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Metaverse as a sociotechnical imaginary: A participatory approach to regulating virtual worlds

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Abstract: India, projected as one of the biggest markets for metaverse and virtual worlds, is yet to adopt a concrete strategy for regulating such technologies. This research advocates a participatory approach to policymaking and outlines what such an approach might look like, based on an empirical study of YouTube videos and comments as well as official reports and press releases about the metaverse. The analysis suggests that digital users in India are mostly sceptical towards the metaverse and concerned about how technology companies and their products are taking away human agency and autonomy. But such concerns are only an afterthought in the state's techno-utopian vision. We compare this vision with Europe's outlook towards virtual worlds, as India has previously drawn inspiration from Europe to formulate digital policies. Finally, we discuss how India can move towards a virtual worlds policy that is cognisant of public imaginaries of the technology – and how user aspirations and anxieties can be translated into specific policy action by looking at European protocols that address similar concerns. This includes paying greater attention to the specific harms that metaverse and virtual worlds can exacerbate, such as intimate scanning and protection of biometric data, while also involving digital rights groups and the public at large in policymaking.

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India is known for its elaborate weddings but this nuptial reception was a little unusual. With COVID-19 restrictions in 2022 making large gatherings impossible, Dinesh SP and Janaganandhini Ramaswamy, a couple from Tamil Nadu, hosted their friends and family members in the metaverse. Digital avatars exchanged pleasantries with each other as music played in the background. Even the bride's deceased father made an appearance to bless the newlyweds. The event became national news and prompted much discussion online. One commenter said they never thought science fiction "would become a reality." Another said, "world end is near." A third jokingly suggested that the couple should also deliver their children in the metaverse (NDTV, 2022).

Metaverse may be defined as "a persistent and immersive simulated world that is experienced in the first person by large groups of simultaneous users who share a strong sense of mutual presence" (Rosenberg, 2022, p. 22). The idea is not new – dating back 20 to 30 years depending on how one conceptualises it. It became a public talking point after Facebook, the world's biggest social media company, rebranded itself as Meta Platforms in 2021 to underscore its pivot into what it viewed as the future of social technologies, although it has since scaled back this foray as it has shifted attention to AI technologies (Snow, 2026).

However, like all widely used technologies, metaverse poses a number of sociolegal concerns. Several studies examine the potential harms of metaverse and virtual worlds, such as discrimination in the workplace (Egliston & Carter, 2022), harassment (Blackwell, 2019), and violation of privacy and mass surveillance (Canbay et al., 2022). Many of these problems are not novel and have beleaguered other technologies, too (Vanacker & Heider, 2012). But it is crucial to recognise that certain risks are exacerbated on account of the nature of metaverse as a technology and the ways in which it enables or constrains its users. For example, protection of users' biometric data is a particular concern in the metaverse because of its immersive nature, which requires that "the hardware must monitor the user in deeply intimate and pervasive ways" (Heller, 2020).

The present research has two overarching objectives. First, we propose a participatory approach to regulating the metaverse, which foregrounds users' experiences with and assessments of a technological artefact (Bibri, 2022). Public participation

in formulating regulation is important because it can not only makes citizens "feel more responsibility for public matters" but also "increases public engagement, encourages people to listen to a diversity of opinions, and contributes to a higher degree of legitimacy of decisions" (Michels & De Graaf, 2010, p. 477). We choose India as our empirical focus for a number of reasons. India is not only the world's largest nation by population but also Meta Platforms' largest market. People here are already using the metaverse as the setting for a range of social activities, from gaming to music concerts to – of course – weddings. The number of users of virtual world technologies in the country is growing rapidly and is expected to cross 770 million in this decade (Statista, 2024). As a government report put it, "Indians have caught the metaverse fever" (Niti Aayog, 2022). In addition, India has built the world's biggest biometric databank through Aadhaar, an identity card programme under which the government has collected the biometric information of some 1.3 billion residents and linked it with everything from their tax records to medical history to cell phone activity (Shahin & Zheng, 2020). Integrating the Aadhaar databank with fresh biometric data points from virtual world technologies can be a "targeted advertising" goldmine for local and global companies already vying for a share of India's metaverse market. At the same time, it can create an enormous privacy risk and amplify related concerns, including health and financial safety, psychological well-being, political freedoms, and so on.

Second, we consider what India can learn from the European policy approach towards virtual worlds. Unlike the EU, which has already outlined a comprehensive regulatory strategy in this domain (e.g., EU Commission, 2023), the arena of metaverse and virtual worlds remains largely unregulated in India. The Indian state has previously looked at the European Union for inspiration in drawing up its own digital policies: India's Digital Personal Data Protection (DPDP) Act of 2023 borrows significantly from Europe's General Data Protection Regulation (GDPR), for example. The issue is not only important for Indian users but also because the long history of technological collaboration between India and Europe means that market and policy developments in one necessarily impact the other as well (Chakraborty & Giuffredi, 2019).

The study draws upon the concept of *sociotechnical imaginaries* from science and technology studies, which scholars have found useful to examine perceptions of and discourses about the metaverse and virtual worlds in diverse geographies. After an overview of the European strategy towards metaverse as a backdrop, we provide an empirical examination of both public and state visions of the metaverse in India, based on an analysis of YouTube videos and comments as well as official

reports and press releases. Finally, based on our findings, we discuss what a participatory approach to regulation might look like as well as how the European strategy can inform Indian policymaking vis-à-vis virtual worlds.

Sociotechnical imaginaries of the metaverse

Conceptualising sociotechnical imaginaries

The participatory approach to policymaking we espouse is premised on a critical understanding of how different actors "imagine" the metaverse as a sociotechnical artefact. Jasanoff and Kim define *sociotechnical imaginaries* as "collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects" (Jasanoff & Kim, 2009, p. 120). This perspective pushes against determinist notions of technology as being *sui generis* and bringing about large-scale changes to the social order without itself being shaped by human society. In contrast, it builds on theorisations of technologies as social constructs or, more specifically, as sociotechnical artefacts that are historically contingent and entrenched within social structures (Bijker, 1997). At the same time, it does not disregard the potential impact of technology on society either. As Jasanoff suggests, technology "both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments, and institutions – in short, in all the building blocks of what we term the social" (Jasanoff, 2004, pp. 2–3).

Jasanoff and Kim's (2009) conceptualisation implies that state actors, in particular, are the key drivers of sociotechnical imaginaries. But as other scholars (Kuchler & Stigson, 2024) and Jasanoff and Kim (2019) themselves later noted, a number of other stakeholders including business corporations, professional groups, and civil society can also participate in the "co-production" of sociotechnical imaginaries. Accordingly, Mager and Katzenbach (2021) identify three features of sociotechnical imaginaries: multiple, contested, and commodified. They are *multiple* because different visions of technology can be proffered by different actors, informing different social orders and different futures. They are *contested* because these multiple visions, representing diverse ideologies or interests, might not co-exist but rather compete with each other for realisation. Finally, they are commodified because technology companies can dominate imaginaries as they "not only take over the imaginative power of shaping future society. They also partly absorb public institutions' ability to govern these very futures with their rhetoric, technologies and business models" (Mager & Katzenbach, 2021). As this perspective indicates, sociotechnical imaginaries can play a vital role in how technologies come to be reg-

ulated.

Imagining the metaverse

Some scholars have already examined metaverse and virtual world technologies as sociotechnical imaginaries. Hunt and Angelopoulos (2024) analysed an archive of technical documents and also interviewed industry experts to understand their vision of the metaverse. Both approaches converged on four desirable future characteristics of the metaverse: interoperability, standardisation, usability, and scalability. Based on the analysis, the authors argued that policymakers needed to focus on establishing standardised protocols "to mitigate risks related to privacy, security, and identity management" and suggested that lawmakers and industry representatives should work together towards this end. Bibri's (2022) critical discourse analysis of metaverse-related academic publications, scientific reports, policy documents, and various other sources suggested that "the Metaverse raises serious concerns as to determinism, social exclusion, marginalization, privacy erosion, surveillance, control, democratic backsliding, hive mentality, cyber-utopianism, and dystopianism." Contrary to Hunt and Angelopoulos, Bibri argues for more public participation in policymaking as well as a larger public role in controlling the metaverse. Egliston and Carter (2022) analysed Facebook's 2014 acquisition of Oculus, a virtual reality technology, to reveal the divergences between the platform's imaginaries of Oculus and perceptions of users about this emergent technology. While Facebook promoted Oculus as enhancing connectivity between end users as an extension of social media, users responding to promotional YouTube videos expressed anxieties about the large-scale mining and extraction of data using this technology.

European strategy towards the metaverse

Strategic vision and sectoral initiatives

The European Union has outlined a strategy and proposed actions for regulating virtual worlds, including the metaverse (EU Commission, 2023). Through the Web 4.0 strategy, the EU positions virtual worlds at the core of Europe's Digital Decade, viewing them as key drivers of transformation across multiple sectors. The metaverse is seen as an opportunity for European economic growth and global competitiveness. The EU-metaverse strategy projects the global virtual worlds market to expand from 27 billion euros in 2022 to over 800 billion euros by 2030 (EU Commission, 2023). Within this expanding market, the EU envisions the metaverse as a space where "European businesses can develop world-leading applications, scale

up and grow" (EU Commission, 2023, p 4). Moreover, the EU envisions a "wealth of opportunities for European businesses" to create new products, services, and business models (EU Commission, 2023, p. 4). To help seize these opportunities and "foster a supportive business environment" several initiatives have been introduced (EU Commission, 2023, p. 10). For instance, MediaInvest, the EU Commission's equity investment arm, is improving access to funding for companies aiming to scale up. Meanwhile Cohesion Fund, which provides financial support for relatively lower-income EU member states, is helping innovative start-ups across the region. The EU strategy also links the metaverse to employment, estimating that XR-related technologies could generate thousands of new jobs (EU Commission, 2023). To meet this growing demand, the EU emphasises the importance of cultivating a strong talent pool of Web 4.0 specialists.

The industrial sector is seen as a beneficiary of the metaverse since the use of virtual worlds offers more efficient human–machine interaction. Logistics, manufacturing, and automotive industries can benefit from advanced virtual environments to "design, develop, simulate and test new products, services or workflows, accelerate permitting, but also to optimize inventories down the production line" (EU Commission, 2023, p. 4). Moreover, the metaverse is viewed as a means to strengthen Europe's cultural and creative industries – spanning from music, visual arts, design, fashion to gaming – by enabling new modes of creation, promotion, distribution, and audience engagement.

Virtual worlds are envisioned to provide opportunities for education and training. According to the EU-Web 4.0 strategy, virtual environments can provide more engaging and experimental learning processes that can make abstract or complex subjects more tangible and easier to understand. The metaverse is believed to improve health services by contributing to the training of medical personnel. Public services are also believed to benefit from the metaverse since virtual worlds can enable more personalised administrative interactions, offer remote assistance in rural or hard-to-reach areas, and support better spatial planning and community development. The metaverse is thus understood as a tool to improve democratic participation "by offering new possibilities for people to voice their ideas, opinions and concerns in more engaging ways" (EU Commission, 2023, p. 3).

Societal risks and regulatory response

While focusing on opportunities, the strategy also identifies a wide range of risks that accompany these transformations. For instance, privacy and data protection issues are viewed as significant concerns. To address these, the EU affirms that the

General Data Protection Regulation (GDPR) fully applies to the processing of personal data within virtual worlds. In addition, the Data Governance Act (DGA) and the Data Act establish a framework for data sharing in virtual worlds (EU Commission, 2023). Connected to this, children's safety emerges as a risk, with the EU stating that following the EU Strategy on the Rights of the Child, children's rights should be upheld in the metaverse through "safety and privacy by design" (EU Commission, 2023, p. 8). Complementing this, the Better Internet for Kids (BIK+) strategy outlines measures to "protect and empower children" (EU Commission, 2023, p. 8) in the metaverse, including a planned code of conduct for age-appropriate design of virtual worlds and educational initiatives for parents, educators, and children themselves through the BIK Portal and Safer Internet Centres. Lastly, the EU proposed to recast Directive 2011/93/EU on combatting child sexual abuse to strengthen prevention and enforcement within virtual environments (EU Commission, 2023).

Consumer protection is seen as another risk in the metaverse. To safeguard users from misleading marketing practices, the EU's General Product Safety Regulation and Unfair Commercial Practices Directive apply to virtual environments (EU Commission, 2023). With regard to work in virtual worlds, the EU Web 4.0 strategy views efforts to bypass EU-standards by applying weaker labour conditions on individuals as a risk (EU Commission, 2023). In response, the Rome I Regulation (EC) No 593/2008 ensures that the terms set by virtual world providers cannot override the mandatory labour protections applicable in the country where the work is primarily performed (European Commission, 2025a).

Intellectual property violations are also mentioned as a risk, where unauthorised copying and sharing of virtual assets can undermine the rights of intellectual property holders. To ensure intellectual and industrial property rights, the existing EU-legal framework applies to the metaverse, including the Directive on Copyright in the Digital Single Market, the EU Trade Mark Regulation, and the Directive on the Protection of Trade Secrets (EU Commission, 2023). Cybersecurity is understood as another potential risk, encompassing threats such as cybercrime, (gender-based) cyber violence, discrimination, exclusion, and hate speech. Thus, the EU extends its digital regulatory framework to virtual worlds, including the Network and Information Systems 2 (NIS2) Directive, which strengthens the prevention and response to cyberattacks. Complementing this, the Cyber Resilience Act requires minimum cybersecurity standards for hardware and software used to access virtual spaces, while the EU Cyber Solidarity Act enhances the Union's collective capacity to detect and respond to large-scale cyber threats (European Commission, 2025b).

Circulation of dis– and misinformation in the metaverse emerges as another threat. Addressing this, the Commission funds research projects such as AI4Debunk, a consortium of universities, NGOs, and corporations that develops AI-based tools to counter disinformation. Networks such as the European Digital Media Observatory (EDMO), which enables cross-national collaboration among independent fact checkers and academic researchers, also play a vital role in monitoring and exposing disinformation across Europe (European Commission, 2025c). Lastly, the metaverse is seen to contribute to climate change because of "increased consumption of energy by devices, data centres and telecommunication networks" (EU Commission, 2023, p. 4).

Metaverse in India

Our research takes an empirical approach to examine sociotechnical imaginaries of the metaverse in India – specifically public perceptions of this emergent technological artefact in relation to how the Indian state imagines the metaverse. To examine public imaginaries, we searched on YouTube for videos using the terms "metaverse" and "india". The search was carried out in September 2024. A total of 12 videos from a variety of sources, depicting metaverse in relation to a range of activities, were identified – including business reality shows promoting metaverse apps, TV news shows reporting novel developments related to metaverse, influencers analysing metaverse, and a metaverse wedding (see Table 1). Critical multimodal discourse analysis was employed to examine the videos as well as the comments under them. Such analysis is in line with a sociotechnical approach to digital discourse and pays attention to visual, textual, and interactional elements for "emotive or evaluative correspondence" (Jovanovic and Leeuwen, 2018, p. 683). As the analysis was inductive, we did not sample the comments in advance; rather, the analysis continued through constant comparison until we were confident in the validity of our coding categories (such as business model, make-belief, user agency, autonomy). To investigate statist visions of the technology, we looked for documents referring to metaverse on various government websites. A total of 9 documents from various official sources, such as the Press Information Bureau and NITI Aayog, the government's policy think tank, were identified (see Table 2). Traditional discourse analysis was employed to distinguish common themes across these documents. The analyses were carried out by one of the authors and subsequently reviewed by other authors.

TABLE 1: Metaverse-related videos from India analysed in this study. (Note: The number of comments is at the time of data collection.)

TITLE	LINK	NUMBER OF COMMENTS
How Metaverse Works? | Secrets of Metaverse | Explained in Hindi | Dhruv Rathee	https://www.youtube.com/watch?v=0azMpBagjI4&t=74s	8,373
Presenting India's first 5G VR classroom	https://www.youtube.com/watch?v=TkOCjc25Gz4	792
DNA: ????? ?????? ??? ???? ?? ???? ???? | Metaverse | News Analysis | Sudhir Chaudhary	https://www.youtube.com/watch?v=j7-rMtvpSTM	572
Into The Metaverse With The Sharks! | Shark Tank India | Full Pitch	https://www.youtube.com/watch?v=2c-OFNlsJ2s	459
Shark Anupam ?? "Upthrust" ?? ????? ???? Gaming Experience | Shark Tank India Season 2 | Full Pitch	https://www.youtube.com/watch?v=m9TLvTVmB4M	314
Anupam ?? Namita ?? ?? Metaverse Product ??? ???? Invest | Shark Tank India S2 | Multiple Offers	https://www.youtube.com/watch?v=ZsVq7iIAnN4	294
Take a tour of the metaverse experiences in India	https://www.youtube.com/watch?v=124CiFP9SIg	73
When Brut India joined the metaverse	https://www.youtube.com/watch?v=GXSMkfpxLFE	55
India's First Metaverse Wedding: Tamil Nadu Couple To Hold Wedding Virtually | NewsMo | India Today	https://www.youtube.com/watch?v=e9QnjbwV5Lw	52
India's First Ever Metaverse Concert| Enjoy Cryptic Orginals on #Metaverse	https://www.youtube.com/watch?v=9Sa16lDGiR8	15
Reporter Diary: Republic Day ?? ???? ?? Daler Mehndi ?? Metaverse ???????? ?? ???? ???? ???? ??????	https://www.youtube.com/watch?v=MQn8vOwDpkE	13
Meet the Indians Making the Metaverse! Will India Become the Web3 Hub?	https://www.youtube.com/watch?v=58kNXaJPF20	4

TABLE 2: Metaverse-related official documents from India analysed in this study.

TITLE	SOURCE	YEAR	LINK
Metaverse – the start of a new era of government services. National Informatics Centre	National Informatics Centre	2022	https://www.nic.gov.in/metaverse-the-start-of-a-new-era-of-government-services/
Meta-governance: Role of	Niti Aayog	2022	https://www.niti.gov.in/meta-

TITLE	SOURCE	YEAR	LINK
metaverse in India's E-governance			governance-role-metaverse-indias-e-governance
MeitY Startup Hub and Meta collaborate to accelerate XR technology startups in India	Press Information Bureau	2022	https://www.pib.gov.in/PressReleasePage.aspx?PRID=1858714
The Digital Personal Data Protection Act, 2023	Gazette of India	2023	https://www.meity.gov.in/static/uploads/2024/06/2bf1f0e9f04e6fb4f8fef35e82c42aa5.pdf
Need for securing AI, blockchain and cybersecurity talent	Invest India	2023	https://www.investindia.gov.in/team-india-blogs/need-securing-ai-blockchain-and-cybersecurity-talent
Full text of Union Home Minister Shri Amit Shah's address at the inaugural session of G20 Conference on Crime and Security in the age of NFTs, Artificial Intelligence and Metaverse in Gurugram, Haryana	Press Information Bureau	2023	https://www.pib.gov.in/PressReleasePage.aspx?PRID=1939176
Consultation paper on digital transformations through 5G ecosystems	Telecom Regulatory Authority of India	2023	http://www.trai.gov.in/sites/default/files/2024-11/CP_29092023.pdf
Deployment of Metaverse in the country	Sansad	2024	https://sansad.in/getFile/annex/263/AU844.pdf?source=pqars
Transform imagination into reality	Press Information Bureau	2025	https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=2104987

Public imaginaries of the metaverse

Metaverse as business model

Indian users on YouTube viewed the metaverse with scepticism and caution. This reaction to the metaverse was framed within the larger context of a neoliberal approach to technology, where users respond to the metaverse as consumers of a commodity. Some YouTube videos exhibited a business reality show where entrepreneurs presented their ideas about investing in metaverse-related projects. The typical format of such a show included a sales pitch by the entrepreneur for a metaverse-related project while three judges commented on the viability of the project. Comments in response to these shows helped us understand the subjectivities of the viewers and their perceptions of this emergent technology. In these

discussions on the metaverse, there is not much focus on the question of governance of the metaverse but rather on the utility of the metaverse for people imagined as customers or consumers.

Some of them argued this was not a business model worth investing in and young entrepreneurs were simply able to market it because of their communication skills. For instance, a user comment pointed out the limitations of the business proposition: "Only got selected because of exceptional communication skills. Though his game may be a crap but the sharks were willing to bet on his intelligence and skills which can help in business" (Shark Tank India, 2022).

The comments also derided the idea of the metaverse itself or did not view it as novel. Several users compared the metaverse to video games from the 1990s. Others, however, were more optimistic about how the metaverse might potentially transform the experience of consumers. For example, in one video an entrepreneur pitched a 3D app based on the concept of the metaverse. A comment in response to this expressed enthusiasm for this prospect. The user suggested that the concept of metaverse could translate into a 3D store for customers and therefore transformed the image of online marketing apps like Flipkart and Amazon (Shark Tank India, 2024, March 9). Other users displayed scepticism about this possibility and suggested that these products are "gimmicky" as 3D modelling was not easy. They also questioned the ultimate utility of such models.

Metaverse was thus imagined as yet another marketing ploy to convert individuals into consumers. As one commenter put it: "If we talk about the usefulness of metaverse or any other commodity in general, the tragic fact is even if we may or may not need them but the marketing teams of these big companies will eventually create our need and impose these on us … Afterall they are spending billions behind the marketing" (Dhruv Rathee, 2022).

Metaverse as make-belief

Some YouTube videos and comments also pointed out that the metaverse lacked any practical utility and bemoaned the fact that it was a poor replacement for real-world experiences. For example, a video posted by renowned Indian influencer Dhruv Rathee analysed the concept of metaverse by describing in detail what the prospect of simulated, immersive reality might look like. He voiced cynicism about what technology promised and also highlighted how it fed into a project of large-scale extraction of data by big tech giants such as Facebook. The popularity of this video can be gauged from the large number of comments – 8,373 at the time of

writing – and discussions it generated. The comments in response to the video expressed disbelief and disenchantment with virtual reality.

Comments by viewers lamented the lack of real human connection in society and were concerned about the onslaught of technological invasion on social life. For instance, a user said, "Imagine how depressing it would be to celebrate your birthday with VR with a virtual cake and friends and then you take off your VR headset and realise you're actually all alone…" Similarly, another user suggested, "I wish this takes decades to come. I dont wanna see more people getting lonely, depressed or die from the same. I wanna live in natural world just like we are living right now" (Dhruv Rathee, 2022). These comments constitute an exchange emphasising the harms of excessive technology invading human lives. One viewer even said that digital technologies were creating a world that was "just fantasy, fake, and a kind of imaginary" (Dhruv Rathee, 2022). Another user claimed that the metaverse was a future version of "addictive social media" but at the same time felt that its use and ascendance in the next decade was inevitable (Dhruv Rathee, 2022).

Similar scepticism was demonstrated by YouTube viewers about videos that showed virtual activities in the metaverse. The video of India's first metaverse wedding also prompted a number of comments. The virtual wedding was attended by an avatar of the bride's late father. A series of comments by viewers flagged how this was just illusory and entailed the risk of deluding people into believing in something that was not true (Chaudhary, 2022). One of the viewers said that this kind of technology could only give temporary sensory pleasure but could never replace reality. Another user claimed that metaverse was a self-deluding hoax facilitated by technology. One commenter lamented how such technologies were symptomatic of the destructive aspect of science, with humanity headed in a direction where science was taking over the role of god.

User agency and autonomy

Multiple viewers of metaverse videos on YouTube underlined the question of agency and autonomy of those who participated in simulated experiences. A video posted by a journalist where she depicted her experience of the metaverse prompted comments suggesting this could potentially lead to manipulation and compromise the autonomy of individuals. For example, one comment claimed the metaverse video was an example of how computers could enslave human beings. Another comment highlighted how the metaverse would only make people "lazy" and addicted to social media.

There were, however, a few contrary opinions which highlighted the salience of the metaverse as the future of the internet. For example, one comment countered those who dismissed the metaverse as merely another video game. The user argued that the metaverse was a complete virtual world where one could do a number of things such as attending concerts, becoming whatever you wanted, getting education, and participating in activities with friends from a distance. The user also referred to a Netflix show, titled "Ready Player One," that demonstrated the concept of metaverse. But this comment only generated more cynicism from other users. One of them said if the Netflix show was something to go by, the metaverse show spelt doom. Another argued they would never use metaverse even though it was an exciting proposition.

A viewer linked metaverse to the concept of manipulation by social media. She argued, "We already see how people are more attached to their social media self rather than their real self and this Metaverse concept just makes it worse. I can't imagine how the future generations will be" (Dhruv Rathee, 2022). A viewer comment also highlighted that the positive aspects of the metaverse were negligible compared to the perils of the technology – namely people becoming "less and less human" (Dhruv Rathee, 2022).

One discussion among user comments also highlighted the risks concerning the ownership of the metaverse by big tech. A viewer commented on how the prospect of Facebook owning the technology was scary as the company already had detailed profiles of its users (Dhruv Rathee, 2022). Another viewer disagreed, saying that Facebook merely provided access to the technology as a platform and did not own it. One comment alerted users to the risks of appropriation and manipulation by technology companies: "Ambitious company owners would do anything to increase their income, projects as useless as these. We must control and keep aware of our life and purpose" (Dhruv Rathee, 2022).

State imaginaries of the metaverse

Facilitating the future

The Indian government largely viewed the metaverse and virtual worlds less as a unique technological artefact, possessing particular characteristics and posing particular social and policy challenges, and more as "one of the basket of emerging technologies that take the future of internet through AI, Web 3.0, IOT, 6G etc" – as stated by Rajeev Chandrasekhar, the junior minister for electronics and information technology (Sansad, 2024). It also hoped that India would play a vital part in the

development of such technologies and considered the government's role as facilitating this process.

Chandrasekhar said, for instance, that the government viewed "the next decade as 'India Techade', a decade full of technology opportunities for young Indians" (Sansad, 2024). He added that government policies were "designed to enable start-ups across the spectrum of tech opportunities including Metaverse." The same minister had earlier announced the government's intention to promote XR technology start-ups in collaboration with Meta (PIB, 2022). The initiative was presented as an effort to enhance skills in emerging and future technologies and linked to the general development of the nation. A press release suggested that India was uniquely placed to play a "pivotal role in the Metaverse with a large talent pool of creators, developers and a vibrant technology ecosystem" (PIB, 2022). The state's role was seen as promoting technological innovation by encouraging the proliferation of new start-ups that developed metaverse products.

This view was echoed by various government officials, agencies, and programmes. Invest India (2023), a government agency for promoting investment in the country, called for efforts to identify and develop "human resources" in order to meet the growing demands of the technology industry, including developing the metaverse. Meanwhile, the Ministry of Information and Broadcasting organised an "AI Avatar Creator Challenge" – inviting digital creators to submit AI-generated virtual "avatars" and compete for cash prizes as well as the opportunity to "showcase their projects to industry experts" (PIB, 2025).

Citizen-centric meta-governance

Sections of the Indian state also urged the government to be proactive in adopting the metaverse and virtual worlds technologies for "citizen-centric" governance. The National Informatics Centre, for instance, suggested there were plenty of opportunities for the government to take advantage of because "Metaverse has a knack to make available services and applications to citizens through avatars that will be available 365/24/7 anywhere, and anytime" (NIC, 2022). In a document titled, "Metaverse – The Start of a New Era of Government Services," it listed a wide range of areas for metaverse applications for governance, from agriculture and defence to "social and political engagement." But recognising that such use would require "high budgets and huge energy," it nonetheless counselled against shying away from this "long-term, tectonic, and paradigm-shifting trend" (NIC, 2022).

Niti Aayog (2022), the government's policy think tank, similarly encouraged the

government to capitalise on India's "metaverse fever." The uses it enumerated included top government officials, including the prime minister, holding public meetings in a virtual reality environment, state officials from different parts of the country meeting each other to discuss development issues, government officials meeting with private industry representatives, and local officials meeting citizens to offer public services. Like NIC, Niti Aayog acknowledged that creating a "citizen-friendly meta-governance infrastructure" posed numerous challenges; like NIC it also pushed for partnering with private industry to make it possible (NIC, 2022; Niti Aayog, 2022).

Metaverse as security risk

The government's celebratory approach towards the metaverse was somewhat tempered by the admission that it also created certain risks for individual citizens and for the nation as a whole. But just as the metaverse was viewed as one among a clutch of emerging digital technologies, these risks were considered as part of a common pool of concerns created by such technologies. There was little recognition of the unique challenges posed by metaverse and virtual worlds.

NIC and Niti Aayog's effusive tributes to metaverse included mentions of the potential harms of the technology. NIC (2022) noted that the metaverse may be "vulnerable to cyber-attacks, identity theft, fraud and (serve as) a safe haven for the harassers, criminals and fringe groups." Niti Aayog (2022) warned of "data protection, cyber security, digital identity, and other digital policy issues" vis-à-vis the metaverse. At an international crime and security meeting, India's interior minister Amit Shah discussed concerns that emerged from metaverse alongside NFTs and AI. The minister said that metaverse "may create new opportunities for terrorist organizations primarily for propaganda, recruitment, and training" (PIB, 2023). He also mentioned deep-fakes and identity theft as other possible misuses of the metaverse.

Responding to a question in parliament about protecting sensitive data in the metaverse, Chandrasekhar, the junior minister for electronics and information technology, referred to India's Digital Personal Data Protection (DPDP) Act of 2023, which aims to provide general safeguards against privacy violations (Sansad, 2024). However, the Act is severely limited when it comes to the metaverse. For instance, publicly shared data is exempt from protection under this law; as many metaverse activities can be viewed as "public," all data generated through such activities would potentially be unprotected. In addition, the Act includes no provision for protecting biometric data, which is particularly at risk in the metaverse

(Gazette of India, 2023).

Discussion and recommendations

The politics of metaverse

The sociotechnical imaginaries of metaverse from India, as evident in YouTube videos and user comments as well as government documents, exhibit the features identified by Mager and Katzenbach (2021). We find *multiple, contested,* and *commodified* visions of the technology, its role in social life, and its implications for the future. The multiplicity of visions is evident in the diverse range of actors involved in constructing the imaginaries – including the state, businesses, online influencers, and ordinary users. These visions are far from homogeneous. Some users believed the metaverse would succeed as a business model, some were sceptical. For still others, its potential success was itself disheartening; it foretold of a lonely, unnatural future in which human beings, sans agency or autonomy, lived as subjects of big tech marketing and manipulation. Not many of these user concerns, however, feature in the state's largely commodified vision of the metaverse. In departmental reports and ministerial statements, virtual world technologies are imagined as opportunities for business and industry and tools for "meta-governance". The state views its role mainly as facilitating the growth of the technology market. This imaginary is, however, politically charged. Winner (1980) once argued that "technical systems of various kinds are deeply interwoven in the conditions of modern politics" (p. 122) – the metaverse is a case in point.

India's ruling Bharatiya Janata Party has often positioned itself as a champion of digital technology as part of its wider efforts to distance contemporary India from the early decades of its post-colonial history during which the country was largely ruled by the main opposition Congress Party. In this vision, BJP-ruled "New India" is capitalist, pro-business, and enjoys close ties with Europe and the United States – the antithesis of the socialist Soviet-ally during the Cold War years (Kaur, 2012). The celebration of the metaverse and support for XR-related startups by the government fits well within this social construction of New India and plays a part in its political rivalries. In this techno-utopian milieu, the expansion of the metaverse and related technologies becomes more likely and its regulation all the more vital.

Participatory approach to policymaking

Several scholars have argued for more public participation in policymaking (for a scoping review, see Moysan & Ródenas-Rigla, 2024). Our study illustrates not only

why it is particularly important for regulating a technology like the metaverse in India but also how it can be achieved. Specifically, our analysis draws attention to how the Indian public imagines the metaverse as a sociotechnical artefact, including its aspirations and anxieties, as well as its disconnect with the state's vision of the technology. Accordingly, we suggest that the government move towards a regulatory framework that recognises and responds to public imaginaries, not only in terms of protocols but also as a practice.

First, our analysis identifies a lack of user agency and autonomy as a key concern. Therefore, we suggest that regulation can adopt a more inclusive approach through a mandate for public participation. The government typically formulates technology policy after consultations with the industry and lobby groups. Indeed, the Telecom Regulatory Authority of India issued a consultation paper inviting "stakeholders" to comment on how to regulate 5G-enabled technologies, including the metaverse (Trai, 2023). However, civil society organisations representing the public interest, including digital rights and consumer protection groups, should also be given a seat at the table. Such open consultations have the potential to bear upon the public discourse and lead to significant shifts in technology regulation. It was such a consultation that, for instance, led to the adoption of network neutrality protocols and the outlawing of Facebook Free Basics in India (Shahin, 2019). They may also improve public engagement and enhance the legitimacy of policymaking (Michels & De Graaf, 2010).

Second, our analysis also indicates that data extraction and exploitation by technology companies is a significant fear among users in India. Policymakers should respond to this by instituting regulations that recognise the unique character of metaverse and virtual world technologies, in particular their capacity for intimate monitoring of users and biometric data collection. The government currently views the metaverse as one among a clutch of emerging digital technologies and expects the general-purpose DPDP Act of 2023 would be sufficient for its regulation. Such an approach won't be sufficient.

DPDP is largely based on Europe's GDPR and includes provisions such as lawful processing, data minimisation, and so on. But GDPR lacks the provisions that can fully cover the concerns raised by metaverse and virtual worlds. As Lau (2022) points out, "GDPR applies based on the location of the subject when their data is processed, not on their home country or citizenship." Making this determination is complicated when it comes to avatars and their data from a virtual world with no boundaries. Moreover, the extent of biometric data gathered in immersive environments, such as pupil dilation, hand gestures and so on, might not be included in

legal definitions, "leaving a large and growing regulatory gap" (Heller, 2020, p. 10). Indeed, DPDP makes no mention of biometric data at all – despite multiple breaches in the Indian government's own biometric data-driven Aadhaar identity card programme.

India-Europe synergy

Translating public imaginaries into concrete policy action, especially when it comes to advanced technologies like the metaverse and virtual worlds, is not a straightforward task. This is where the Indian state can also take a leaf out of Europe's regulatory book. There are many similarities in how the two regions envision the metaverse. Both India and Europe conceptualise the metaverse as a transformative force. In both the European and Indian contexts, the promotion and support of innovative start-ups is emphasised as a key strategy to unlock the economic potential of virtual worlds. Both consider the creation of a strong pool of industry experts and skilled professionals as essential for driving innovation and sustaining economic growth through virtual worlds. Both also view the metaverse as a means and a setting for delivering governance and government services in a range of domains.

But the similarities end there. While both India and Europe acknowledge the need for regulating the metaverse, their approaches are vastly different. India views the metaverse as one among a clutch of emerging digital technologies including AI, the Internet of Things, and so on. There is little cognisance of the need to regulate the particular concerns it gives rise to. Unlike India, Europe recognises that a general-purpose regulation like the GDPR is hardly sufficient to meet the unique challenges presented by virtual worlds. As a result, it has already embarked on creating a virtual worlds-focused strategy that identifies a wide range of concerns stemming from the particularities of the technology. One example is the Rome I Regulation (EC) No 593/2008, which is aimed at preventing labour exploitation on the grounds that work is carried out in "virtual worlds" and not in physical space. Another example is the steps that target misleading marketing practices in virtual environments, in order to protect consumers. The strong measures to "protect and empower children" (EU Commission, 2023, p. 8) in the metaverse also illustrate Europe's customised approach. Learning from Europe, India needs to develop a virtual worlds-oriented policy framework whose specific provisions are guided by the experiences and concerns of Indian users.

Conversely, the analysis presented in this study also has some lessons for European policymakers. Although our empirical research focuses on India, the so-

ciotechnical imaginaries of metaverse among Indian users intersect with those discovered in other geographies. Like us, Bibri (2022) and Egliston and Carter (2022) also found digital users to be deeply concerned about the deterministic impact of the metaverse on ordinary humans and fears we are headed towards a dystopian future. This indicates that such concerns are not nation- or culture-specific but shared by users of digital technologies around the globe. However, these anxieties are absent from Indian policy documents and do not yet feature in European policy deliberations about virtual worlds either. A market-oriented approach to technological innovation that only looks at potential harms on a piecemeal basis is not suited to address such fears. Sociotechnical imaginaries and strategic visions, to the extent they reflect desirable futures, ought to consider the wider societal shifts that technologies contribute to.

Contributions, limitations, and agenda for future research

Our research makes both scientific and societal contributions. Previous studies on sociotechnical imaginaries of the metaverse have not included India, one of the largest markets for virtual world technologies. We, therefore, address an important empirical gap in this literature. Most studies tend to draw on government documents, industry reports, academic publications, expert interviews, and so on, while eliding social media conversations as a data source (*cf.* Egliston & Carter, 2022). Our analysis of YouTube comments foregrounds *public* imaginaries of the metaverse: it also enables us to postulate a participatory approach to regulation that recognises and responds to the expectations and concerns of ordinary users of technology. Such an approach bridges social theory with legal practice, not only allowing policymaking to be evidence-based but also helping sociological research have real-world impact. In addition, this approach is deliberative and lends transparency to the participatory process, which are widely recognised as key indicators of the quality of participation (Moysan & Ródenas-Rigla, 2024).

At the same time, our study has multiple limitations, which can also serve as avenues for future research. For instance, our study focuses on a single social media platform, YouTube, and uses a relatively small data sample. Future research can consider cross-platform research designs and computational tools that allow the collection and analysis of much larger data sets (e.g., Shahin & Dai, 2019). This will be especially important for studying more widely used technologies, such as generative AI. That said, examining public imaginaries from posts and comments on YouTube and other social media platforms does not ensure the analysis is representative of all perspectives and viewpoints. Ensuring broad-based representation is, in fact, a well-established concern with participatory policymaking (Michels

& Binnema, 2018). Scholars should, therefore, focus on designing representative participatory approaches that incorporate the deliberation and transparency of digital publics without compromising user privacy.

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