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# Freedom of expression and the metaverse: on the importance of content creation for the emergence of a complex environment

## Liberdade de expressão e o metaverso: da importância da criação de conteúdo para o surgimento de um ambiente complexo

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### Abstract

This research analyzes the importance of the freedom of expression in the creation of the metaverse, in a context of increasing power of Big Techs in the digital environment. As its results, technical knowledge related to many areas and creativity are fundamental for the creation of the metaverse. Thus, its creation must be democratized. Public policies ensuring ways to access content creation must be developed, and such a democratization must be based on freedom of expression. And limitations to the exercise of such freedom must not be subjected to private interests of huge corporations, nor moderated solely by technological tools. Methodology: hypothetical-deductive method of procedure, with a qualitative and transdisciplinary approach, and a bibliographic review research technique.

**Keywords**: metaverse; freedom of expression; Big Techs; digital environment; content creation.

### Resumo

Esta pesquisa analisa a importância da liberdade de expressão na criação do metaverso, em um contexto de crescente poder das Big Techs no ambiente digital. Como resultados, tem-se que o conhecimento técnico relacionado a diversas áreas e a criatividade são fundamentais para a criação do metaverso. Assim, sua criação deve ser democratizada. Políticas públicas que garantam formas de acesso à criação de conteúdo devem ser desenvolvidas, e tal democratização deve ser baseada na liberdade de expressão. E as limitações ao exercício dessa liberdade não devem ser submetidas a interesses privados de grandes corporações, nem moderadas apenas por ferramentas tecnológicas. Metodologia: método de procedimento hipotético-dedutivo, com abordagem qualitativa e transdisciplinar, e técnica de pesquisa de revisão bibliográfica.

**Palavras-chave**: metaverso; liberdade de expressão; Big Techs; ambiente digital; criação de conteúdo.

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## SUMMARY

## 1.  INTRODUCTION

Mark Zuckerberg, Facebook's creator, only deals with one subject currently: the creation of the metaverse.[1] This illustrates the importance given to the topic by businessmen and scholars. Education, socialization, entertainment, commerce, services, marketing and advertising are the most promising areas to take advantage of this new universe based on immersive and interactive experiences. Thus, a potentiation of several already existing markets - and the creation of not yet imagined new ones - will occur shortly. If internet users have established relationships, taken courses, made business and had fun virtually, in the near future, the intimate coupling between physical and the virtual worlds will occur ubiquitously.

What relationship does the creation of the metaverse have with freedom of expression? As a hypothesis for that problem, it is presented that the creation of the metaverse depends not only on the work of programmers and technology designers, requiring huge efforts from the most varied areas of creation and expression, including the artistic ones. Thus, the freedom of expression of such creators has fundamental importance for the creation of a space that is not only dynamic and safe from an economic point of view, but also legally, politically and artistically. And just as the creation of this new universe should not be attributed only to Big Techs that are currently making efforts to do so, the regulation of expression should not be subjugated only to the economic interests of such companies.

The main objective of this research, which has the hypothetical-deductive method of procedure, with a qualitative and transdisciplinary approach, and a bibliographic review research technique, is to analyze the importance of the freedom of expression in the creation of the metaverse, in a current context of increasing power of large technology companies in relation to such a right in the digital environment.

Its first section identifies meanings for freedom of expression in the information society. Secondly, it seeks to understand the power of large technology companies over expression on the internet. Thirdly, it aims to understand the fundamentals of the metaverse – namely, augmented reality, lifelogging, mirror worlds, virtual reality and

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[1]    HAYS, Kali; STEWART, Ashley. Mark Zuckerberg's metaverse obsession is driving some current and former Facebook employees nuts: 'It's the only thing Mark wants to talk about'. **Insider**, Apr 22, 2022. Available at: https://www.businessinsider.com/mark-zuckerberg-metaverse-obsession-driving-some-employees-nuts-2022-4?utm_source=feedly&utm_medium=webfeeds. Accessed in May 9th, 2022.

mixed reality. Its fourth part studies the so-called pillars of the metaverse ecosystem – the avatar, content creation, virtual economy, social acceptability, the security/privacy binomial, and the relationship between trust and responsibility. Finally, its fifth section draws a parallel between free expression and the needs of creating the metaverse for the most diverse types of professionals and users.

## 2.    THE DYNAMICS OF FREEDOM OF EXPRESSION IN AN ENVIRON-MENT TRANSFORMED BY TECHNOLOGY

Freedom of expression is a generic terminology, which encompasses both the free expression of thought (art. 5º, IV, CRFB) and other dimensions of expression.[2] However, the several fundamental positions (artistic, scientific, press, information, etc.) linked to free expression should be seen as interconnected parts of a general conception – although each fundamental right included in it has essential particularities. It presupposes fair access to opportunities for expression and listening in the process formation of opinion and will. This assumption includes not only distribution of opportunities, but also effective discouragement  of views that violate such freedom.[3]

Social media has quickly entered national judicial arenas, and since the 2010s case law on them within the EU has grown significantly — but their revolutionary impact on communication practices was not reflected in national Courts.[4] But few cases around social media have been approached from a fundamental rights perspective. When judges use some component of fundamental rights in their reasoning, they have done it mainly from the point of view of freedom of expression. In relevant cases, Judiciary has faced issues related to privileges of political discourse and restrictions on it, or to the applicability of constitutional safeguards enshrined for the press on social media, or even on interpretation of norms for television broadcasting in the wake of social media. Safeguards of freedom of expression established in national constitutions and supranational instruments (particularly the European Council of Human Rights – ECHR) have been interpreted with great attention to the new technological and communication context, showing that sources of fundamental rights are living instruments for the interpretation in current conditions. Fundamental rights have significantly aided the interpretation of rules not specific to social media, which reflects how useful they are.

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One of the most important fundamental rights, free expression is based on human dignity among other conceptions, concerning autonomy and free development of individual personality. Moreover, it is one of the main social and political conditions and guarantees of democracy and political pluralism, as it ensures free circulation of ideas. It also reveals a clearly trans-individual dimension, since it operates essentially in the sphere of social communication. In fact, effective respect for freedom of expression means a true "parameter that ascertains the degree of consolidation of democracy and respect for the human rights of a country."[5]

Bento[6] corroborates this position by emphasizing that free expression does not only have an individual dimension (right to express opinions and share ideas and information), but also trans-individual ones (collective and diffuse), consisting of the right to access ideas, opinions and information disclosed by others. In other words, this right does not only affect each subject of communication in isolation, but also collectively on the communicative process, which is essential for human interaction and ultimately for democracy itself.

Free expression must be related to the demand for equal respect and consideration for all members of political society — and the exercise of political authority is legitimated only if it can be publicly justified[7] in this sense. Thus, institutional responses to the structural conditions of the system that mediates public communication must be supported through interpretations of freedom of expression. Thus, democracy and free expression complement and condition each other in a dialectical and dynamic way – as although more democracy can mean more freedom of expression, unlimited freedom of expression can pose risks to democracy.[8]

Often defended as necessary for informed collective decision-making in a democracy on matters of public interest, freedom of expression is fundamental for public discussion of shared responsibilities as democratic decision-makers, in this sense — and current anomalies such as misinformation fall under the category of "public discourse." News have value because of the ways they support democratic decision-making, but

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[5]   SIMAO, José Luiz de Almeida; RODOVALHO, Thiago. A Fundamentalidade do Direito à Liberdade de Expressão: as justificativas instrumental e constitutiva para a inclusão no catálogo dos direitos e garantias fundamentais na Constituição Federal de 1988. **Cadernos do Programa de Pós-Graduação em Direito PPGDir./ UFRGS,** v. XII, n. 1, p. 203-229, 2017. DOI: https://doi.org/10.22456/2317-8558.72978, p. 225)

[6]   BENTO, Leonardo Valles. Parâmetros internacionais do direito à liberdade de expressão. **Revista de Informação Legislativa**, v. 53, n. 210, p. 93-115, 2016. Available at: https://www12.senado.leg.br/ril/edicoes/53/210/ ril_v53_n210_p93. Accessed in March 16, 2022.

[7]   FRANCISQUINI, Renato. On the limits of free speech: towards the fair value of communicative liberties. **Brazilian Political Science Review**, v. 9, n. 1, p. 65-92, 2015. DOI: http://dx.doi.org/10.1590/1981-38212014000200003.

[8]   SARLET, Ingo Wolfgang; WEINGARTNER NETO, Jayme. Liberdade de expressão: algumas ponderações em matéria penal à luz da Constituição Federal do Brasil. **Espaço Jurídico Journal of Law**, v. 18, n. 3, p. 637-660, 2017. DOI: https://doi.org/10.18593/ejjl.16256.

they do not give a voice to people who want to contribute to the debate — behold, its producers do not really believe in it — nor do they provide a source of information for decision-making – since they are not tactically true – and they do not even provide an opportunity to discuss important values – because when presented as factual, they distract attention from genuine issues of discussion.[9] In this sense, specially protected discourses[10]  — which deal with matters of public interest, criticize the actions of State agents and/or denounce irregularities, mismanagement or violations of rights — must be differentiated from those that are not protected — those which only characterize themselves in the face of the real and imminent danger of generating violent/discrimi- natory acts – that is, speeches restricted not by their content, but by their consequenc- es, according to the principle of neutrality of regulation.

Free expression embodies expressing value judgments about facts and ideas, and serves as a shield not only for the content of the expression, but also for the means of expression; but this right must be understood as referring to a changing world, which includes new modalities such as electronic media.[11] The current advent of infor- mation society has been praised as the result of the information revolution, which has: i) brought the growing importance of networks,; ii) collapsed old hierarchies; and iii) placed knowledge at the center of economy.[12] Flowing information networks promote globalization, but they are also sources for international civic societies and subversive movements.

Whereas the twentieth-century system of free speech taught that such freedom has limited meaning when no ability to act upon it is available, the twenty-first-century system has hitherto taught that the ability to expression has limited meaning with- out freedom from interference. Currently freedom of expression has been increasingly remodeled as a privilege entitled by Big Tech companies that control communication platforms, and anyone can have accounts on social networks. In practice, they provide broad freedom of expression – though this breadth of speech opportunities obliter- ates the perception that the interests of users are always subject to the graces of the companies that own and develop such means. No matter how broad the privilege of

9     MATHIESEN, Kay. Fake News and the Limits of Freedom of Speech In: FOX, Carl; SAUNDERS, Joe (eds.). **Media Ethics, Free Speech, and the Requirements of Democracy.** New York; London: Routledge, 2019, p. 161-180.

10     BENTO, Leonardo Valles. Parâmetros internacionais do direito à liberdade de expressão. **Revista de Infor- mação Legislativa**, v. 53, n. 210, p. 93-115, 2016. Available at: https://www12.senado.leg.br/ril/edicoes/53/210/ ril_v53_n210_p93. Accessed in March 16, 2022.

11     SARLET, Ingo Wolfgang; WEINGARTNER NETO, Jayme. Liberdade de expressão: algumas ponderações em matéria penal à luz da Constituição Federal do Brasil. **Espaço Jurídico Journal of Law**, v. 18, n. 3, p. 637-660, 2017. DOI: https://doi.org/10.18593/ejjl.16256.

12     HALLBERG, Pekka; VIRKKUNEN, Janne. **Freedom of Speech and Information in Global Perspective.** New York: Palgrave Macmillan, 2017. DOI: https://doi.org/10.1057/978-1-349-94990-8.

communication granted by such entities may be, it is not a right operatively — and this seriously threatens freedom of expression in the digital environment.[13]

Social media users not only access such means anywhere or connect them-selves with anyone linked to their networks, but also create their own content and tell their versions of the facts to the rest of the collectiveness. As social media develops and opens up newer and faster ways to communicate and explore the world, people become more digitally literate and aware of the potential of these tools. Furthermore, web society continues to grow in population, becoming faster, more convenient, and more practical.

Twenty-first century discourse environment threatens the foundations of the democratic project although, as the current discourse operates in ways that could not be imagined not only by their modern founding philosophers and politicians, but also for the twenty-century democracy defenders. Discourse has undergone reduction in price and increase in abundance, therefore it can be exploited by governments and powerful private actors as a tool — both to control other people's speech and to thwart the meaningful public discourse and democratic outcomes.[14] The pace of change in the speech environment has become more exponential than incremental, inducing a danger — the need for bold strategies of adapting Law to the possible harmful con-sequences for democracy of the twenty-first century discourse environment — and a paradox — as the fast transformations advise judicial and academic modesty, as their consequences are poorly understood hitherto.

Social media provides instant and easy connection by text, sound, images and video. Moreover, people no longer rely on the occasional one-person-at-a-time confer-ence that lasts for only a few hours, as social media facilitates an endless intercontinen-tal conversation in real time, with no interruption. At best, it can lead to an environment of unbridled innovation. But social media is only an engine of social change transform-ing information media. In the political arena, it may help a loosely coordinated public to come together and collectively demand change, for example.[15]

New opportunities for exercising free expression emerged from the Internet, specially regarding quality and quantity of speech individuals enjoy.[16] But the possibility

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[13] YEMINI, Moran. The New Irony of Free Speech. **The Columbia Science & Technology Law Review**, v. 20, n. 1, p. 119-194, 2018. DOI: https://doi.org/10.7916/stlr.v20i1.4769.

[14] MASSARO, Toni M.; NORTON, Helen. Free Speech and Democracy: A Primer for Twenty-First Century Re-formers University of California, **Davis Law Review**, v. 54, n. 3, p. 1631-1685, 2021. Available at: https://lawre-view.law.ucdavis.edu/issues/54/3/articles/massaro_norton.html. Accessed in March 16, 2022.

[15] LEISTI, Sanna. Digital Era and Social Media Shaping the World In: HALLBERG, Pekka; VIRKKUNEN, Janne. **Freedom of Speech and Information in Global Perspective.** New York: Palgrave Macmillan, 2017. DOI: https://doi.org/10.1057/978-1-349-94990-8, p. 234-239.

[16] POLLICINO, Oreste. Judicial protection of fundamental rights in the transition from the world of atoms to the word of bits: The case of freedom of speech. **European Law Journal**, v. 25, n. 2, p. 155-168, 2019. DOI: https://doi.org/10.1111/eulj.12311

of exercising such a freedom increase conflicts with other interests, especially those with fundamental rights status. It is common to see generic definitions of the Internet as being an environment of freedom, due to the fact that it supposedly increases the possibility of demonstrations by a larger group of people than it would be possible in traditional media – but this definition should be nuanced, given that several types of limitations characterize such freedom in the online environment.[17] Economic limitations to Internet access must be considered, as it is impossible to exercise any freedom without resources to access the network and publish opinions that may become known to third parties – regarding connection costs, technological communication with third parties, etc. Technical limitations must also be mentioned, as sufficient technical knowledge is needed to make use of the network and express oneself – although this limitation has become less relevant, thanks to the information available in various ways to the general population within the scope of the knowledge society, as States and companies has assumes responsibilities to provide citizens the necessary resources to use the Internet. However, even more relevant is the ease with which the control of information disseminated on the network occurs. China and Turkey, for example, provide regulation prescribing that the State must censor or monitor content, preventing viewing content that would be totally accessible in any other country. Hence, although freed expression on the Internet gives citizens opportunities to communicate interactively — as well as the possibility of being better informed about public affairs — the control or suspension of communication on the Internet has been observed in many countries that have more restrictively regulated free expression in the name of values such as national security, public order and crime repression.[18]

Social media has revolutionized free speech landscape, but it still faces an age-old economic divide that manifests itself nationally and internationally: money buys the ability to be heard. Owners and managers of media outlets are able to express themselves in ways that most people cannot. There is also a huge disparity between people with access to the Internet and people in a more vulnerable economic situation who do not. The debate on freedom of expression should therefore not only focus on the political issue of State censorship on citizens, but also on the continuity of freedom of expression.[19]

Given the growing use of social networks as a means of exercising free expression, such access must also be recognized as a fundamental human right. Internet access

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[17] GALINDO, Fernando; CARMO, Valter Moura de. ¿Libertad e Internet? **DIXI**, v. 19, n. 26, p. 73-83, 2017. DOI: https://doi.org/10.16925/di.v19i26.1952.

[18] MOMEN, Md Nurul. Myth and Reality of Freedom of Expression on the Internet. **International Journal of Public Administration**, v. 43, n. 3, p. 277-281, 2020. DOI: https://doi.org/10.1080/01900692.2019.1628055.

[19] TILAK, Geetali. Freedom of Expression in the Digital Age. **Indian Journal of Applied Research**, v. 9, n. 6, p. 1-3, 2019. Available at: http://210.212.169.38/xmlui/handle/123456789/6078. Accessed in March 16, 2022.

has become essential to perform basic civil tasks — and this dependence is threatened by social and personal cyber vulnerabilities. As digital means of political participation supplant their traditional analogue counterparts (local campaigning, assemblies, paper ballot voting, etc.), the demand for a human rights framework that gives Internet access human and fundamental legal status has increased.[20] This transformation could even find support in the struggle to protect free expression. It may even establish positive duties for States to guarantee connectivity (including high-speed and stability). While many governments are already doing this as a result of economic incentives, a human rights motivation may manifest itself differently.

## 3. REGULATION OF EXPRESSION AND THE POWER OF THE BIG TECHS

The normative analysis of violations of the freedom of online intermediaries can motivate policies to increase it. Freedom-conscious legal systems may be interested in legal limits on the ability of Big Tech companies to limit users based on their content, require online intermediaries to proceed before blocking accounts, impose levels of transparency of algorithms, and regulate personal data treatment. However, for the digital ecosystem to configure a free environment, Law must more effectively consider users' freedom — which does not mean depriving online intermediaries of all the power to regulate expression on platforms. Online moderation can be advantageous because when moderators competently do their jobs, they facilitate communication and create conditions of cooperation online. Thus, Law should determine legitimate exercise of power for online intermediaries instead of encouraging them to act as they consider fit merely.[21]

Great tensions over free of expression occur today, as Big Techs establish norms for access to information and public conversation, which stems from the capitalization of free expression by them.[22] As a result, expression and information suffer private, automatic and opaque algorithmic interferences. So, there is a set of censorship interference guidelines based on policies formulated by Big Techs to create an information environment reflecting their own ideals. Vague and confusing in their elaboration, such policies reduce complex legal decision-making, meaning that the determination of attention of contents is increasingly determined by such companies. That is, while

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people's physical lives are currently mostly subject to democracies in the Western world, digital lives are mostly in autocracies. [23]

Social media platforms have a huge impact on online expression as they set rules for most of the generated content and the information exchanged; thus, they constantly interfere on speech, while enjoying virtually unlimited power to surveil, block, filter, and manipulate it. Therefore, an environment for promoting expression is unsustainable without the possibility of effective constitutional verification on the exercise of power by online intermediaries. [24] Thus, Big Techs have great powers that do not come with great responsibilities – and one of the biggest challenges of policies regarding the Internet today is changing power balance between online intermediaries and end users. This can happen in different ways, including self-regulation by private actors and regulation by design. But the State is fundamental for that, as it depends on constitutional safeguard for users' free expression. Thus, existing and future rules must be subjected to broader tests of legitimacy, giving the Legislature and Administrative entities substantial latitude to develop policies to protect freedom, concomitantly imposing limits against the regulation of policies of suppression of expression. Courts must, therefore, adjust the doctrine of first dimension (the civil one, where free expression belongs) fundamental rights to digital online realities, transcending the traditional, vertical concept of fundamental rights (between State and users uniquely) by adopting alternative, horizontal pluralist conceptions, in which fundamental rights also binds non-state entities.

The Internet is a new type of technical system, not just a tool or device, but a communication network, which takes on the features of the telephone network, entertainment broadcasting, delivery, logistics and transportation, opening up new "worlds" for its users, who also acquire new capabilities and identities through their participation — especially in what is observed with the unprecedented absorption in social relations mediated by platforms.[25] Although such worlds and capabilities/identities coexist, many conflicts occur as well —between users and between them and Big Techs. Such conflicts can mainly be described as the passivity of users facing the policies of companies and technical problems and abuses, which provoke new forms of resistance. Thus, only a more powerful and acute participation of the State in Internet affairs could reverse that situation of autocracy by Big Techs. Both States and social networks must demand that political advertising on the Internet be identified by its source (although

[23]    SHAPIRO, Ehud; TALMON, Nimrod. Foundations for Grassroots Democratic Metaverse.**Arxiv**, 2022. DOI: https://doi.org/10.48550/arxiv.2203.04090.

[24]    YEMINI, Moran. Missing in "State Action": toward a pluralist conception of the First Amendment. **Lewis & Clarke Law Review**, v. 23, n. 4, p. 1149-1220, 2020. Available at: https://law.lclark.edu/live/files/29476-lc-b234art2yeminipdfpdf. Accessed in March 16, 2022.

[25]    FEENBERG, Andrew. The Internet as network, world, co-construction, and mode of governance. **The Information Society**, v. 35, n. 4, p. 229-243, 2019. DOI: https://doi.org/10.1080/01972243.2019.1617211.

the extraterritoriality of many actors represents an obstacle to this), in which abusive bots and trolls can be algorithmically identified and excluded.

Internet monopolies must be broken, and States must support the development of a decentralized social networking system that respects privacy. Such systems would replace the massive server farms of the Internet giants, whose main function is to process data for sale. As no venture capitalist will finance this type of research and development, State intervention, as in the case of basic medical research, is essential. Thus, a ban on the uncontrolled collection and sale of personal data (except when it is necessary to improve services and identify intrusions) could occur. And participation in advertising and political campaigns, therefore, should also be based on choice, not on indirect data collection. And the sharing economy needs state support to get rid of venture capital, and this support must be democratically administered by management teams chosen by the participants.

With the need to discuss the constitutional legitimacy that should be given to the regulation of freedom of expression in digital networks, it is essential to (re)discuss the idea of sovereignty, relating it to the context of postmodern connectivity. Advocates of the concept of current political and publicly popular digital sovereignty have realized that the very idea of sovereignty has changed as it has been highlighted, in addition to reversing some of their initial beliefs about the governability of a networked world. Cybersovereignty is a non-territorial challenge to sovereignty specifically to the virtual realm of the Internet, and it has become much broader, addressing not only issues of communication and networking, but also the digital transformation of societies. It has often been used to express the idea of an orderly, values-driven, regulated and, therefore, reasonable and secure digital sphere — including the multifaceted problems of individual rights and freedoms, collective and infrastructural security, political and legal applicability, as well as fair economic competition.[26]

Sovereignty has traditionally been considered the basis of enforceable law backed by clear structural arrangements — including State monopoly on violence — by which the State is conceived as a relatively coherent, capable, independent and, therefore, autonomous actor. Even though sovereignty has always been imperfect, the means of sovereign power in the Westphalian system were quite simple. However, digitization, globalization and platformization have made the interpretive needs of sovereignty meaning much more complex. And in this sense, the digital sovereignty of a State cannot be reduced to its ability to define and enforce norms: it must be understood as deeply invasive and more as an active managerial capacity, with the possibility

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[26]   POHLE, Julia; THIEL, Thorsten. Digital sovereignty. **Internet Policy Review**, v. 9, n. 4, p 1-19, 2020. DOI: https://doi.org/10.14763/2020.4.1532

of installing control and manipulation infrastructures, than as dependence on the organizational capacity of the State.

But if on hand it is insufficient to propose the absolute submission of Big Techs commanding the internet to traditional democratic sovereignty, digital sovereignty should not be confused with the ability to uphold liberal and democratic values alone, on the other. It should not be an end in itself, then new procedural structures must be devised, appropriate to the situation of enormous pervasiveness of networks in civil liberties.

Although the State should play a major role in regulating online free expression, it would also be fallacious to attribute it only that regulatory task. There is no online governance without cooperation of private actors, such as providers.[27] But such actors cannot be simply considered "guardians": the State-centered governance paradigm must be overcome, which engenders a permanent conflict of interests between the political-normative interests that communicate upwards and downwards in society -- that is, between the State and the governed ones. If providers and users are included in the normative framework, alongside existing descending normative structures and initiatives, in the long run, such private entities may be given the role of guardians in such a galaxy of freedom and rights.

New normative and technological tools must be provided, *pari passu* with the possibility of deeper immersion in traditional governance structures. In the creation of this normative culture of inclusion and self-regulation legitimation, traditional legal notions and the content of substantive and procedural rights will be transformed – but this can mean a great opportunity.

## 4.   THE METAVERSE: EVOLUTION, KEY TECHNOLOGIES AND FUNDAMENTALS

The term metaverse was initially used to designate an amplified version of an individual virtual world, but currently it means a large network of interconnected virtual worlds. In the 1992 novel *Snow Crash*, Stephenson coined the term to define an immersive world that appears as a nocturnal metropolis developed along a large street-lit avenue, where humans-as-avatars interact with each other as well as with intelligent agents. A 100-meter-wide neon called Street conjures up images of an over-the-top strip of Las Vegas, and it runs the entire circumference of a featureless black planet considerably larger than Earth, which has been visited by 120 million users, with

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[27]   PODSTAWA, Karolina. Hybrid Governance or... Nothing? The EU Code of Conduct on Combatting Illegal Hate Speech Online In: CARPANELLI, Elena; LAZZERINI, Nicole (eds.). **Use and Misuse of New Technologies:** Contemporary Challenges in International and European Law. Cham: Springer, 2019, p. 167-184. DOI: https://doi.org/10.1007/978-3-030-05648-3.

around 15 million of them occupying the Street at any given time. Users gain access to the metaverse via computers that project a first-person perspective virtual reality (VR) screen onto glasses, and stream digital stereo sound through tiny headphones. Users customize their avatars, and engage in the full range of human social and instrumental activities. Thus, it is essentially an extremely large and densely populated virtual world that functions as an open digital culture that operates in parallel to the physical domain, rather than a game environment with parameters and specific goals. Apparently inspired by Stephenson's version of the metaverse, Zuckerberg describes the metaverse as being a virtual environment where one is present with people in digital spaces, being an embedded internet in which the user is inserted, and not just as an observer.[28]

Subsequent technological advances allowed the implementation of virtual worlds and more complex and expansive conceptions of metaverse. In 2007, the Metaverse Roadmap Project brought out a multifaceted conception that involved simulation technologies, creating physically persistent virtual spaces and technologies that virtually enhance physical reality, such as augmented reality (AR). While it is remarkable in its attempt to conceive the metaverse in broader terms than an individual virtual world and is advancing very rapidly, augmented reality technologies have served to redirect attention away from the key qualities of immersion, three-dimensionality, and simulation, which are foundations of virtual world environments. AR space is a subset of the metaverse, and constitutes a crossroads between purely virtual and real environments. Like in any virtual system, AR also builds access assets and data from an independent or shared world state, overlaying them as a view of the physical world, rather than a synthetic one.

On key technologies, Lee et al.[29] describe eight pillars that enable the metaverse: i) extended reality; ii) user interactivity; iii) robotics/internet of things (IoT); iv) blockchain; v) computer vision; vi) artificial intelligence; vii) cloud/edge computing; viii) network. Extended reality (i) allows users to access various technologies like AI, computer vision and IoT sensors. Metaverse evolves from concept to reality, and the conjunction between virtual, augmented, and mixed realities makes up a necessary intermediate stage. Virtual environments are, in some way, its technical basis, a shared virtual space that allows individuals to interaction, "existing" as concrete virtual images, parallelly "living" with the real world.

Immersive technologies thus shape the immersive internet: VR will allow more realistic users and specific experiences of the networked virtual world, increasingly

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[28]  DIONISIO, John David N.; BURNS III, William G.; GILBERT, Richard. 3D Virtual Worlds and the Metaverse: Current Status and Future Possibilities**. ACM Computing Surveys**, v. 45, n. 3, Article 34, 2013. DOI: http://dx.doi.org/10.1145/2480741.2480751.

[29]  LEE, Lik-Hang et al. All One Needs to Know about Metaverse: A Complete Survey on Technological Singularity, Virtual Ecosystem, and Research Agenda. **Journal of LATEX Class Files**, v. 14, n. 8, 2021, p. 1-66. DOI: 10.13140/RG.2.2.11200.05124/8

making virtual actions and communications resemble the real ones, while that AR, combined with mixed reality (MR) will transform the physical world, in parallel – and it will result in an integration of the virtual and physical worlds. Because of this, perhaps super-realistic virtual entities merging with the physical environment will be real-time and ubiquitously presented, as technology and economics allow it, through large screens, mobile speakers and/or holography. Metaverse users will interact with digital entities and interoperate with real-life objects.

As for user interactivity (ii), mobile techniques allow interaction with digital overlays through extended reality. Designing subtle, body-centric, miniaturized mobile techniques, will result in invisible computing interfaces for ubiquitous interaction with virtual environments in the metaverse. Furthermore, multimodal (especially tactile) feedback suggestions in mobile techniques will make users perceive virtual entities with better senses of presence and realism in the metaverse, and work collaboratively with IoT devices and service robots.

However, virtual environments allowed by VR, AR and MR are complex, providing people only with surreal experiences of partial senses, being unable hitherto to allow the sharing and interaction of all human senses. Therefore, Brain-Computer Interface (BCI) stands out there, as it establishes direct signal channels between the human brain and other electronic devices, bypassing the limitations of language and limbs to interact with electronic devices. All human senses are ultimately formed by transmitting signals to the brain, and if BCI technology becomes fully used, entire simulations of all human sensory experiences by stimulating the corresponding areas of the brain will be allowed. Compared to currently existing headphones and glasses, BCI devices (such as the Neuralink) is likely to be better for user interaction in the virtual world in the future.

Regarding robotics and IoT (iii), autonomous vehicles and robots take advantage of extended reality (ER) systems to observe their own operations and invite human users to participate in decision making. Thus, it is necessary to develop means for comfortable and easily visualized presentation of data streams for efficient interaction with IoT and robots. While such means do not yet exist, ER interfaces enable humans to decide in the metaverse.

By its turn, blockchain (iv) is a technology that adopts proof of operation as a consensus mechanism, requiring participants to make efforts in forms of encryption to ensure the security of the data produced (even in the metaverse). But the verification process of encrypted data is not as fast as conventional approaches – thus faster proofs of operation will accelerate the speed and scalability of data access. Furthermore, data from public blockchains is available to all users, which leads to privacy issues, which demands a great development of privacy protection mechanisms in this area.

Computer vision (v), in turn, comprises a range of technologies that will allow the development of computing devices that understand visual information from human activities and environment. The construction of more reliable and accurate 3D virtual worlds in the metaverse will therefore demand computer vision algorithms. However, such algorithms should be much more efficient and accurate from a computational point of view (mainly algorithms for understanding space; body and pose tracking; color correction; texture restoration; and blur estimation), because the integration between the physical world and virtual objects engenders much more complex environments.

AI technologies (vi) – in particular, deep learning – allow considerable progress in the development of automation in the metaverse. However, AI must also be applied in facilitating the operation of users and improving their immersion experience. Current AI models are often very deep, demanding huge computing resources – which is not supported by current mobile devices. Thus, lightweight and efficient AI models must be developed for a widespread metaverse.

As for cloud and edge computing (vii), both Wi-Fi and cellphone networks will be used to achieve the metaverse (and therefore cloud technology for information storage is fundamental), and such networks have a time latency, which makes last-mile latency – especially for wirelessly connected users – still the main latency bottleneck for both Wi-Fi and cellular networks. Thus, reducing latency is critical.

Finally, network (viii) itself is fundamental for the development of the metaverse, as it will be the medium through where data flows. Thus, the performance of mobile networks is critical to ensure a smooth user experience. User mobility and embedded sensing will further complicate this task as, unlike the traditional layered approach to networking (where communication between layers is minimal) user experience requirements are rigid in the metaverse, where bidirectional communication between layers is fundamental. 5G network and its successors will facilitate this inter-layer communication.

## 5. KEY ASPECTS AND FUNDAMENTALS OF THE METAVERSE AS AN ECOSYSTEM

The metaverse is a generalized expression of technological culture whose impact will be global – in the first moment, through knowledge; in a second one, through the social; and, from the present moment, through geospatial aspect, AI (basis of the metaverse) will connect all beings on Earth by digital means, creating a three-dimensional layer of information and experience throughout the world thus.[30]

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[30] BOLGER, Ryan K. Finding Wholes in the Metaverse: Posthuman Mystics as Agents of Evolutionary Contextualization. **Religions,** v. 12, n. 768, p. 1-15, 2021. DOI: https://doi.org/10.3390/rel12090768.

The three main factors for the advent of the metaverse are:[31] i) technological advancement; ii) social acceptance of data collection; iii) efficiency of algorithms in predicting needs. Exponential technological progress has resulted in the availability of miniaturized sensors with the computing and communication capabilities of laptops and smartphones, and has spread the technology's adoption to all aspects of life in society. Added to this advance is the social acceptance of recording and sharing data from personal experiences and the high efficiency of machine learning and AI algorithms in predicting surprisingly close to most needs and actions and in continuing to improve.

Parallelly, facilitated by the Accelerated Studies Foundation, in 2007 scholars from several sciences and leaders from various industry sectors developed a twenty-eight-page document on the future of the internet – which they called the metaverse. In that study, the authors have listed four aspects of the metaverse:[32] i) augmented reality; ii) lifelogging (or life record); iii) mirror worlds; and iv) virtual reality.

Augmented reality (AR) gives the metaverse new perspectives to observe the material world. It occurs when the individual's view of the physical world is enhanced by the use of an AR-compatible device (mobile phone, headset, glasses). Such enhancements usually consist of virtual items or information that appear on top of what is seen as physical reality. Such layers of information can be communicated by video, audio, and even addressed by voice. Augmented reality is similar to the lifelogging (see this below) because it adds yet another layer of perception to the experience of reality, and also to mirror worlds as it continuously communicates with sensors in the environment and turns to an external world.[33] Furthermore, the metaverse will be integrated into the urban environment through AR, and digital entities will be visible and touchable over countless physical objects in urban areas.[34] Users equipped with AR will simultaneously act in physical world and communicate with their virtual counterparts.

Lifelogging is a term coined in 1945 by Vannevar Bush, director of the National Institute of Science, to describe the recording made by people themselves of many parts of their lives through technologies such as cameras and tape recorders.[35] This

[31]   DI PIETRO, Roberto; CRESCI, Stefano. **Metaverse:** Security and Privacy Issues In The Third IEEE International Conference on Trust, Privacy and Security in Intelligent Systems, and Applications (IEEE TPS'21), 2021. Available at: https://cri-lab.net/wp-content/uploads/2021/12/Metaverse_Security_and_Privacy_Issues.pdf. Accessed in Feb 21st, 2022.

[32]   SMART, John; JAMAIS, Cascio; PAFFENDORF, Jerry. **Metaverse Roadmap:** Pathways to the 3D Web. A Cross-Industry Public Foresight Project, 2008. Available at: https://www.w3.org/2008/WebVideo/Annotations/wiki/images/1/19 /MetaverseRoadmapOverview.pdf. Accessed in Feb 21st, 2022.

[33]   BOLGER, Ryan K. Finding Wholes in the Metaverse: Posthuman Mystics as Agents of Evolutionary Contextualization. **Religions,** v. 12, n. 768, p. 1-15, 2021. DOI: https://doi.org/10.3390/rel12090768.

[34]   LEE, Lik-Hang et al. All One Needs to Know about Metaverse: A Complete Survey on Technological Singularity, Virtual Ecosystem, and Research Agenda. **Journal of LATEX Class Files**, v. 14, n. 8, p. 1-66, 2021. Available at: https://arxiv.org/abs/2110.05352. Accessed in: Feb 21st, 2022.

[35]   BOLGER, Ryan K. Finding Wholes in the Metaverse: Posthuman Mystics as Agents of Evolutionary Contextualization. **Religions,** v. 12, n. 768, p. 1-15, 2021. DOI: https://doi.org/10.3390/rel12090768.

characteristic of the metaverse occurs when someone posts information (text, photos, videos, etc.) on social networks (such as YouTube, Instagram, Facebook). These presentations are not necessarily a descriptive map on the same scale as the reality – they reveal the version one wants the world to see.[36]

Lifelogging is also augmented – that is, technologies are used to enhance reality – as tools are provided to build the current experience of everyday life; and it is similar to (AR) because wearables are also likely to be used through it to capture what is happening in people's lives.[37] As lifelogging is subjective, they are internal views of the individual's life (and not external as in AR). As in VR, lifelogging is also personalized; however, it coincides with a personal identity in the real world, whereas agency in VR is mediated by avatars.

In turn, mirror worlds allow the creation of digital twins of Earth for immersive experiences in the metaverse. They resemble virtual worlds because they model a world as accurately as possible, so it can be experienced in three dimensions. Google Earth (2005) has been the most significant effort for digitally mapping the Earth,[38] while Google Maps has been used to map the world in 2D and 3D visual aspects.[39] Other geo-based apps, however, such as Waze and body tracking apps, are constantly updated, providing the latest information.

Mirror worlds are extensions of information to the virtual world, realistically reflecting the real world.[40] The terminology was originated from a homonymous book written by Gelernter in 1992.[41] Being built mainly on maps of the Earth, mirror worlds resemble AR, but focusing on the connection with the real external world.[42] Thus, they constitute the "places" where the world is mapped in such a way that a 3D-rendering can occur – some calling them "AR clouds", "digital twins", "ubiquitous computing" and "onlife".[43] But their key aspect is that they offer the possibility for the entire global public

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[36]  KIM, Sangkyun. **The Metaverse:** The Digital Earth - The World of Rising Trends. Paju: PlanB Design, 2021.

[37]  KELLY, Kevin. **AR Will Spark the Next Big Tech Platform**: Call It Mirrorworld. Available at: https://www.wired.com/story/mirrorworld-ar-next-big-tech-platform/. Accessed in Feb 21st, 2022.

[38]  SMART, John; JAMAIS, Cascio; PAFFENDORF, Jerry. **Metaverse Roadmap:** Pathways to the 3D Web. A Cross-Industry Public Foresight Project, 2008. Available at: https://www.w3.org/2008/WebVideo/Annotations/wiki/images/1/19 /MetaverseRoadmapOverview.pdf. Accessed in Feb 21st, 2022.

[39]  KIM, Sangkyun. **The Metaverse:** The Digital Earth - The World of Rising Trends. Paju: PlanB Design, 2021.

[40]  PARK, Sang-Min; KIM, Young-Gab. A met averse: taxonomy, components, applications, and open challenges. **IEEE Access**, v. 10, p. 4209-4251, 2022. DOI: https://doi.org/10.1109/ACCESS.2021.3140175.

[41]  GRIMSHAW, M. **The Oxford Handbook of Virtuality**. New York: Oxford University Press, 2014., p. 702.

[42]  SMART, John; JAMAIS, Cascio; PAFFENDORF, Jerry. **Metaverse Roadmap:** Pathways to the 3D Web. A Cross-Industry Public Foresight Project, 2008. Available at: https://www.w3.org/2008/WebVideo/Annotations/wiki/images/1/19 /MetaverseRoadmapOverview.pdf. Accessed in Feb 21st, 2022.

[43]  FLORIDI, Luciano. **The 4th Revolution:** How the Infosphere is Reshaping Human Reality. Oxford: Oxford University Press, 2014., p. 43.

space to be mapped in a 3D representation and, from that, everything that is digital in terms of AR can be built on it.[44]

Still, mirror worlds resemble VR, as both constitute immersive simulated worlds. In VR, each individual's avatar does not represent their real-world version, but in mirror worlds each avatar represents a real-world "self".[45]

Finally, VR involves gameplaying and narratives in an immersive environment, being associated with humanity's search for immersion – in other words, for presence and agency in other worlds, through myths and stories.[46] Through an avatar, it exists within a game and plays a fundamental role in the development of a story.[47] These types of experiences were reflected in MMORPG games, which allow millions of people around the world to take part in online games. This dynamic has a much greater reach with VR, placing a person in so vivid environments that one has a whole-body experience of being in the game. VR requires people to suspend their disbelief, which allows them to fully "dive" into the story itself.[48]

Although most VR games focus on goal-oriented tasks, there are some focused on social relations.[49] Such experiences do not contain a story, as each person accesses VR as an avatar among onthers. Online platforms such as Second Life, Roblox and Fortnite allow one to spend time with friends as an avatar without gameplay. In VR, interactions are limited by the avatar chosen in the game, and its identity and ability define rules for playing and chances of winning.

VR is an internally focused simulation.[50] Similar to lifelogging, it orbits around people and their relationships: it is internal, because everything works from each one's point of view, where one has agency. And it resembles mirror worlds as well, because it is an immersive simulation. However, while AR is externally focused, lifelogging is

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[44]    CRONIN, Irena; SCOBLE, Robert. **The Infinite Retina:** Spatial Computing, Augmented Reality, and How a Collision of New Technologies Are Bringing about the Next Tech Revolution. Birmingham: Packt Publishing, 2020.

[45]    BOLGER, Ryan K. Finding Wholes in the Metaverse: Posthuman Mystics as Agents of Evolutionary Contextualization. **Religions,** v. 12, n. 768, p. 1-15, 2021. DOI: https://doi.org/10.3390/rel12090768.

[46]    FINK, Charlie. **Charlie Fink's Metaverse:** An AR Enabled Guide to AR & VR. Washington: Cool Blue Media, 2018.

[47]    SMART, John; JAMAIS, Cascio; PAFFENDORF, Jerry. **Metaverse Roadmap:** Pathways to the 3D Web. A Cross-Industry Public Foresight Project, 2008. Available at: https://www.w3.org/2008/WebVideo/Annotations/wiki/images/1/19 /MetaverseRoadmapOverview.pdf. Accessed in Feb 21st, 2022.

[48]    FINK, Charlie. **Charlie Fink's Metaverse:** An AR Enabled Guide to AR & VR. Washington: Cool Blue Media, 2018.

[49]    SMART, John; JAMAIS, Cascio; PAFFENDORF, Jerry. **Metaverse Roadmap:** Pathways to the 3D Web. A Cross-Industry Public Foresight Project, 2008. Available at: https://www.w3.org/2008/WebVideo/Annotations/wiki/images/1/19 /MetaverseRoadmapOverview.pdf. Accessed in Feb 21st, 2022.

[50]    BOLGER, Ryan K. Finding Wholes in the Metaverse: Posthuman Mystics as Agents of Evolutionary Contextualization. **Religions,** v. 12, n. 768, p. 1-15, 2021. DOI: https://doi.org/10.3390/rel12090768.

personal and intimate.[51] When people record their lives for their social networks, they start to carry the way they want their lives to be perceived by the world.[52] This "documentation" is not intended to fair and accurately represent biographies, therefore, but social media (including wellness and general health monitoring apps here) offer ways to see other angles of reality in relation to personal lives – so, lifelogging does not simulate, but represents biographies.[53]

Lee et al.[54] list other features of the metaverse yet, mixed reality (MR), something between augmented and virtual realities, which allows the user to interact with virtual entities in physical environments. MR objects, endowed with environmental understanding capability, can interact with other tangible objects in various physical environments – a physical tool (screwdriver, for example) can fit rotating digital screw entities with MR carved heads, which demonstrates a possible of interoperability between digital and physical entities. In contrast, AR just displays information overlaid on physical environments, usually with no possibility of interoperability. Thus, because of its interoperability, MR may be an improved version of AR.

Hence, metaverse represents physical environment in virtual worlds. These representations are designed for the increasing recursion between "real" and "virtual" worlds, allowing immersion and interoperability. Law and public policies must complexly focus on such aspects, to enable the building of future norms respecting human and social aspects of dignity; but also, to enable effectiveness, representativeness and recursiveness of Law in favor of humanity.

On fundamentals of metaverse as an ecosystem, Lee et al.[55] list what the six pillars of the metaverse should be: i) Avatar; ii) Virtual economy; iii) Social acceptability; iv) Security and privacy; v) Trust and responsibility; vi) Content creation;

Avatar is the digital representation of a user in metaverse, where one interacts with others (representing individuals, companies, or exclusively digital entities). A user may create several avatars in different applications, assume human, animal or imaginary forms. Interestingly, in this sense, some games allow their users to leave their avatars acting in their absence – Forza Motorsport drivatars learn the driving style of their

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[51]  SMART, John; JAMAIS, Cascio; PAFFENDORF, Jerry. **Metaverse Roadmap:** Pathways to the 3D Web. A Cross-Industry Public Foresight Project, 2008. Available at: https://www.w3.org/2008/WebVideo/Annotations/wiki/images/1/19 /MetaverseRoadmapOverview.pdf. Accessed in Feb 21st, 2022.

[52]  KIM, Sangkyun. **The Metaverse:** The Digital Earth - The World of Rising Trends. Paju: PlanB Design, 2021.

[53]  BOLGER, Ryan K. Finding Wholes in the Metaverse: Posthuman Mystics as Agents of Evolutionary Contextualization. **Religions**, v. 12, n. 768, p. 1-15, 2021. DOI: https://doi.org/10.3390/rel12090768.

[54]  LEE, Lik-Hang et al. All One Needs to Know about Metaverse: A Complete Survey on Technological Singularity, Virtual Ecosystem, and Research Agenda. **Journal of LATEX Class Files**, v. 14, n. 8, p. 1-66, 2021. Available at: https://arxiv.org/abs/2110.05352. Accessed in: Feb 21st, 2022.

[55]  LEE, Lik-Hang et al. All One Needs to Know about Metaverse: A Complete Survey on Technological Singularity, Virtual Ecosystem, and Research Agenda. **Journal of LATEX Class Files**, v. 14, n. 8, p. 1-66, 2021. Available at: https://arxiv.org/abs/2110.05352. Accessed in: Feb 21st, 2022.

human players through AI, so other users may compete with such avatars representing humans. In other words, technology allows a so-called *avatar autonomy*.

When interacting with virtual robots, avatars represent a potential communication channel between humans and virtual entities in the physical world and in the metaverse, therefore. Robots learn human emotions of the user and more adequately interact with him or her, or even, robots can provide telework services in the physical world.[56]

The fundamentality of the avatars in the metaverse is undeniable, as they serve as digital proxies of users so that they can express themselves in virtual environments.[57] However, while current technology is capable of capturing physical characteristics of humans and translating them into avatars, the same cannot be said about the translation of the mobilization of avatars in real time through mobile sensors, about the understanding of the design space of avatars, their influences on user perception, or how avatars interact with other smart devices (IoTs, smart vehicles, robots).

Furthermore, the ethical design of avatars and their behaviors or representations in cyberspace are also critical, as the metaverse can create a locus for the propagation of offensive messages, and lead to new perspectives on identity as well. If an avatar creates its new identity in metaverse, it may stimulate new ideas about human life – since it is a digital clone of the human in the metaverse, it will be able to last much longer than its physical representation, retaining its personality, behavior, and memories, which obviously engenders several legal debates: respect and exercise of rights, fulfillment of obligations, inheritance, titularity of marital and family relationships, only to name a few.

Regarding the virtual economy of the metaverse, it is so far known that it has been based on cryptocurrencies, but the reliability of this system is still uncertain, as they are decentralized regarding reliable authorities such as governmental organizations, which are maybe the most reliable ones hitherto (although not perfect). Moreover, users of the metaverse will also live in the real world, which leads to debates about the intertwining of the real and virtual economies. Thus, holistic perspectives must be adopted to observe the meaning of the virtual economy for the metaverse – especially with regard to the individual's consumption behaviors in both worlds, and the affectation of their aggregate activities in one world in relation to the other. Furthermore, virtual worlds very similar to the real one can serve as a test environment (sandbox) for new economic policies before their implementation in real life. Therefore,

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[56]    LACEY, Cherie; CAUDWELL, Catherine. Cuteness as a 'dark pattern' in home robots. **14th ACM/IEEE International Conference on Human-Robot Interaction (HRI'19)**, March 11-14, Daegu, South Korea**.** IEEE Press, 2019, p. 374-381. DOI: http://dx.doi.org/10.1109/HRI.2019.8673274.

[57]    LEE, Lik-Hang et al. All One Needs to Know about Metaverse: A Complete Survey on Technological Singularity, Virtual Ecosystem, and Research Agenda. **Journal of LATEX Class Files**, v. 14, n. 8, p. 1-66, 2021. Available at: https://arxiv.org/abs/2110.05352. Accessed in: Feb 21st, 2022.

sandbox-optimized conversion mechanisms must be developed to adequately simulate reality.

Social acceptability reflects the behaviors of metaverse users, representing collective decisions and opinions about actions and policies. Social acceptability factors (such as threats to privacy, diversity of users, fairness and user dependence, etc.) would determine the sustainability of the metaverse. And as the metaverse would affect the physical and virtual worlds, complementary norms must be enforced in both worlds.

While factors for social acceptability existing in the physical world can apply to the virtual, simply matching such factors in the huge metaverse may prove unfeasible, and examining such factors at length is tedious and time-consuming. The automatic adoption of norms with their subsequent assessment of social acceptability to understand collective opinions could rely on many AI agents in the metaverse. Therefore, designing such agents at scale in the metaverse is urgent. And as the metaverse will be integrated into all aspects of life, everyone will be impacted by it, which demands strategies and technologies to curb crimes and report abuse to improve its social acceptability.

The grueling digitization of the physical world will require users to frequently authenticate their identities to access applications and services in the metaverse. Often required passwords will be an obstacle to authentication of numerous objects. New security mechanisms must therefore be developed (such as biometrics). Even so, the countless logs of user activity and traces of user interaction will remain, and leaking this backlog will certainly cause privacy damages. It is also necessary to design privacy-preserving machine learning to automate recognition of user privacy preferences for dynamic and diverse contexts in the metaverse.

And creating/managing digital assets such as avatars and digital twins poses major challenges in protecting users from digital copies, which can be created to modify users' behavior in the metaverse and share more personal information with others – even deep-fake-avatars, for example.

With regard to reliability and responsibility, the metaverse – when understood as the convergence between extended reality and the Internet – broadens the definition of personal data, including biometrically inferred data. The current regulation of privacy cannot support the definition of personal data, as the pace of regulatory innovation does not keep pace with technological innovation. Hence, a framework of principles defining personal data that follows the potential for technological innovation challenges the law. And the rights of minorities and the vulnerable ones must also accompany the evolution of the metaverse.

Finally, content creation cannot be limited to professionals, it may become everyone's right in the metaverse. The creation of a digital world could involve the participation of all, and co-creation with professionals as well. And the development of

automatic and decentralized governance over censorship and limitations on content creation is also still unknown. It is also essential to consider cultural diversity, intergenerationality and the preservation of endangered content in the creation and management of content.

# 6.    FREEDOM OF EXPRESSION AND THE CREATION OF THE METAVERSE

Digital creation is the basis of the Metaverse, and its progress is analogue to material production in the physical world.[58] In this sense, variety of creators is fundamental for its development. Hence, first of all, there is an urgent need to develop basic authoring tools — such as intuitive and playful editing and coding — to facilitate access and personalization of digital creation for its construction. This huge and complex virtual-physical space brings unprecedented opportunities for artists from the most varied areas to combine all aspects of the physical environment with digital creativity — from elements for its construction (scenes and virtual players), through various textual and auditory elements (music, voices, sound effects in general), to new types of creations (immersive arts, robotic arts and other user-centered approaches that foster contemporary creative productions).[59] Given the importance of artistic creativity for this construction, it is necessary to democratize computer arts, without relegating important topics such as privacy and digital security for artists in this field, as well as the recognition of ownership of digital artworks and other technological challenges that may arise during the evolution of the Metaverse.

In the physical environment, arts make space and social interactions more meaningful, pleasant and provocative of ideas and sensations; hence, the construction of the metaverse involves not only programmers, designers and AI for the production and evolution of physical and virtual space. Architects and engineers, musicians and sound engineers/technicians, screenwrights, short stories and novels writers are needed, as well as visual artists in general, playwrights, actors and film artists in general, so that this space is constantly aesthetically attractive to users. So, protecting and promoting free expression in content creation in metaverse are essential elements for its democratization and richness.

Therefore, huge central planning fails when one thinks about the scale of the metaverse, which is much larger than the virtual worlds of games — which demonstrates the need for some kind of distribution of creation, if the metaverse is a virtual

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[58]    QUINGLIN Yang et al. Fusing Blockchain and AI with Metaverse: a survey. **Arxiv,** 2022. DOI: https://doi.org/10.48550/arxiv.2201.03201

[59]    LIK-HANG Lee et al. When Creators Meet the Metaverse: A Survey on Computational Arts. **ACM Computing Surveys**, v. 37, n. 4, p. 1-36, 2021. DOI: https://doi.org/10.1145/1122445.1122456.

universe that overcomes the complexity of the real world.[60] In this sense, its users provide resources that should be leveraged to help creating on a scale never seen before. Many examples from the interaction between users and various technologies demonstrate the desire of people to create their own content.

Games like *The Sims* — in which about 80% of the content is created from the user experience — and *Second Life*, modifying faceplates from consoles to video games and personalized ringtones are very illustrative of this desire.[61] But metaverse users must be able to create truly new objects, not just to produce results to evolve, as in games where characters must gather resources and transform them into other products such as weapons and miscellaneous objects. Such objects must present added value during the creation process, and the market must be able to determine the creations that have value in this new universe.

Thus, there are many possibilities for users to creating the metaverse based on certain rules, but they also must be combined with their more developed skills also in the real world, and in collaborative, interactive ways. In this sense, users with project management skills could find others with technological skills (programming, coding and engineering), dissemination (online marketing and social communication), sales and event coordination in metaverse, so they can not only create the new in such an environment, but make it the basis for productive activities in the new universe. These abilities will have to be reinterpreted and recontextualized into capabilities that only exist in the structure and functions of the metaverse, but this is a good way to think about how personal expression can be combined with new interaction ways to develop virtual worlds and their economic uses, and not just for Big Techs that currently develop games and social networks.

Free expression has to be respected in the creative process, but limitations to it — offered mainly by other fundamental legal spheres— must always be normatively established. Recent abuses of expression in the online environment (hate speech and misinformation dissemination influencing electoral processes in important democracies), virtual embezzlement, stalking and offenses against the security and privacy of others, demonstrate the need for creation not only of public policies and norms that promote free of expression without abuse, but also of technologies to contain and prevent such abuses, especially those based on AI. Being free expression a fundamental right, it is at least reasonable to consider that technologies, policies and standards to be applied on moderation of its exercise must necessarily and directly be related to fundamental rights — held by the people involved in each manifestation, by the

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[60]    ONDREJKA, Cory. Escaping the Gilded Cage: User Created Content and Building the Metaverse. **New York Law School Law Review**, v. 49, n. 1, p. 81-101, 2005.

[61]    ONDREJKA, Cory. Escaping the Gilded Cage: User Created Content and Building the Metaverse. **New York Law School Law Review**, v. 49, n. 1, p. 81-101, 2005.

companies responsible for both the platforms where the demonstrations take place and those that establish the policies of moderation, State and collectivity. And in this sense, Oliva[62] carried out an important study relating Human Rights to the moderation of online content, according to which, terms of services and ways through which they are implemented in online environments must be relevant to this category of rights, as well as the technologies developed to carry out content moderation. In the same line of reasoning, companies involved in content moderation in the metaverse should be subject to human and fundamental rights, regarding not only the free expression of individuals, companies and collectivities, but also enabling for monitoring the respect of other rights in case of abuse of such freedom.

It must be considered, therefore, that the Metaverse must not be simply transformed into a commodity, or understood only as a market in the economic sense: this universe that will intimately unite the virtual and the physical will also be an environment for the exchange of ideas, arguments and values in legal and political senses, being a true virtual public sphere glimpsed thus. And Pasquale[63] considers that many pitfalls can arise with regulation related to fraudulent, offensive and harmful content. Relegating content moderation functions in the virtual environment to algorithms alone (as has already been denounced in relation to the feed of platforms such as Facebook), without any direct supervision from responsible engineers and humans, is something that cannot happen in the Metaverse. These human content moderators cannot be low-level, contracted workers — or worse, outsourced workers — who can be disconnected from the companies responsible for the virtual universe without any respect for basic labor rights. Norms regarding human responsible people, who will make decisions in more complex cases that require human expertise in contextualization, interpretation and empathy, must ensure the responsible and transparent performance of this type of work. The deliberations of such human agents should also be scrutinized and subject to compliance and social accountability norms — for example, an ombudsperson or public editor with human team responsible for moderation should establish the interface between members of the public harmed by their decisions and such a team.

Clearly there is resistance to the idea of professionalizing creation, curation and delivery of online content, precisely because it contradicts the ideal of democratizing content creation. But this ideal must be pragmatically considered, precisely because of the ease with which, in recent practice, the abuses that information technology

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[62]  OLIVA, Thiago Dias. Content moderation technologies: applying Human Rights standards to protect freedom of expression. **Human Rights Law Review**, 2020, v. 20, p. 607–640, 2020. DOI:  https://doi.org/10.1093/hrlr/ngaa032

[63]  PASQUALE, Frank. The automated Public Sphere in: SAETNAN, Ann Rudinow; SCHNEIDER, Ingrid; GREEN, Nicola (eds.). **The Politics of Big Data:**  Big Data, Big Brother? London; New York: Routledge, 2018, p. 110-128.

giants committed or facilitated have been verified: it must not be forgotten that the Cambridge Analytica scandal involved not only this company, but Facebook as well. Communication tools, although they democratize the use and dissemination of information, must be moderated, intermediated with safe policies, in which both State regulation and company self-regulation corroborate in hybrid strategies, and also combined with regulation by design of Metaverse, algorithmic tools for the moderation of created and disseminated content, and several other proposals that the interface between Law, Politics and Technology will bring with its evolution.

In the wake of public policies to be developed, thus, education plays vital roles in launching new domains of virtual reality and augmented reality not only as markets where to acquire services and goods, professionally develop new products and services, undertake and perform professions, or establish new forms of social relations.[64] Such tasks are extremely important, but more than that, educators have to take on the task of transforming the Metaverse into a place where new forms of political contestation and participation in public life can be developed.

## 7.    CONCLUSION

The first specific objective of the research was to identify meanings for freedom of expression in the information society. In this sense, it was possible to conclude that freedom of expression is dynamic, and must be understood in its trans-individual dimension, due to the current massification, the reach of communication and its potential both to increase and to produce democratic deficit. And it also should be the basis for legal interpretation for law enforcement in cases involving human rights in complex ways.

The second specific objective was to understand the power of large technology companies over expression on the internet. Hence, it was understood that Big Techs, especially those that develop and manage social networks, currently have a lot of power over what can be said, shown, written and created on the Internet. Such companies unilaterally set the rules for expression on their platforms and control the design of the network in ways that make it impossible to play a role on their platforms in other manners than those predefined by them. This means great limitation, by Big Techs, on the Agora where ideas about political life are discussed and created. And also disrespect for the sovereignty of the State, since the typical actor for ruling what has political and social meaning is the democratic rule of law. This demonstrates the need not only to think of the regulation of freedom of expression in the information society as something to

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[64]    KNOX, Jeremy. The Metaverse, or the Serious Business of Tech Frontiers. **Postdigital Science and Education**, v. 4, n. 2, p. 207–215, 2022. DOI: https://doi.org/10.1007/s42438-022-00300-9

be merely imposed by the State in the written norm, but also managed by its institutions in the design possibilities of the virtual world.

The third specific objective was to understand the fundamentals of the metaverse. Thus, the fundamental technologies of the metaverse – extended reality, user interactivity, robotics/internet of things (IoT), blockchain, computer vision, artificial intelligence, cloud/edge computing, and networking – were exposed. It was also notable that, although some of them are already everyday life today, such as the network, user interactivity, artificial intelligence, robotics and cloud computing, others, such as blockchain, computer vision and the internet of things are still are in a development very close to the embryonic stage, when analyzing the technological requirements for a fully immersive, real-time and compatible virtual reality. And even the technologies already inserted in the current reality still need to evolve a lot so that a metaverse itself can be developed, with all its social potentialities.

Its third section dealt with the main aspects of the metaverse as well – namely, augmented reality, lifelogging, mirror worlds, virtual reality and mixed reality. It is remarkable that such aspects have several similarities and complementarities with each other, so that one enhances the other, and/or constitutes a requirement for reaching the others. It is also noticeable that several recent sociotechnical developments – such as social networks and their acceptance, embedded technologies for electronic games, applications for geolocation and navigation and the simulation of reality in a digital environment – although they still do not mean the constitution of a metaverse properly said, already represent essential requirements for this, as long as technology continues to advance in this direction.

Finally, the fourth specific objective was to study the so-called pillars of the metaverse ecosystem – the avatar, content creation, the virtual economy, social acceptability, the security/privacy binomial, and the relationship between trust and responsibility. And it is precisely in relation to these six foundations that the legal discussion about the metaverse should, at least initially, look more closely. The regulation of this new opening world permeates the construction of these pillars, and it is not absurd to speak, perhaps, of a new way of thinking about Law in a more intimate and transdisciplinary way linked to technological development.

In this sense, the avatar is the primary form of action, communication and identification of the individual (be the individual real or AI-based) in the metaverse – therefore, a normalization totally related to personality rights is demanded. Content creation appears as a form of expression and creation of the individual in this new environment, and its regulation should be thought of in the sense of being increasingly democratized, moving away from technocracy and the monopoly of technology companies. The virtual economy, on the other hand, presupposes much more than the use of cryptocurrencies, and one should think that the economy becomes intertwined between two

worlds – what people still insist on calling "real" and the virtual, which increasingly complicates relationships production, consumption, distribution and inspection activities. Social acceptability must ultimately be thought alongside privacy, security, trust and accountability. Such factors must be thought in a transdisciplinary and complex way, and in a principled and fundamental way as well, so that the metaverse can be another world closely linked to this one.

Technical knowledge related to many areas, as well as creativity, have fundamental importance for the creation of the future Metaverse. In this sense, the creation of such a universe must have democratized access, not being monopolized by Big Techs. Thus, public policies that ensure ways to access content creation from the most varied types of users, technicians, scientists and artists, must be developed. This democratization must also be based on freedom of expression, which is fundamental for the creation of a meaningful space. With this, not only will new economic activities flourish in this space, but also new forms of contestation, political thought and legal ideas. And, as one could not fail to consider, limitations to the exercise of such freedom must exist, but they must not be subjected to private interests of huge corporations, nor only moderated solely by technological tools, without the participation of the human element responsible for taking of decisions related to the legality of the content.

It is clear that the discussions about the evolution and constitution of the metaverse is only beginning with the those which were presented here. The imminence of this new world demands that Social Sciences (being Law included here) be thought of in a complex way, with the observation also of the knowledge that is being produced based on other sciences, in order to have a Metaverse Law that is as humanistic, economically efficient and legitimate as possible at this time when such a world is still being created. The advantage of the present is that it is possible to glimpse this creation and correct, still on the route of creation, the deontology for such complexity.

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