with the Metaverse.

The lack of a common definition between the interviewees interviewed throughout this research project was compatible with the lack of a common definition observed throughout the literature review process, which reinforces the need for establishing a common understanding and definition of this virtual space.

b. Different Objectives

Through our examination of the selected three case studies, it became evident that these actors are utilising the Metaverse to achieve distinct objectives that are aligned with their respective agendas. For example: the ICRC has adopted the Metaverse for internal purposes, in particular to provide training programs accessible to its staff all over the world, thereby ensuring widespread availability and accessibility of training programs to its staff. Whereas the goal behind Metaverse Seoul is one that exhibits strong emphasis on public service. The primary objective of the government of Seoul is to leverage the Metaverse for the purpose to improve the efficiency, accessibility and overall quality of public services provided by the government. The strategy is oriented in a direction that is citizen – centric which prioritises replicating all the public services across different sectors for citizens in the virtual world. Metaverse Seoul is mainly a composition of two primary intertwined elements, namely citizens' needs and public services to fulfil those needs. On the other hand, Dubai's objective behind its Metaverse strategy is one that is heavily profit oriented, with the ambition to utilise this technology to further increase economic gains, attract projects and investments to Dubai: "In the near future, we will measure countries and cities by Gross Metaverse Product (GMP) instead of GDP. GMP will ride on virtual contributions to a country's economy, fuelled by the Metaverse.[61]"

c. Risks and concerns

From our analysis, risks associated with power and misuse emerge in the context of defining the Metaverse. Philosophical and ethical considerations, as articulated by Mr. Seifert, underscore the need to critically examine the implications and consequences of the Metaverse. Additionally, there

[61] Al Olama, 2022

are rising concerns about the potential manipulation of the public and the shaping of behaviour through surveillance capitalism, as well as the ambiguous nature of existing as a digital avatar, as highlighted by Mr. Mantellassi. Territoriality, as discussed by Dr. Barclay, is another aspect that comes into play when contemplating the presence of governments in the Metaverse. The question of whether the state should have a role in virtual territories and what territoriality means in the virtual world remains open for exploration and debate.
To address these challenges, it is crucial to align the scopes and objectives of governance initiatives clearly. As COO Fang suggests, careful planning and coordination are necessary to ensure that governance efforts are focused, effective, and capable of addressing the specific challenges posed by the Metaverse. Furthermore, education emerges as a key factor, particularly when thinking of public services offered by local governments or city administrations, where services and infrastructure need to adapt to the evolving digital landscape: COO Fang emphasises the importance of educating citizens and stakeholders about the Metaverse to enable informed decision-making and foster participation in governance processes.

d. Recommendations

On the basis of this comprehensive research undertaken on the concept of the Metaverse, the different uses of this technology by various actors and the analysis provided, the authors of this paper propose the following recommendations to actors in International Geneva:

1. ***International Geneva should foster networks for a common definition of Metaverse through multi-stakeholder collaboration:***

A common understanding and definition of the concept of Metaverse and its related technologies is crucial for good governance in terms of clarity, accountability, communication, and learning. With a standard definition, it becomes easier to coordinate efforts, allocate resources effectively, and work towards shared goals. Moreover, it enables consistent decision-making and actions across different levels and departments of governance, ensuring that policies, regulations, and actions are aligned with the desired outcomes and fostering accountability.

2. ***Similar to the Seoul Metaverse Values which reflects values on a national level, International Geneva can propose a set of values for the worldwide Metaverse community that can reflect international values***:

The Metaverse bears the potential to be a tool for more accessible exchanges of information, it is emotionally more salient[62] and could be able to reach new levels of empathy building.[63] This shift requires careful consideration of the values, principles, and ethics that govern the design, operation, and regulation of the Metaverse, and these considerations must be carried out by representatives of many different sectors, including and especially the humanitarian sector.

What differentiates values from regulations is that values are not binding in their nature. Hence, values can exist, but still lack the administrative and legal authority to be enforced and depend on individuals to what extent these values are preserved and are more a representation of morality and principles. However, regulations are binding tools that have the capacity to enforce compliance and are established to prevent violations.

3. International Geneva should consider the establishment of a Metaverse Academy:

In partnership between the government of the Canton of Geneva and IOs, a Metaverse academy that cultivates talent in Metaverse related fields is necessary to prepare the next generation of personnel in International Geneva for work in the virtual world.

4. ***International (Regulations/Code of Conduct/Policies) to Start in International Geneva with the Aim to Build a Responsible Metaverse Ecosystem:***

The parameters and rules of the Metaverse, raising concerns about access, inequalities, and data privacy issues. Evidence shows that a shift is needed, going from a technologically and market-driven Metaverse to one that prioritises human connections. Academic discourse already highlights the importance of ensuring that the Metaverse serves as a platform for meaningful human interactions rather than being solely driven by technological advancements or commercial interests. Hence, International Geneva can play a pivotal role in kicking off international

[62] Adapted from Mr. Seifert

[63] Adapted from Ms. Kiehl

discussions with the aim to advocate for either (international regulations/code of conduct/policies) around the development stage and within the Metaverse.

The concept of "Responsible Metaverse" highlighted at the Dubai Metaverse Assembly (2022) emphasises the importance of creating partnerships between the public, private, civil society, Metaverse developers and consumers. Actors in international Geneva can in fact become key players in building a responsible metaverse. For example: one of the elements to a responsible metaverse include the protection of intellectual property within the Metaverse, the ultimate international actor concerned with the rights and protections of intellectual properties is the World Intellectual Property Organization (WIPO), one of the key constituents of International Geneva.

5. Advocate for the Creation of a Space/Platform to Address the Issue of Territoriality within the Metaverse:

The actors in International Geneva such as ITU, WIPO… etc., can play a leading role in commencing international discussions on the issue of territoriality within the Metaverse. If the Metaverse is going to be an extension of our physical world, then it is important to understand if and what types of national and international laws and regulations will be extended to the Metaverse world. For example: in the physical world, in most cases, foreign tourists visiting a city are required to apply for a visa; would this also be the case in the Metaverse, when 'international' users try to visit, for example, the 10 most popular tourist destinations in Seoul or other cities?

6. Promotion of Research and Talent Development:

The Canton of Geneva, in collaboration with academic institutions and research organisations, should support research initiatives focused on the Metaverse's social, economic, and ethical implications.

7. Establish a Roadmap for Metaverse Implementation:

How should the infrastructures be built and what is their utility?[64] The Canton of Geneva should develop a comprehensive roadmap for implementing a Metaverse platform, of which an inspirational example comes from the approach taken by Metaverse Seoul. The roadmap should outline different phases, including introduction, expansion, and application phases, and include

[64] Citing Mr. Seifert

services from various sectors of the municipal administration, such as culture, tourism, education, and economy. The goal should be to provide comprehensive public services through the Metaverse, prioritising citizen-centric approaches.

Bibliography

‘A Blockchain Virtual World and Metaverse’. Accessed 20 March 2023. https://www.voxels.com/

‘Dubai Metaverse Assembly’ 28 & 29 September 2022.

‘Dubai’s VARA enters the Sandbox and Becomes First Asset Regulator with a Metaverse HQ’ 4 May 2022.

‘Educational Applications of Metaverse: Possibilities and Limitations’. *Journal*

‘ICRC and Norwegian Red Cross Create Remote Multiplayer VR Security Trainer’. Inspired, 11 June 2021. https://blogs.icrc.org/inspired/2021/06/11/icrc-and-norwegian-red-cross-create-remote-multiplayer-vr-security-trainer/.

‘Impact of Digital Twins and Metaverse on Cities: History, Current Situation, and Application Perspectives’. *Applied Sciences* 12, no. 24 (14 December 2022): 12820. https://doi.org/10.3390/app122412820.

‘IN FOCUS 4 | UNGSC’. Accessed 21 March 2023. https://www.ungsc.org/in_focus_4.

‘Official Release of Metaverse Seoul’. Seoul Metropolitan Government. 16 January 2023.

‘The Application of Augmented Reality and Virtual Reality Technologies in Countering Terrorism and Preventing and Countering Violent Extremism | UN Web TV’, 8 July 2021. https://media.un.org/en/asset/k1m/k1m7xgrgx4.

‘The Metaverse as a Virtual Form of Smart Cities: Opportunities and Challenges for Environmental, Economic, and Social Sustainability in Urban Futures’. *Smart Cities* 5, no. 3 (September 2022): 771–801. https://doi.org/10.3390/smartcities5030040.

‘The Resilience of the Ruins: Towards a Critique of Digital Humanitarianism’. *Resilience* 4, no. 3 (September 2016): 147–65. https://doi.org/10.1080/21693293.2016.1153772.

‘The Social Shaping of the Metaverse as an Alternative to the Imaginaries of Data-Driven Smart Cities: A Study in Science, Technology, and Society’. *Smart Cities* 5, no. 3 (September 2022): 832–74. https://doi.org/10.3390/smartcities5030043.

‘The United Nations Virtual Reality Experiment – Innovating for Peace Series | UN Web TV’, 16 December 2022. https://media.un.org/en/asset/k12/k12aut27i5.

‘UN Virtual Reality – United Nations Virtual Reality

‘Using Virtual Reality to Drive Public Engagement’. Inspired, 28 October 2020. https://blogs.icrc.org/inspired/2020/10/28/using-virtual-reality-to-drive-public-engagement/.

‘Using Virtual Reality to Drive Public Engagement’. Inspired, 28 October 2020. https://blogs.icrc.org/inspired/2020/10/28/using-virtual-reality-to-drive-public-engagement/.

‘Virtual & Augmented Reality for Tackling Global Issues @

‘Virtual Realities: How Cities Are Moving into the Metaverse and beyond | Bloomberg Cities’. Accessed 21 March 2023. http://bloombergcities.jhu.edu/news/virtual-realities-how-cities-are-moving-metaverse-and-beyond.

‘Welcome to Decentraland’. Accessed 20 March 2023. https://decentraland.org/.

‘What Is an Emerging Technology?’ arXiv, 4 January 2016. http://arxiv.org/abs/1503.00673.

13 October 2022.

Allam, Zaheer, Ayyoob Sharifi, Simon Elias Bibri, David Sydney Jones, and John Krogstie. ‘The Metaverse as a Virtual Form of Smart Cities: Opportunities and Challenges for Environmental, Economic, and Social Sustainability in Urban Futures’. *Smart Cities* 5, no. 3 (8 July 2022): 771–801. https://doi.org/10.3390/smartcities5030040.

Ball, Mathew. “Framework for the Metaverse” June 29, 2021 https://www.matthewball.vc/all/forwardtothemetaverseprimer

Bibri, Simon Elias. ‘The Social Shaping of the Metaverse as an Alternative to the Imaginaries of Data-Driven Smart Cities: A Study in Science, Technology, and Society’. *Smart Cities* 5, no. 3 (September 2022): 832–74. https://doi.org/10.3390/smartcities5030043.

Breia, Rachel. “Metaverse Meaning: Definition, Origin and Opportunities.” March 30, 2022. https://sensoriumxr.com/articles/sensoriumxr.com/articles/metaverse-meaning.

Damar, Muhammet. ‘Metaverse Shape of Your Life for Future: A Bibliometric Snapshot’, n.d.

Dionisio, John David N., William G. Burns Iii, and Richard Gilbert. '3D Virtual Worlds and the Metaverse: Current Status and Future Possibilities'. *ACM Computing Surveys* 45, no. 3 (June 2013): 1–38. https://doi.org/10.1145/2480741.2480751.

Disaster-Resilience in the Network Age Access-Denial and the Rise of CyberHumanitarianis, Mark Duffield, Danish Institute for International Studies (2013), http://www.jstor.com/stable/resrep13344

Dragicevic, Pierre. 'Towards Immersive Humanitarian Visualizations'. arXiv, 4 April 2022. http://arxiv.org/abs/2204.01313.

Duffield, Mark. 'Post-Humanitarianism'. *Journal of Humanitarian Affairs* 1, no. 1 (1 January 2019): 15–27. https://doi.org/10.7227/JHA.003.

Edgar, Brenda Lynn, Valérie Gorin, and Dolores Martín-Moruno, eds. *Making Humanitarian Crises: Emotions and Images in History*. Cham: Springer International Publishing, 2022. https://doi.org/10.1007/978-3-031-00824-5.

Gerring, John. *Social Science Methodology: A Unified Framework*. 2nd ed. Strategies for Social Inquiry. Cambridge ; New York: Cambridge University Press, 2012.

Giacomello, Giampiero, Francesco Niccolò Moro, and Marco Valigi. 'Introduction: Technology and International Relations – The New Frontier in Global Power'. *Technology and International Relations*, n.d.

Government of Dubai Media Office. 'Dubai's VARA Issues Specialized Regulations for Virtual Assets' 7 February 2023.

Haklay, M. (2010). How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets. Environment and Planning B: Planning and Design, 37(4), 682-703.

Hoijtink, Marijn, and Matthias Leese, eds. *Technology and Agency in International Relations*. Emerging Technologies, Ethics and International Affairs. London ; New York: Routledge Taylor & Francis Group, 2019.

Huessner, Mae. 'Virtual public Square: Metaverse Seoul' TIME. 10 November 2022.

Ibrahim, Danial. ‘8 Metaverse Cities to Keep a Close Eye on in 2023’. The Metaverse Insider, 16 December 2022. https://metaverseinsider.tech/2022/12/16/metaverse-cities/.

ICRC Audiovisual archives. ‘ICRC Audiovisual Archives’. Accessed 21 March 2023. https://avarchives.icrc.org/Film/23946.

International Committee of the Red Cross. ‘Virtual Reality & Innovation’. Topic, 10 November 2020. https://www.icrc.org/en/what-we-do/virtual-reality.

International Committee of the Red Cross. ‘War at the Front Door: A Virtual Reality Challenge inside Urban Conflict’. News release, 22 October 2018. Middle East/Syria;Middle East/Iraq;Middle East/Yemen. https://www.icrc.org/en/document/war-front-door-virtual-reality-challenge-inside-urban-conflict.

International Committee of the Red Cross. ‘War at the Front Door: A Virtual Reality Challenge inside Urban Conflict’. News release, 22 October 2018.

Josef Erl, “Here Are 10 Metaverse Definitions, Take Your Pick,” MIXED Reality News, September 3, 2022. https://mixed-news.com/en/here-are-10-metaverse-definitions-take-your-pick/.

Kshetri, Nir. “National Metaverse Strategies” University of North Carolina at Greensboro. 2023.

Kye, Bokyung, Nara Han, Eunji Kim, Yeonjeong Park, and Soyoung Jo.

Lamb, Hilary. “What Can the Metaverse Learn from Second Life?,” April 13, 2022.

Lee, Lik-Hang, Tristan Braud, Pengyuan Zhou, Lin Wang, Dianlei Xu, Zijun Lin, Abhishek Kumar, Carlos Bermejo, and Pan Hui. ‘All One Needs to Know about Metaverse: A Complete Survey on Technological Singularity, Virtual Ecosystem, and Research Agenda’. arXiv, 3 November 2021. http://arxiv.org/abs/2110.05352.

Lu, Q., Zhang, L., Wang, Y., Huang, K., & Zhang, J. (2021). Artificial intelligence in metaverse: State-of-the-art and future perspectives.

Luo, M., & Qi, L. (2021). Web 2.0 and Web 3.0: A Comparative Analysis of the Web Development Stages. In International Conference on Computer Science, Communication and Security (pp. 615-623). Springer.

Lv, Zhihan, Wen-Long Shang, and Mohsen Guizani. ‘Impact of Digital Twins and Metaverse on Cities: History, Current Situation, and Application Perspectives’. *Applied Sciences* 12, no. 24 (January 2022): 12820. https://doi.org/10.3390/app122412820.

M. Kiehl. ‘ICRC and Norwegian Red Cross Create Remote Multiplayer VR Security Trainer’. Inspired, 11 June 2021. https://blogs.icrc.org/inspired/2021/06/11/icrc-and-norwegian-red-cross-create-remote-multiplayer-vr-security-trainer/.

Madianou, Mirca. “The Biometric Assemblage: Surveillance, Experimentation, Profit, and the Measuring of Refugee Bodies,” *Television & New Media* 20, no. 6 (September 2019): 581–99, https://doi.org/10.1177/1527476419857682.

Mellado Dominguez, Alvaro. ‘From Humanitarianism to Post-Humanitarianism: A Digital Consequence: Post-Humanitarianism: Governing Precarity in the Digital World, by Mark Duffield, Cambridge, Polity Press, 2019, 224 Pp. , + Bibliography + Index, £17.99 (Paperback), ISBN 9780745698595’. *International Peacekeeping* 29, no. 2 (15 March 2022): 338–40. https://doi.org/10.1080/13533312.2020.1846529.

Meta Official Website. 2023.

Moura, D., Pinto, A., Duarte, F., Cardoso, T., Peres, E., Carriço, L., ... & Leitão, R. (2020). MALLARDS: A 3D metaverse platform for downtown promotion. In 2020 15th Iberian Conference on Information Systems and Technologies (CISTI) (pp. 1-6). IEEE.

Mystakidis, Stylianos. ‘Metaverse’. *Encyclopedia* 2, no. 1 (10 February 2022): 486–97. https://doi.org/10.3390/encyclopedia2010031.

Naqvi, Nassem. “Metaverse for Public Good: Embracing the Societal Impact of Metaverse Economies” The JBBA. 7 April 2023.

Narin, Nida Gökçe. ‘A Content Analysis of the Metaverse Articles’, n.d.

Nath, Keshab, and Raja Iswary. "What comes after Web 3.0? Web 4.0 and the Future." In Proceedings of the International Conference and Communication System (I3CS’15), Shillong, India, vol. 337, p. 341. 2015.

Nath, Keshab, and Raja Iswary. ‘What Comes after Web 3.0? Web 4.0 and the Future’, n.d.

National League of Cities. ‘Cities and the Metaverse’, 18 April 2022. https://www.nlc.org/resource/cities-and-the-metaverse/.

Ning, Huansheng, Hang Wang, Yujia Lin, Wenxi Wang, Sahraoui Dhelim, Fadi Farha, Jianguo Ding, and Mahmoud Daneshmand. ‘A Survey on Metaverse: The State-of-the-Art, Technologies, Applications, and Challenges’, n.d.

November 2017, Burton Bollag // 01. ‘Inside ICRC’s Virtual Reality Unit’. Devex, 1 November 2017. https://www.devex.com/news/sponsored/inside-icrc-s-virtual-reality-unit-91361.

of Educational Evaluation for Health Professions 18 (13 December 2021): 32. https://doi.org/10.3352/jeehp.2021.18.32.

Oluoch, P. O., Okeyo, G. O., & Wario, R. (2018). Ushahidi platform: Crowd-based approach for disaster management. In 2018 IST-Africa Week Conference (IST-Africa) (pp. 1-6).

Palm, E. (2021). What comes after Web 2.0? Introducing the Metaverse. Communications of the ACM, 64(1), 20-22.

Park, Sang-Min, and Young-Gab Kim. ‘A Metaverse: Taxonomy, Components, Applications, and Open Challenges’. *IEEE Access* 10 (2022): 4209–51. https://doi.org/10.1109/ACCESS.2021.3140175.

Patel Thompson, Avni, Ethan Winn, George Oates, Jad Esber, Li Jin, Maxwell Kanter, Morshed Mannan, et al. ‘Toward A More Cooperative Web3’. *SSRN Electronic Journal*, 2022. https://doi.org/10.2139/ssrn.4302681.

Project Implemented by the UN SDG Action Campaign’. Accessed 21 March 2023. https://unvr.sdgactioncampaign.org/.

Ramos, Jaime. “Seoul is the First City to Join the Metavrse (And This is What Can Already be Done)” Tomorrow City. 13 April 2023.

Rickli, Jean-Marc, and Federico Mantellassi. ‘Our Digital Future: The Security Implications of Metaverses’, 2023

Rotolo, Daniele, Diana Hicks, and Ben R. Martin. ‘What Is an Emerging Technology?’ arXiv, 4 January 2016. http://arxiv.org/abs/1503.00673.

Sharma, Alkesh. “Dubai Chamber of Digital Economy’s Metaverse Academy receives more than 150 Applications” The National News. 15 November 2022.

Sheridan, Dan, James Harris, Frank Wear, Jerry Cowell Jr, Easton Wong, and Abbas Yazdinejad. ‘Web3 Challenges and Opportunities for the Market’. arXiv, 6 September 2022. http://arxiv.org/abs/2209.02446.

TechNovation UNITAR | Office of Information and Communications Technology’ Accessed 21 March 2023. https://unite.un.org/techevents/virtual_reality.

The Sandbox. ‘The Sandbox Game — Create, Play, Earn’. Accessed 20 March 2023. https://www.sandbox.game/en.

United Arab Emirates Government Portal. ‘Dubai Metaverse Strategy’ https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/strategies-plans-and-visions/government-services-and-digital-transformation/dubai-metaverse-strategy

Van Den Homberg, Marc J. C., Caroline M. Gevaert, and Yola Georgiadou. ‘The Changing Face of Accountability in Humanitarianism: Using Artificial Intelligence for Anticipatory Action’. *Politics and Governance* 8, no. 4 (10 December 2020): 456–67. https://doi.org/10.17645/pag.v8i4.3158.

World Health Organization. “Report of the WHO consultation on digital technologies for tuberculosis”. 2022. https://apps.who.int/iris/bitstream/handle/10665/365973/9789240068254-eng.pdf?sequence=1

Zawya. “The Metaverse Welcomes UAE’s first hospital, Medcare Women and Children’

Zhang, Y., Chen, M., Wei, J., & Zhang, L. (2021). Blockchain-based Metaverse: Design, challenges, and opportunities. Future Generation Computer Systems, 117, 140-148.