An Ethics Framework for the Musical Metaverse

James Brusseau and Luca Turchet, IEEE Senior Member

***Abstract*—While ethical reflection on the metaverse is increasing, the artistic and participatory nature of the musical metaverse (MM) necessitates a customized framework. This paper customizes a framework by synthesizing existing ethics guidelines with empirical studies of MM stakeholders. Five core values are identified—autonomy, privacy, fairness, equity, and decentralization—and each is examined in relation to the MM socio-technical conditions, including avatar-mediated identity formation, biometric data exposure, authorship attribution, inclusivity of vulnerable communities, and decentralized cultures. The framework is then applied to two MM platforms, with the evaluation demonstrating how ethical assessment can meaningfully guide design, deployment, and policy. The contribution is both conceptual and practical: it grounds MM ethics in lived experience while providing a reproducible evaluative method to support human-centered development of future musical metaverse systems.**

***Index Terms*— Ethics, ethics evaluation, design framework.**

I. INTRODUCTION

BY blending virtual and augmented worlds, the musical metaverse (MM) is redefining how music is created, shared, and enjoyed [1]. Thus far, platforms have largely been designed around technological requirements [2]. To balance this trend, recent design approaches have focused on MM users [3], and discussions have been elaborated about potential ethical concerns [1], [4].

This paper advances in the ethical direction by proposing an ethics framework for the design and evaluation of MM systems, and by demonstrating its application in two case studies.

To begin, the uniqueness of the MM as a techno-ethical subject is delineated. Next, five principles suited to the MM are developed and explored. They are autonomy, privacy, fairness, equity, and decentralization. Of them, autonomy is the most significant as its ramifications for personal identity and freedom transcend strictly musical concerns. Finally, the principles are applied to assess two MM platforms.

Manuscript received XX January 2026; revised XX XXX 2026, XX XXXXX 2026, and XX XXXX 2026; accepted XX XXXXX 2026. Date of publication XX XXXXX 2026; date of current version XX XXXX 2026. (Corresponding author: James Brusseau).

We acknowledge the support of the MUSMET project funded by the EIC Pathfinder Open scheme of the European Commission (grant agreement n. 101184379).

James Brusseau is with the Department of Philosophy, Pace University, New York, NY 10038 USA (e-mail: jbrusseau@pace.edu). Luca Turchet is with the Department of Information Engineering and Computer Science, University of Trento, 38122 Trento, Italy (e-mail: luca.turchet@unitn.it).

Digital Object Identifier XXXXXXXXXXXXXX

II. WHAT IS TECHNICALLY UNIQUE ABOUT THE MM?

The metaverse can be defined as a persistent multiuser environment merging physical reality with digital virtuality, supported by the convergence of technologies that enable multisensory interactions with virtual environments, digital objects and people. These technologies include networking systems as well as XR, which comprises virtual reality (VR), augmented reality (AR), and mixed reality (MR). In the metaverse, each user interacts with the others and the environment through an avatar.

The MM inherits the core features of the metaverse while exhibiting technical specificities driven by the musical nature of interactions. These include: (i) dedicated hardware and software compatible with musical interfaces and practices; (ii) scalable platforms supporting seamless interaction among large numbers of performers and audiences; (iii) ultra-reliable, low-latency networking enabling satisfactory musical signal exchange within tolerable delays (≈30 ms [5]); (iv) interaction between human and AI musicians; and (v) multisensory augmentation of musical experiences, including haptics.

Nevertheless, current metaverse platforms such as VRChat or Somnium Space primarily support virtual reality concerts, while other musical activities – such as remote education, collaborative composition, or real-time networked performance – remain largely unexplored. As a result, today's MM is better described as a vision rather than a fully realized reality, since existing technologies are still insufficient to adequately support musical practices. As discussed in [2], most metaverse hardware and software systems are not designed with musical activities in mind.

The MM is developing by integrating existing technologies, including Musical XR [6] and the Internet of Musical Things (IoMusT) [7]. Musical XR sits at the intersection of interactive music and immersive technologies, and the IoMusT extends the Internet of Things paradigm to musical devices and ecosystems, fostering novel forms of interaction among musicians, audiences, and other musical stakeholders. A key component of the IoMusT is networked music performance systems [5], which comprise technologies that enable geographically distributed musicians to perform together in real-time over wired or wireless networks.

III. MATERIAL SOURCES FOR THE ETHICS FRAMEWORK

There are two material sources for the distinctive MM ethics. First, the framework will be built on existing theoretical work in adjacent fields, starting with the 2019 publication of the *Ethics Guidelines for Trustworthy AI* [8]. That work, along with related advances including the German Data Ethics

Commission recommendations [9], and the and the American National Institute of Standards and Technology publication titled Artificial Intelligence Risk Management Framework [41] set a standard for considering the human effects of information systems as tri-partite [10]. First, there are a set of principles surrounding the individual, including human autonomy, dignity and privacy. There follows a cluster of principles applying to the wider society, including fairness, equity, and social and environmental wellbeing. Finally, there are principles joined to machines and their operation, including explainability, safety, and performance.

More recent theoretical work has focused ethical attention on the metaverse [11], and on the internet of things [12]. These additions have included considerations of originality as an ethical virtue, as well as decentralization in the sense of expanded sources for authorship of music when spectators are able to channel their own bodily movements into feedback shaping musicians' performances [13].

Taken together, this precedent work forms an initial array of theoretical ethical principles that are refined by the second material source for the ethical framework, empirical research tracking the real-world experiences of stakeholders. The paper *Looking inside the VR Music Scene: Mapping Platforms, Events and People* [14] surveys participants in the MM and provides grounded analysis of their experiences. The survey queried audience members, meaning both passive consumers and active contributors to the produced sounds. Then, in a related publication [3], queries were addressed to musicians, broadly understood to include composers, performers, teachers, students, producers, and sound engineers, as well as those in their periphery. Together, these studies identify a subset of ethical principles responding well to the uniqueness of the MM as it is lived by its inhabitants.

Finally, this paper aims to show how an ethics framework can be tailored for, and engage with concrete experiences in the MM, as opposed to deriving a definitive framework for all future MM work. Broadly, this experimental method participates in the AI ethics movement that functions by inferring from practice to principles instead of initially justifying a set of principles for application to experience. The idea is to let specific episodes of material reality dictate abstract understanding [21]. Nevertheless, a rigorous presentation demands conceptual organization, and the underlying reasoning supporting the ethics principles treated in this paper is presented in Table I.

TABLE I
PRINCIPLES FOR A MM ETHICS FRAMEWORK.

CANDIDATE PRINCIPLE FROM PRIOR FRAMEWORKS	TREATMENT IN MM FRAMEWORK	REASON FOR TREATMENT
Human autonomy / human agency	Retained as Autonomy	Retained because sampled user experience suggested avatar-mediated musical participation directly affects identity experimentation, preference formation, and the relation between operational and structural freedom.
Dignity	Merged into Autonomy	Merged because sampled user experience suggested many human dignity questions in the arts concern self-expression.
Privacy / data governance	Retained as Privacy	Retained because sampled user experience showed that MM systems may collect unusually intimate personal information.
Fairness / non-discrimination	Split into Fairness and Equity	Retained because sampled user experience suggested that the MM raises problems of proportional attribution of creative contribution across human, AI, technical, and audience roles.
Equity / justice	Retained as Equity	Retained because sampled user experience suggested that the MM supports inclusion of disadvantaged users in participatory musical spaces
Social and environmental well-being / beneficence / non-maleficence	Merged into Equity and Decentralization	Merged where sampled user experience connects MM participation to inclusion, community formation. Environmental sustainability is not centered because the present framework focuses on participant-level musical experience.
Explainability / Accountability / Transparency	Merged into Fairness and Decentralization	Merged because responsibility in the MM appears mainly through attribution of creative contribution and through governance over emergent user practices.
Technical robustness / safety / security	Not retained as a core ethics principle; treated as enabling condition	Essential for MM systems, especially latency and reliability, but primarily a technical precondition unless connected to autonomy, privacy, fairness, or equity harms.
	Added: Decentralization	In MM settings and sampled user experience, oversight is not only top-down review but also user/community participation in defining norms, affordances, and acceptable uses. Added because MM platforms frequently develop through user appropriation, emergent norms, creator economies, and community-led transformation of tools. However, decentralization is treated as ethically ambivalent, not automatically good.

IV. ELEMENTS FOR THE ETHICS OF THE MM

The five ethical principles identified in the empirical work as particularly suited to participating in the MM are autonomy, privacy, fairness, equity, and decentralization. They are elaborated in this section.

A. Autonomy

Human autonomy is self-determination, which can be operational or structural as illustrated by John Locke's thought experiment of the locked room [15]. According to the experiment, you willingly enter and contentedly occupy a room, but then the door is silently locked from outside. So, you are

unable to exit. But, as you have no desire to leave, you remain unaware of your captive state. The question is: are you free?

In terms of what you are *doing*, yes: you remain unimpeded, getting what you want. In terms of what you *could* do, however, autonomy is restricted: since you cannot leave, you cannot *change* what you want. So, the thought experiment displays an operational freedom (getting what you want), and then a structural freedom (deciding what you want), and finally a paradoxical opposition between them.

The autonomy paradox emerges today in analyses of social media effects and, still more recently, in discussions of AI conversational agent companions. In both cases, the more users get what they want, the less able they are to change what they want. So, social platforms including X and TikTok maintain user engagement by providing satisfactions modelled on what users have enjoyed in the past, but these funneling satisfactions limit exposure to new possibilities [16] and so impede new discoveries. There is nothing nefarious in this – the recommendation tool is performing as promised – but that does not change the reality that operational freedom conflicts with the structural.

A parallel conflict inhabits conversational agents with their solicitous questions and numbing flattery. When these tools alleviate human loneliness and minor depression, psychological evidence suggests that they succeed by failing: they diminish the loneliness with a conversational style that alienates the user even more from real-world interaction with other humans [17]. The overall result is an autonomy paradox as old as philosophical reflections on freedom, and as contemporary as today's technology.

The MM holds the potential to reverse the dynamic and undo the freedom dilemma, at least within the narrow range of its sonically-driven experience. First, the MM opens a space between what users want (in the natural world), and what they could want (in XR). According to the *Looking inside the VR Music Scene* survey, avatars allowed an online form of self-expression that was unconstrained by appearance or norms. Existence in the metaverse was described alternately as a "second life" and "escapism." As one surveyed participant described, "Actually losing myself to dancing was interesting because I've never had any interest in dancing before." [14]. So, the functional logic of the MM is plainly different from the one driving social media, or at least it can be different. Instead of setting operational freedom and structural freedom against each other, the metaverse potentially allows their coordination. The enjoyment of a musical experience corresponds naturally with the development of new ways of enjoying.

Another of those surveyed in *Looking Inside the VR Music Scene* recounted that a metaverse appearance as an avatar DJ later converted into an offline DJ career. In other words, an individual projected through their avatar in a pleasing (virtual) room explored satisfactions, and that led outside the room, to the potential for new activities and pleasures. Again in this case, getting what is wanted leads to wanting new things.

Of course, there is nothing original in the observation that the metaverse provides a space for personal experimentation that can be existentially reversed in the sense that the human makes the avatar, and then the avatar remakes the human. This Proteus effect goes back to the early days of the internet and debates about the ethical status of anonymity online [18]. What is being added here, however, is an ethics customized to MM experience. It is the imperative to join operational and structural autonomy in the MM, an imperative to use technology to create spaces where users who are getting what they want also find ways to want new things.

Radical solution to the autonomy paradox. If operational autonomy is getting what you want, and structural autonomy is changing what you want, then one step up the scale would be changing the person who does the wanting. This happens when an individual's evolving interests – the kinds of small adjustments that happen to everyone, every day – shift into stronger and more abrupt transformations. At some point, a transformation threshold is crossed and an individual developing new preferences goes beyond evolution and into rupture [19]. They cross from a person with new interests to a new person.

A form of this identity-transforming strategy has been approached in recent speculative legal research in Europe as the "right to discontinuity" [20]. Based on the idea of the already instantiated "right to be forgotten," it initially allows users to demand that data holders delete their personal information in some places and circumstances. So, users are forgotten in the sense of being erased from the databanks. Then, discontinuity goes further by adding the idea that new personal information will emerge which is distinct from the past. Instead of being erased, a cluster of personal data transforms with the discovery of new things to want. Possibly, this explains the metaverse DJ who took the new virtual identity into real life. He developed a new interest to the degree of discontinuity, to the extent that it made him into a new man.

Philosophically, work on this subject has appeared under the rubric of genhumanism [21], [22]. The idea is that personal interests – the kind of music that an individual enjoys, how they enjoy it, and what roles they adopt for themselves as musicians – can be generated through encounters with unfamiliar experiences. When that happens, there is a climaxing of human freedom in the following sense. Conventionally, autonomy is understood as something I possess and exercise that reveals who I am through the choices I make. But, when those choices are foreign to me – when autonomy means discovering new things to want instead of ways to get the things I have already wanted – then freedom no longer belongs to me. I belong to it. I am reshaped and remade by the new things that I want.

None of this is to argue that recreating ourselves is necessarily desirable, or that it is intrinsically good to disrupt one's own life by becoming a DJ or anything else. There are strong arguments against it [23], [24]. The re-creation is, however, a maximum expression of human autonomy, and one invited by the MM.

Ethics grade. Locke [15] revealed that self-determination can conflict operationally and structurally, but part of what makes the MM ethically remarkable (though not unique) is that within the scope of its operation it can twist the two kinds of freedom together: by providing experiences that users want,

they can discover new things to want. Consequently, one way to grade platforms and music-making applications in the MM is in terms of their affordance of autonomy in this dual and then combined sense. The resulting ethical questions are:

- Does the platform provide what users want?
- Does it provide new experiences of what could be wanted?

B. Privacy

Privacy is control over access to one's personally identifying information [25], and the reason for privacy – the purpose it serves – is personal identity. The way that we establish ourselves as someone specific in the world is by revealing selected aspects of ourselves while concealing others. So, a man who is a father with his children manifests certain characteristics while also hiding some of those he displays when he is a husband with his wife, or when he is a son with his own parents. The idea is that we become who we are by displaying *and* by suppressing. Correspondingly, the activity of privacy is a process of establishing who we are.

The MM – like experience in the related area of the IoMusT [7] – creates extraordinary opportunities for individuals to experiment with who they are, but it also opens deep vulnerabilities of personally identifying information. For example, the mentioned person in [14] who experimented with dancing in the metaverse found a new combination of personal revelation and concealment, but the data collection surrounding this kind of transformation was potentially extensive. Depending on how a virtual experience is arranged, the gathered information may include precise spatial coordinates and bodily movement dynamics from the head to feet. Heart rate, galvanic skin response, eye-tracking metrics, and even electroencephalography data capturing neural activity may be recorded [26]. Regardless of the personal information that is digitized, once it has been committed to electronic circuits it has escaped the human subject's control.

So, just entering the metaverse is a significant privacy decision. It is also a very specific kind of privacy decision because it is not just about letting one or another person see a side of oneself, it is also about crossing the line between virtual and real. Returning to the study reported in [14], it described the personal experience of a user who attended a Fatboy Slim concert on the EngageXR platform, and who recalled that "I got to drive a flying cockroach with a handsome man riding on the back!" Obviously, this is fantastical, but it remains true that this individual may – or may not – want the personal information from the curious episode to enter the natural world: they may want other real humans to know what happened, or they may prefer that the episode remains within the MM, and without any data bridge out from digital to natural reality. For privacy, there is no inherent preference over which decision is made, but there is no way to avoid the fact of the decision.

The result is a conception of privacy as an ethical value that exists in specific ways in the MM. First, the privacy questions are extremely intimate given the human relation to music as well as the biometric information that automatically circulates through a metaverse experience. Second, there is a particular privacy question that stands out: do the events of the MM stay there? Along the blurry line dividing virtual and natural worlds, are users able to determine whether and how their avatar's experiences are connected with the natural self outside the virtual reality?

Ethics grade. Privacy demands in the MM emerge on two levels. First there is the personal biometric information, and then there is the question of the virtual and real-world boundary. The demands convert into questions for MM tools, platforms, and projects:

- Do they include mechanisms to manage the specific biometric privacy risks of the MM?
- Does the tool allow people to participate in the metaverse without revealing their natural self unless they choose to do so?

C. Fairness

Fairness is defined by Aristotle as equals treated equally, and unequals treated proportionately unequally within the decision domain [27]. One area of practical application – and sharp debate – in musical contexts is authorship. When work is collaborative, how should the portions of artistic credit be distributed among the participants?

The broad question can be specified in two ways characteristic of the MM. First, this particular context requires increased sensitivity to exactly who – and to what – deserves a proportion of credit when compared with more traditional scenes of creation. As reported in the *Looking inside the VR Music Scene* survey, questions arose about debts owed not only to those who produced sounds, but also to the software creators of the virtual spaces. "Are we not giving our due to the 3D artists?" asked one survey participant. "What is the fair split between the name, the music, and the 3D artistry?" [14]. Of course, this is a common problem independent of digital reality. Judging contributions – and what counts as a contribution – is difficult, but it has a special impact in the MM because so much work is literally invisible [14]. In the case of the virtual world software engineers, the participants within the world never see their keyboarding labors in the same way that natural musicians see stage producers, audio technicians, and similar.

Additionally, the "who" question – as in who deserves credit for the music – involves avatar AI contributions, especially autonomous virtual musicians. While the technologies surrounding these algorithmic productions are still developing, sound and artistic production may develop along lines already followed by today's large language model agents. Just as language models can capably interact with human authors, so too it will be (or already is) reasonable to expect that an AI device can improvise capably alongside human musicians (a preliminary work in this direction is reported in [28]. The question is, should these contributions be compared to human efforts, or do they more closely resemble simple mechanical additions, like metronomes? The overall result is that the difficulties of distributing authorship rights in collaborative environments are especially pointed in the MM.

The second kind of fairness question characteristic of the

MM involves metrics for measuring contributions, especially across the distinct domains encompassing the virtual and natural worlds. Once we know, in other words, who and what the legitimate authors are, then we can ask how much relative credit each one deserves. Concretely, how does a vocal contribution compare with an instrumental one? Stretching further, how much does the work of a 3D artist contribute to the VR musical experience?

One way to begin answering suggested by the survey of MM participants [14] starts by devising more direct routes for rewarding collaborators. As opposed to the traditional model where revenue for an artistic work is first gathered at a single point when the work is sold (e.g., the downloading of a song from a streaming service), and subsequently divided up according to legal and contractual formulas, the apportioning could occur earlier in the process. Most directly, it could be linked straight to individual contributors. For example, one participant in the *Looking inside the VR Music Scene* survey asserted that, "the music industry model needs to change. Labels should build VR worlds with portals to each artist. Monetization could come through memberships while offering fan rewards to keep audiences engaged" [14].

There are multiple ways that revenue could be provided directly to creators. One strategy sells limited-edition digital assets structured as non-fungible tokens (NFTs) which serve as virtual concert merchandise and accessories [29]. The underlying blockchain technology enables smart contract royalties, ensuring that original creators receive a continuous, passive income stream from any subsequent sales, a feature impossible with physical merchandise [30]. The significant aspect of this strategy is that it can be implemented immediately by individuals as they participate in a musically creative experience, as opposed to coming after the experience [31]. The basic idea is that artists of every kind – from musical composers to dancing audience members to 3D scene designers, as well as autonomous AI musicians – can individually find recognition of their contribution in the open virtual marketplace. Moreover, the contribution can be *measured* by that economic success, as opposed to being decided through legal negotiation and the contractual inertia that characterizes profit splits in traditional areas of musical experience. In a single sentence, individual participation in the marketplace replaces the collective force of law, and monetary rewards replace legal copyright claims.

The overall result is two transformations in how fairness operates that emerge as responses to the challenges of attributing creative credit for work done in the metaverse. First, the credit is linked directly to the many unique participants instead of emanating from a contractual nexus that collectively governs who merits shares of profits. Second, the metric is money (or a comparable digital unit of exchange) in the marketplace instead of judicial decisions stemming from legal negotiation and precedent. In operational terms, consequently, it is plausible to expect that the mechanisms of fairness will be operated more by musical participants and coders than by lawyers and accountants.

Ethics grade. There are significant practical hurdles to the fairness of direct creative attribution in the marketplace. Still, the approach responds to the MM's unique quandaries revolving around the distribution and measurement of artistic credit. Corresponding with this fairness strategy, there are two questions:

- Do formal methods exist for attributing credit and responsibility directly to those collaborating in a musical experience?
- Are there channels for human participants including artists and audience members, as well as machines, to earn money directly from their efforts, and so measure their own contributions to the group effort?

D. Equity

Equity is a theory of inclusiveness formalized by John Rawls's rule to provide the greatest advantage to the least advantaged [32]. The immediate contrast exists with Aristotle and fairness, and the distinction takes on special importance today as many previously standard equity initiatives are now illegal in the United States [42].

Conceptually, the contrast hinges on the application of equality. Equity attaches equality to outcomes, while fairness applies it to opportunity. A coin-flip, consequently, is not equitable but it is fair. A hundred coin-flips, however, are both equitable and fair since opportunity remains equalized while the overall outcome also tends toward even-handedness.

The contrast reappears on the social level where equity privileges the community over individuals since the first responsibility is to ensure that no one is left out of the collective, while fairness privileges the individual over the collective since equal opportunities exist for individuals to set themselves apart. Stated slightly differently, equity means that no one is left behind, while fairness ideally guarantees that everyone has an equal chance to get ahead.

In direct human terms, the difference is sometimes visible in the separation between familial and professionally competitive environments. When members of a family gather to compete in an activity, a preference will frequently be allowed for the younger or weaker members of the group. The younger children, for example, will get extra attempts to score. That makes the game more fun for everyone. In the World Cup, however, no one proposes that apparently weaker teams receive an extra player or some similar equitable benefit. So, in the first case, the outcome is justifying the process (equity), and in the second case the process justifies the outcome (fairness).

In the broadest terms, equity seeks to bring everyone closer to the mean, while fairness allows those who are exceptional to stand out. It may not be coincidental that fairness rules the distribution of resources and opportunities in the United Sates, while equity is more pronounced in Europe.

TABLE II
FAIRNESS VERSUS EQUITY

Fairness	Equity
Equals treated equally and unequals treated	Greatest advantage to the least advantaged (Rawls)

proportionately unequally (Aristotle)	
1 coin flip	100 coin flips
Equality applies to opportunities	Equality applies to outcomes
Process justifies the outcome	Outcome justifies the process
Everyone can advance	No one is left behind
Society is a collection of individuals	Individuals are aspects of a larger society

With respect to the MM, the inclusive aspect of equity reverberated in an interview with the co-founder of the PatchWorld VR metaverse platform. The co-founder reported that the community is composed of "broken people, those having a difficult life or health issues or a lot of things." Specifically, they recalled one user who had suffered an accident and was no longer able to work. PatchWorld served to "replace his studio. And now everything he used to do in the real world he's doing in PatchWorld and basically keeping the motivation of life" [14].

Finally, this is not the forum for debating the conflict between equity and fairness, or why equity may be promoted as a value over fairness. However, the existence of the question does forward basic questions about MM platforms. Is the space dedicated to fomenting the contributions of the most capable and highest musical accomplishments, or is it dedicated to providing resources for the widest possible collaborations even if that means denying some capabilities to the most gifted? Of course, there are situations where the answer is both, but these are not scenes of ethical decision. Ethics only exists when choices need to be made between competing values.

Ethics grade. When equity is promulgated as a value in the MM, it also projects a conception of the musical space as privileging collaborative interaction and solidarity over the nurturing of individual talent. The corresponding question to pose is:

- Are resources and opportunities diverted to those who are the least advantaged in the community?

E. Decentralization as an ethical imperative

Decentralization as a form of AI governance operates along two vectors, one in time and the other in conceptual space [22].

First, decentralization in time means that decisions about who can do what in the MM come after, and not before the musical technology is developed and employed. So, it is not that administrative decisions are made, and therefore the musical technology is allowed to be engaged by users, instead, deployment commences, people participate in the experience, governance problems arise, and *then* they are addressed and resolved.

So, social and technical governance is an iterative process more than an imposition of fixed rules. What people are allowed to do in the metaverse and how the associated technology is used are products of the doing and the using.

The survey *Looking Inside the VR Music Scene* reports that the specific uses of technology in the metaverse are frequently the subjects of "appropriation," [33] meaning they are hacks, repurposing of tools. VRChat, for example, was designed as a social platform, but it has become a vibrant space for concerts. Similarly, Discord servers lacking native VR integration nevertheless help coordinate festivals across platforms. In both cases, music communities did not succeed within a platform's pre-established affordances and limitations, instead, they succeeded because they generated the platform's affordances *after* the platforms' existence.

Surveyed stakeholders further related that "Rituals around avatar use, dance floor etiquette, and cross-platform festival coordination were not predictable in advance. They emerged through experimentation and cultural evolution." They are rules, in other words, for interacting with technology that arise as a result of the interaction, because the interactions have already happened.

The second quality of decentralization is that the digital space rules emerge from *within* the process of using the technology, as opposed to being peremptory judgements issued by centralized authorities and imposed from outside the technology. As the *Looking Inside the VR Music Scene* authors write, "Our findings challenge assumptions that guide user- and human-centered design in HCI. The communities we studied did not thrive because their needs were identified and addressed. Participants instead described practices that developed over years." The case of VRChat again exemplifies, while it was planned by its overseers and designers as a social platform, users working inside the platform transformed it into a concert space.

This transformation leads to the conclusion that "appropriation," which is the retooling of technology for unforeseen purposes, is actually something closer to designation. In other words, the purposes of a tool are not known at their production and deployment, and they are not known by those who *do* the producing and deploying. Instead, they only become clear through use and as an effect of what those uses are. When that happens, governance responsibility – the accepted understanding of what a tool is and how it should be used – shifts from those who originally stood outside and designed the machine, to those working inside and operating it. Of course, it is true that the question of decentralization is a staple of digital reality, especially in the areas of blockchain and smart contracts [34], as well as in private industry developments [35], but the question is especially pressing in the MM because of the field's novelty. Even if a more centralized and authoritarian view were adopted as a governance strategy, it is presently difficult to determine where that center would be (which tools and uses determine what should be used and how), and who the authorities are (which people's peremptory judgements command obedience).

Ultimately, decentralization is elaborated as not identical with unexpected use, user creativity, or appropriation. Instead, it becomes ethically relevant when emergent user practices meaningfully influence platform affordances, governance, or ownership structures. It should also be noted that decentralization is more of an ethical value than a design ideal since this form of governance can also create accountability gaps, informal domination by technically skilled users, and

governance vacuums.**Ethics grade.** Decentralization in the MM means that the rules for using technology emerge after and as an effect of the technology being used, and from within that using. The corresponding ethical questions determining whether tools and acts support decentralization are:

- Is iterative governance embraced? Do the rules emerge from what is being done instead of determining what is allowed and disallowed from the start?
- Does the technology conform to users' musical projects instead of conforming users and their projects to the technology?

TABLE III
MM ETHICS FRAMEWORK.

PRINCIPLE	DEFINITION	ALIGNMENT QUESTIONS
AUTONOMY	Self-determination as freedom to get what is wanted, and to change what is wanted (Locke)	Does the platform provide what users want? Does it provide new experiences of that could be wanted?
PRIVACY	Control over access to one's personally identifying information (Westin)	Are musical metaverse biometric privacy risks manageable? Do users control what information crosses from virtual to natural worlds?
FAIRNESS	Treat equals equally and unequals proportionately unequally within decision domain (Aristotle)	Can credit be attributed directly to collaborators in a musical experience? Are there channels for collaborators to earn directly from their efforts?
EQUITY	Distribute the greatest advantage to the least advantaged (Rawls)	Are collaborators treated equally in terms of outcomes on the platform instead of opportunities?
DECENTRALIZATION	Governance comes after and from inside technology, instead of before and from outside	Do the rules emerge from what is being done instead of determining what can be done? Does the technology conform to users' projects instead of conforming users' projects to the technology?

V. APPLYING THE FRAMEWORK TO CASE STUDIES IN THE MM

This section applies the proposed ethics framework to evaluate two existing MM platforms. The assessment identifies gaps and opportunities across ethical dimensions.

A. Methodology

Ethics in recent information technology has been more theoretical than practical, with more written about *how* to do it than about actually doing it [36]. Real ethics evaluations have been performed, however, including those by a group of philosophers, computer scientists, lawyers and domain experts organized out of the Frankfurt Big Date Lab in 2019 [37]. The process described here developed from that work, and it divides the process into three stages: preparation, evaluation, and narration [38]. Significantly, the three stages have been truncated and condensed in the name of brevity in this paper.

Preparation. To prepare, participants are collected from across the stakeholder spectrum: musicians and spectators and other metaverse participants, along with engineers, philosophers, and associated domain experts. A social-technical summary follows. Through a collaborative discussion, it identifies the hardware and software components that make up the MM system, as well as the data flows between the involved users while summarizing the human relations and experiences in comprehensible terms [38]. Project documentation also begins here with the consolidation of findings committed to writing.

Evaluation. An ethical evaluation moves from the top down and from the ground up [39]. From the top down, the established definitions of ethical principles are employed to explore the MM system. Does a platform catalyze autonomy? Protect privacy? Ensure fairness? Exercise decentralization? Then, from the ground up, open-ended questions are posed about the ethical and human experiences encountered when using the technology. Here, for example, it would be natural for a musician to ask about authorship and the ability to claim credit for composed music. While this stage opens the evaluation to a wide a range of human experience, the results must ultimately be organized within the framework's principles. Without that, it becomes difficult to compare evaluations across platforms and devices.

Narration. With the ethical opportunities and dilemmas located, described, and named, the evaluation process can resolve with a narration of conclusions. One way to summarize the evaluation's findings is through a color-coding scheme, which may be supplemented with notes explaining the rationale behind each decision (i.e., the selected color). The proposed color coding is reported in Table IV. Notably, the evaluations presented below should be understood as illustrative applications of the framework rather than comprehensive ethical audits. The purpose of the case studies is to demonstrate how the framework can be operationalized in practice and to identify the kinds of ethical questions that arise when assessing MM platforms. The evidence base used here relies primarily on founder interviews, public statements, and platform documentation. While these sources provide valuable insight into platform design intentions and governance models, they do not necessarily reflect user experiences or actual platform practices. Future applications of the framework should therefore triangulate multiple evidence sources, including user interviews, ethnographic observation, technical audits, policy documentation, and independent expert assessments.

TABLE IV
DECISION RULES FOR ETHICAL ASSESSMENT CATEGORIES.

Code	Decision Rule
Green	Explicit platform features or policies directly support both alignment questions associated with the ethical principle, with supporting evidence from at least one documented source.
Yellow	Evidence supports one alignment question but not the other, or support exists but is incomplete, emerging, or inconsistently documented.
Red	The principle is relevant to the platform but no supporting mechanisms, policies, or practices were identified.
Gray	The principle is not meaningfully implicated by the evaluated feature or platform context.

The proposed framework is intended to complement rather than replace existing ethics assessment methodologies. In contrast to IEEE 7000, which focuses on value-based systems engineering throughout the development lifecycle, and the NIST AI Risk Management Framework, which emphasizes governance and risk identification, the present framework is tailored to the distinctive social and creative dynamics of the musical metaverse. The methodology also shares affinities with the participatory and reflective approach of Z-Inspection, from which the preparation–evaluation–narration structure was adapted. The contribution of the present work is therefore not a general-purpose ethics audit procedure, but a domain-specific framework for identifying and discussing ethical issues arising in musical metaverse environments.

B. Case Studies Analysis

Two prominent MM platforms were elected as case studies, one oriented to musicians and music-making/composing/jamming in VR, the other mostly dedicated to audiences and VR concerts. The evaluations are reported in Tables V and VI respectively. Where evidence was mixed, the lower grade was assigned.

Case study 1: Collaborative music-making in PatchXR. PatchWorld (https://patchxr.com/) is a VR metaverse platform tailored specifically for musicians, offering a space where users can perform, create, and collaborate using VR-based musical instruments. Instead of merely serving as a social or gaming environment, PatchWorld enables artists to enter immersive 3D spaces where musical expression arises from interacting with virtual instruments and environments.

Within PatchWorld, musicians can pick up virtual instruments, manipulate them in real time, and compose or perform music in a shared virtual space. This allows geographically distributed artists to meet in VR, improvise together, or present performances as though on a shared virtual stage. The platform's design emphasizes realistic interaction and embodied musical creation: avatar-based presence, gesture-responsive instrument controls, and spatial immersion work in concert to approximate aspects of live musical performance, even when participants are physically distant.

Because PatchWorld is built for musical collaboration, it supports creativity beyond traditional session constraints. Artists can experiment with instrument sounds, virtual acoustics, and interactive effects that might be difficult or impossible in physical studios. The shared VR environment also fosters spontaneity and social dynamics – rehearsals, jam sessions, and full performances become possible regardless of location. This makes the platform potentially valuable not just for concerts, but for composition, practice sessions, experimental collaboration, and community-building among musicians from diverse backgrounds.

Moreover, PatchWorld's structure promotes accessibility and inclusivity: by leveraging VR technology and virtual instruments, it lowers the barrier to specialized physical equipment or rehearsal spaces. Musicians who might lack access to a studio or live venue can still participate in creative work and performance. At the same time, the virtual nature of the platform sidesteps geographic and logistic constraints, enabling collaborative networks that are global, flexible, and scalable.

In an interview with a PatchWorld co-founder, the platform was evaluated in terms of the ethical queries developed in Section IV. Their responses are quoted and paraphrased below, and all correspond with a Zoom interview conducted on December 12, 2025.

Autonomy is evaluated in terms of how well a platform allows users to pursue what they want, while also experimenting with novel things they could want, even to the degree of self-transformation. PatchWorld facilitates this freedom.

Initially, the co-founder reports, the platform lets users create their own avatar and transform their voice, enabling them "to find community that is not based on their body, or their gender, or their money, or their jobs." In other words, it allows them to break away from core aspects of their real-world being.

This fulfills a negative requirement of transformative freedom: users can create experiences discontinuous with their real lives. What remains is the positive aspect, the platform's capacity to go beyond escapism and help users construct novel experiences. Here the co-founder relates that, "Users on the platform discover things they couldn't do before. It's possibly because the platform is very open to collaboration between people with different skills. So, they could collaborate with people who made musical worlds, and then whatever can be built with these musical blocks can exist. Some people like to build synthesizers, some people like to play them, and some people like to connect the synthesizer to a visual effect." Ultimately, in other words, a musical introduction can lead elsewhere, including to the visual arts.

Additionally, the transformations occur in a way that is highly attuned to the musical metaverse. The co-founder explains that, "it's like you're coding inside the app. So you, you have a device. You can go in edit mode, you open that device and you have the guts of this device, you have all the cable, all basically what makes it work is in front of you. And you can tweak some numbers just so it sounds different or you can change like some parts, or you can change the shell. And then it has your name".

Of course, the changes made to the device need not be fundamentally novel like the transformation from musical to

visual art, but when they are, and when the platform and the musical metaverse catalyzes new *kinds* of engagements and ways of living, then the outer limit of human autonomy is potentially reached, the point where freedom converts into a possibility for users to change what they want, to be reinvented.

Privacy is control over access to one's personally identifying information, and the PatchWorld metaverse takes steps in this direction. On the platform, user and avatar information is gathered only for interactions, and the data is not saved or sold. User profiles are encrypted and, finally, there is no obvious way to connect a PatchWorld user to their Facebook profile, even though registering that profile is necessary to subsequently enter PatchWorld.

The Facebook requirement adds a layer of discussion. Leaving aside debates about Meta and Facebook and their direct commitments to privacy as an ethical value, it is certain that the commitment will be diminished by the sites' overriding dedication to user authenticity, to ensuring that all users on the platform are the single person who they say they are (Brusseau 2019b). Obviously, there is no intrinsic objection to this Facebook ethics, but it is nevertheless the case that valuing authenticity disallows anonymous and pseudonymous users, and to guarantee user fidelity with their established identity Facebook must compile significant information about each user. Again, this is not an objection to the value of authenticity, but Facebook's authenticity commitment inescapably de-prioritizes privacy.

Next, to the extent that PatchWorld implements Facebook technology, the values of the larger company threaten to swamp the commitments of the smaller one. As a response, the co-founder has indicated future plans for PatchWorld to build their own technology from the ground up.

Fairness in the metaverse includes questions about the distribution of credit for creative work, both about who gets credit and about measuring the extent of the contribution. These questions are especially pressing in virtual reality where industrial-era laws and customs apply imperfectly or not at all.

To succeed in this area, PatchWorld is launching a labelling system allowing recordings made on the platform to be owned by their users. The ownership plans also extend through at least some collaborative projects by way of platform software. The co-founder explains that individual users can re-code devices inside the app so that they produce different kinds of sounds, and those changes are recorded as a text file, allowing ownership to be listed across all those who contributed to the device's evolutionary construction. Finally, the work can be made available freely to others on the platform, or sold through a tip jar model.

So, the challenge of mapping creative credit is being met in some areas of the platform. Creators are individually listed and a structure for rewards is provided. Further, the co-founder notes that plans are underway to activate a blockchain-type model where revenue not only passes to the ultimate creator, but is split between all those who provided modifications since the initiation of the virtual object. While implementation is underway, some questions remain unanswered. One of the most important involves the degree of partial credit. When an instrument has been created and recreated and then modified again, how should the income be split? Is there an automatic algorithmic function for the distributions? Should buyers decide themselves how the money is split? These questions remain unresolved.

Finally, it should be noted that the incipient PatchWorld is insufficiently large economically to involve real world money inside the platform. Instead, users exchange virtual coins called Vibes.

Equity requires dedicating the greatest advantage in terms of resources and opportunities to the least advantaged members of a community. As reported above, PatchWorld welcomed those users whose lives had been "broken" by their own decisions or circumstances, and the site allows users and their avatars to escape at least some of their real-world limitations.

In this way, there exists a crossover with the ethics of autonomy in the sense that a platform for virtual reality that enables individuals to create new real-world definitions of themselves seems inherently enabling for those who had been left behind or left out. Additionally, there seems to be no attempt to allot platform resources in more competitive ways, which work against equity by providing equal opportunities to individuals to outperform the rest instead of arranging for equal outcomes across the community.

Decentralization in ethics means that the governance for a platform arises from users and their uses. Along the vector of time, rules come after a platform has been entered, and along the vector of conceptual space, they come from within the platform instead of being imposed by overseers. PatchWorld's construction satisfies both requirements.

In the words of the interviewed co-founder, "PatchWorld is coming from the user, and users are almost an extension of the engineering team. They're debugging the app for us all the time. They're telling us what doesn't work, what, what their problem is, and we're trying to fix them and they're trying to fix many things for us too. It is a creative platform where users build stuff." The platform is, in essence, user generated content. It is not just that the rules governing the platform develop from users and their uses, but the platform itself emerges from those forces.

This is, perhaps, a dynamic of total decentralization. In a sense, it reverses the notion of origin and development. Traditionally, and from a centralized perspective, a piece of technology begins as something and then develops in one way or another. But, when user control is complete, the "original" version is just the one that exists now because of how the users have made it. The earlier iterations are not evolving steps away from the original so much as developing steps toward the current reality. Everything is a matter of perspective, of course, but the different perspectives generate distinct virtual-world effects. From the centralized perspective, users obey the first design of a platform, while decentralization means that the designers and then the platform itself responds to the users.

Finally, on the question of decentralization, the co-founder puts it succinctly, "The definition of the platform is being reshaped by how it's being used."

TABLE V

EVALUATION OF THE MM PLATFORM PATCHWORLD.

Dimension	Code	Notes
Autonomy		Platform composition enables engagement with new interests, and identity recreation.
Privacy		Privacy ensured on the platform, though threatened by larger Facebook dependence.
Fairness		Mechanisms established for personalized and direct distribution of creative credit.
Equity		Users helped to escape their real-world limitations.
Decentralization		Platform is user generated content in the sense of being reshaped by users and their uses.

Case study 2: VR concerts in Somnium Space. Somnium Space (https://somniumspace.com/) is a persistent virtual-reality metaverse built on the Ethereum blockchain, where users can own and trade digital assets such as land parcels, avatars, and virtual environments. Its in-world economy is supported by the CUBE token, which enables transactions ranging from land purchases to the monetization of user-generated content. The platform provides creators with development tools, including an SDK, world-building features, and an integrated NFT marketplace, facilitating the design of customized spaces and interactive virtual experiences.

The platform is accessible through full VR setups as well as desktop and web clients, ensuring broad participation regardless of hardware. Its VR environment supports high levels of immersion through full-body avatar systems, wearable technologies, and advanced in-world interaction tools.

A key feature of Somnium Space is its support for user-driven live events, particularly concerts. Musicians and performers can create dedicated venues, host real-time shows, and leverage the platform's economic infrastructure to monetize their performances. Concerts can be attended by both VR and non-VR users, with VR participants benefiting from spatial audio and embodied interaction, while others join via desktop or web clients.

Somnium Space thus offers a hybrid model that combines immersive VR, decentralized asset ownership, and audience inclusivity. For musical and cultural projects, it enables new forms of production, community engagement, and revenue generation through virtual goods, NFTs, and tipping systems, while ensuring long-term value and portability of digital assets.

In terms of an ethical evaluation, Somnium Space can be provisionally graded in the following ways, though all results are tentative as insufficient space exists to fully evaluate the platform.

Autonomy is evaluated in terms of how well a platform allows users to pursue what they want, while also experimenting with new things that could be wanted, even to the degree of self-transformation. Somnium Space, according to its founder, opens space toward this degree of freedom. The platform requires no identity verification. "We don't keep the data. We don't know your name. We don't know your address. We don't know anything." [40, 00:21:51] That is, the online experience breaks links between natural humans and their avatars.

This severing is not just a privacy guarantee, it is also an identity opportunity. To the extent the platform enables free experimentation online with personal identities - to the degree it allows users to experiment with new interests as unbound from their own natural selves - the possibility exists for those new preferences to cross out of the metaverse and remake the natural human as occurred in the *Looking Inside the VR Music Scene* [14] when it recounted the avatar DJ show that later converted into an offline career. Still, actual cases of these identity transformations on the Somnium platform were not discovered by the authors, and no processes within the platform were identified to catalyze this particular identity disruption.

Privacy is control over access to one's personally identifying information, and given the intimacy of data potentially flowing across virtual reality hardware, these kinds of questions are especially sensitive. The previously noted severance on the Somnium platform between the natural person and their avatar already makes a strong privacy statement in the ethics of the natural world.

Then, entirely within the virtual world, privacy is guaranteed in some ways by the platform. Even while the virtual world's elements are persistent, the founder relates that "That's another thing which is special about Somnium Space. You can create like a normal messenger and you can communicate with your friends. The key part is we don't store your messages. The moment your session ends, the messages are gone. It's between you and your friends. We don't want your data. This is the number one thing which Somnium Space is built on, your privacy. We don't care what you do and how you do it here. This is your stuff." [40, 00:09:58] It seems, consequently, that both walls of privacy are respected by the platform, the one between the virtual and natural world, and the one that surrounds avatars in their purely virtual reality.

Fairness in the metaverse includes questions about the distribution of creative credit: who deserves rewards for their work? How are those rewards measured? One possible response is direct attribution in a marketplace where money – in one form or another – answers the question about who deserves how much credit. To make this work, however, a reliable link must be forged between creators and the consumer marketplace. And, as opposed to industrial era fairness where operations centered on established laws and signed contracts, metaverse fairness grants any participant the opportunity to directly convert their creative labor into tangible rewards.

Somnium Space appears to succeed in this area, both in terms of direct connection and immediate conversion. As an example, its founder states this about a wearable item, a hat: "It's created by Shoda, and if this item were for sale you would see a buy button and you'll instantly be able to buy this from him and then it will go into your inventory and you can simply wear that item. That's the simple yet very powerful way for people to actually outfit their avatars and have the accessories and also support creators because the creators are actually the ones who are creating those items. [40, 00:07:45]. The support - the

distribution of creative credit - is direct.

Then, on the subject of immediate conversion, the founder describes the process for Somnium Space this way. “I'll explain what actually happens. So, I click on his tip jar. I put my PIN code in and the transaction is confirmed from my credit card. And that's where the magic begins because the real money left my credit card, my bank account, and it landed in his account. Now it didn't land in a Somnium account. It is his Stripe account. So tomorrow he gets paid. He doesn't need to wait for Somnium to get approval to withdraw the money or buy some virtual box or whatever. No, no, no. It's money going directly from my credit card to his bank account directly in real time.” [40, 00:13:54]

Equity privileges a platform’s community over its individual members by diverting resources to those in greatest need as opposed to the fairness principle which provisions individuals with equal opportunities to separate themselves from the rest.

Clearly, Somnium Space leans toward the fairness option as considerable resources are dedicated to allowing particular contributors to be directly compensated for their work. At the same time, the founders make no mention of formulas or strategies for rebalancing rewards away from those who most succeed directly in the marketplace. In other words, the platform seems more dedicated to helping individuals stand out and stand apart from the rest in terms of relative excellence, than it is to reincorporating and including those who have found fewer other members willing to contribute to their tip jar.

Additionally, the site’s decentralized operation creates an obstacle to equity. Decentralized systems lack the oversight required to first determine which members of a community are being left behind, and then secondly rearrange resources to ensure collective solidarity, their continued participation in collective successes. Structurally, a similar argument could be made with respect to the platform’s marketplace system for distributing artistic recognition.

Of course, there are always potential cases where the dedication to individualism and fairness will come at no expense to equitable considerations, but that potential does not appear to be a priority on the site.

Decentralization in ethics means that governance for a platform emerges after the platform’s instantiation and from within it. The rules rise from users and their uses, and Somnium Space appears to satisfy both requirements.

In the words of the founder, “We literally give people almost a God mode sandbox because it is unlock C# scripting. You can literally do anything. So, I think the best thing we've done is provide tools and we have a heavy social presence with the creators and the way we do it is we listen to them and if there's something they need or want and if it's a good idea, it goes on the list basically. It's pretty much keep the creators happy because at the end of the day, a platform like this is built by the creators.” [40, 00:20:37] Stated differently, it is the experiences of those who are using the platform that will produce judgments about how it ought to be developed and used.

TABLE VI
EVALUATION OF THE MM PLATFORM SOMNIUM SPACE.

Dimension	Code	Notes
Autonomy		Satisfies a necessary though not sufficient requirement to allow users to recreate themselves.
Privacy		Privacy is a priority within the virtual world, and between the virtual and natural world.
Fairness		Direct credit for creative contributions operated through a Somnium marketplace.
Equity		Excellence and fairness seem to be prioritized over inclusion and equity in Somnium Space.
Decentralization		Users empowered to develop rules of Somnium Space through their use of the platform.

VI. CONCLUSIONS

This paper developed and implemented an ethics framework for evaluating the design and performance of MM platforms and tools. Within the universe of contemporary ethical principles applying to recent digital technologies, it identified five principles as highly relevant to MM experience, and then customized their application to conform with the real experiences of today’s MM.

Further work in this area may extend in several directions. First, more thorough applications of the framework could be accomplished as stand-alone research projects. Second, future research may further validate and refine the framework through applications across multiple evaluators and platforms. Finally, the framework itself will naturally flow along with MM development. As the technology advances, the ethical categories most suited to understanding the resulting human experience will also transform. What could persist, however, is a methodology that seeks to understand the generic ethical principles as deeply conditioned by the MM, and that evaluates MM platforms in the tabular form here proposed.

REFERENCES

[1] L. Turchet, “Musical Metaverse: vision, opportunities, and challenges,” Pers. Ubiquitous Comput., vol. 27, no. 5, pp. 1811–1827, 2023.

[2] A. Boem, M. Tomasetti, and L. Turchet, “Issues and challenges of audio technologies for the musical metaverse,” J. Audio Eng. Soc., vol. 73, no. 3, pp. 94–114, 2025.

[3] A. Boem, M. Tomasetti, A. Gabriele, A. Di Scipio, A. Micalizzi, and L. Turchet, “Imagining the musical metaverse: A study on the needs and creative practices of composers and musicians,” Digit. Creat., pp. 1–27, 2025.

[4] G. W. Young, “Ethical considerations in the production and consumption of music in the metaverse,” in Proc. IEEE Int. Symp. Internet of Sounds, 2024, pp. 1–9.

[5] C. Rottondi, C. Chafe, C. Allocchio, and A. Sarti, “An overview on networked music performance technologies,” IEEE Access, vol. 4, pp. 8823–8843, 2016.

[6] L. Turchet, R. Hamilton, and A. Çamci, “Music in extended realities,” IEEE Access, vol. 9, pp. 15810–15832, 2021.

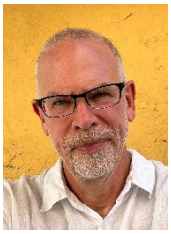
[7] L. Turchet, C. Fischione, G. Essl, D. Keller, and M. Barthet, “Internet of musical things: Vision and challenges,” IEEE Access, vol. 6, pp. 61994–62017, 2018.

[8] European Commission, Ethics Guidelines for Trustworthy AI. Luxembourg: Publications Office of the European Union, 2019.

[9] Data Ethics Commission, Opinion of the Data Ethics Commission - Executive Summary. German Federal Government, 2019.

[10] J. Brusseau, “What a philosopher learned at an AI ethics evaluation,” AI Ethics J., vol. 1, no. 1, 2020.

[11] M. Al-Kfairy, S. Alrabaee, O. Alfandi, A. T. Mohamed, and S. Khaddaj, "Navigating ethical dimensions in the metaverse: Challenges, frameworks, and solutions," IEEE Access, vol. 13, pp. 79996-80018, 2025.
[12] G. Baldini, M. Botterman, R. Neisse, and M. Tallacchini, "Ethical design in the internet of things," Sci. Eng. Ethics, vol. 24, no. 3, pp. 905–925, 2018.
[13] J. Brusseau and L. Turchet, "An ethics framework for the Internet of Musical Things," IEEE Trans. Technol. Soc., vol. 6, no. 2, pp. 155–164, 2024.
[14] S. Ppali and L. Turchet, "Looking inside the VR Music Scene: Mapping Platforms, Events and People," in Proc. CHI Conf. Hum. Factors Comput. Syst., 2026.
[15] J. Locke, An Essay Concerning Human Understanding, Book II, Chapter XXI ("Of Power"), Section 10, P. H. Nidditch, Ed., Oxford University Press, 1975 [1690].
[16] S. Milli, M. Carroll, Y. Wang, S. Pandey, S. Zhao, and A. D. Dragan, "Engagement, user satisfaction, and the amplification of divisive content on social media," PNAS Nexus, vol. 4, no. 3, pgaf062, 2025.
[17] S. Turkle, Reclaiming Conversation: The Power of Talk in a Digital Age, Penguin, 2015.
[18] R. Kang, S. Brown, and S. Kiesler, "Why do people seek anonymity on the internet? Informing policy and design," in Proc. SIGCHI Conf. Hum. Factors Comput. Syst., pp. 2657–2666, 2013.
[19] J. Brusseau, "Ethics of identity in the time of big data," First Monday, vol. 24, no. 5, 2019.
[20] C. Casonato, "Unlocking the synergy: Artificial intelligence and (old and new) human rights," BioLaw J., no. 3, pp. 233–240, 2023.
[21] J. Brusseau, "Mapping AI avant-gardes in time: Posthumanism, transhumanism, genhumanism," Discover Artif. Intell., vol. 3, no. 1, pp. 32, 2023.
[22] J. Brusseau, "The dilemma between euphoria and freedom in recommendation algorithms," Ann. Studi Religiosi, pp. 507–520, 2025.
[23] C. Taylor, Sources of the Self: The Making of the Modern Identity, Cambridge, MA: Harvard University Press, 1989.
[24] A. MacIntyre, After Virtue: A Study in Moral Theory, 3rd ed., Notre Dame, IN: University of Notre Dame Press, 2007, ch. 15.
[25] A. Westin, Privacy and Freedom, New York: Atheneum, 1967.
[26] Y. van den Eede, "The ethics of immersive experiences: Privacy, control and responsibility in the metaverse," Ethics Inf. Technol., vol. 25, no. 3, 2023.
[27] Aristotle, The Nicomachean Ethics, L. Brown, Ed., Revised ed., Oxford: Oxford University Press, 2009 [350 BC], Book 5, 3A.
[28] T. Hopkins, R. Vanukuru, S. C. C. Weng, C. Tobin, A. Banic, M. D. Gross, and E. Y. L. Do, "Networking AI-driven virtual musicians in extended reality," in 2023 IEEE Int. Symp. Mixed Augmented Reality Adjunct (ISMAR-Adjunct), pp. 752–756, 2023.
[29] J. Choi, "A study on the applicability of NFT in the entertainment industry: Application of the means-end chain analysis and laddering," in Proc. 24th Biennial Conf. Int. Telecommun. Soc., 2024.
[30] M. Finck and V. Moscon, "Copyright law on blockchains: Between new forms of rights administration and digital rights management 2.0," IIC Int. Rev. Intellect. Prop. Compet. Law, vol. 50, no. 1, pp. 77–108, 2019.
[31] L. Turchet and C. N. Ngo, "Blockchain-based internet of musical things," Blockchain: Res. Appl., vol. 3, no. 3, 100083, 2022.
[32] J. Rawls, A Theory of Justice, Cambridge: Harvard University Press, 1971.
[33] V. Zappi and A. McPherson, "Dimensionality and appropriation in digital musical instrument design," in Proc. Int. Conf. New Interfaces Music. Expression, pp. 455–460, 2014.
[34] B. Bodó, J. K. Brekke, and J. H. Hoepman, "Decentralisation: A multidisciplinary perspective," Internet Policy Rev., vol. 10, no. 2, 2021.
[35] J. Brusseau, "Acceleration AI ethics and the Telus GenAI conversational agent," Law Ethics Technol. 2026(2):0006, https://doi.org/10.55092/let20260006. 2026.
[36] T. Hagendorff, "AI ethics and its pitfalls: Not living up to its own standards?" AI Ethics, vol. 3, no. 1, pp. 329–336, 2023.
[37] R. V. Zicari, J. Brodersen, J. Brusseau, B. Düdder, T. Eichhorn, T. Ivanov, G. Kararigas, et al., "Z-Inspection: A process to assess trustworthy AI," IEEE Trans. Technol. Soc., vol. 2, no. 2, pp. 83–97, 2021.
[38] J. Brusseau, "What a philosopher learned at an AI ethics evaluation," AI Ethics J., vol. 1, no. 1, pp. 4, 2020.
[39] J. Brusseau, "Using edge cases to disentangle fairness and solidarity in AI ethics," AI Ethics, vol. 2, no. 3, pp. 441–447, 2022.
[40] vrgamerdude, "Somnium Space VR Tour With Artur Sychov and Shodah - The First Social VR App To Go Adults Only!" YouTube video, Nov. 10, 2025. [Online]. Available: https://www.youtube.com/watch?v=xfD5XB6DyxI
[41] National Institute of Standards and Technology. (2023). *Artificial Intelligence Risk Management Framework (AI RMF 1.0)* (NIST AI 100-1). U.S. Department of Commerce. https://doi.org/10.6028/NIST.AI.100-1
[42] Morris, F. C., Jr., & Sholinsky, S. G. (2025, August 8). "Illegal DEI": New DOJ guidance and its implications for all employers. Epstein Becker Green. https://www.ebglaw.com/insights/publications/illegal-dei-new-doj-guidance-and-its-implications-for-all-employers



James Brusseau (PhD, Philosophy) works at the intersection of philosophy and AI. He is a Philosophy Professor at Pace University near his home in New York City, and a Visiting Professor in the Department of Information Engineering and Computer Science at the University of Trento, Italy



Luca Turchet is an Associate Professor at the Department of Information Engineering and Computer Science of the University of Trento, Italy. He serves as an Associate Editor for IEEE Transactions on Huma-Machine Systems. He coordinates the European project MUSMET.