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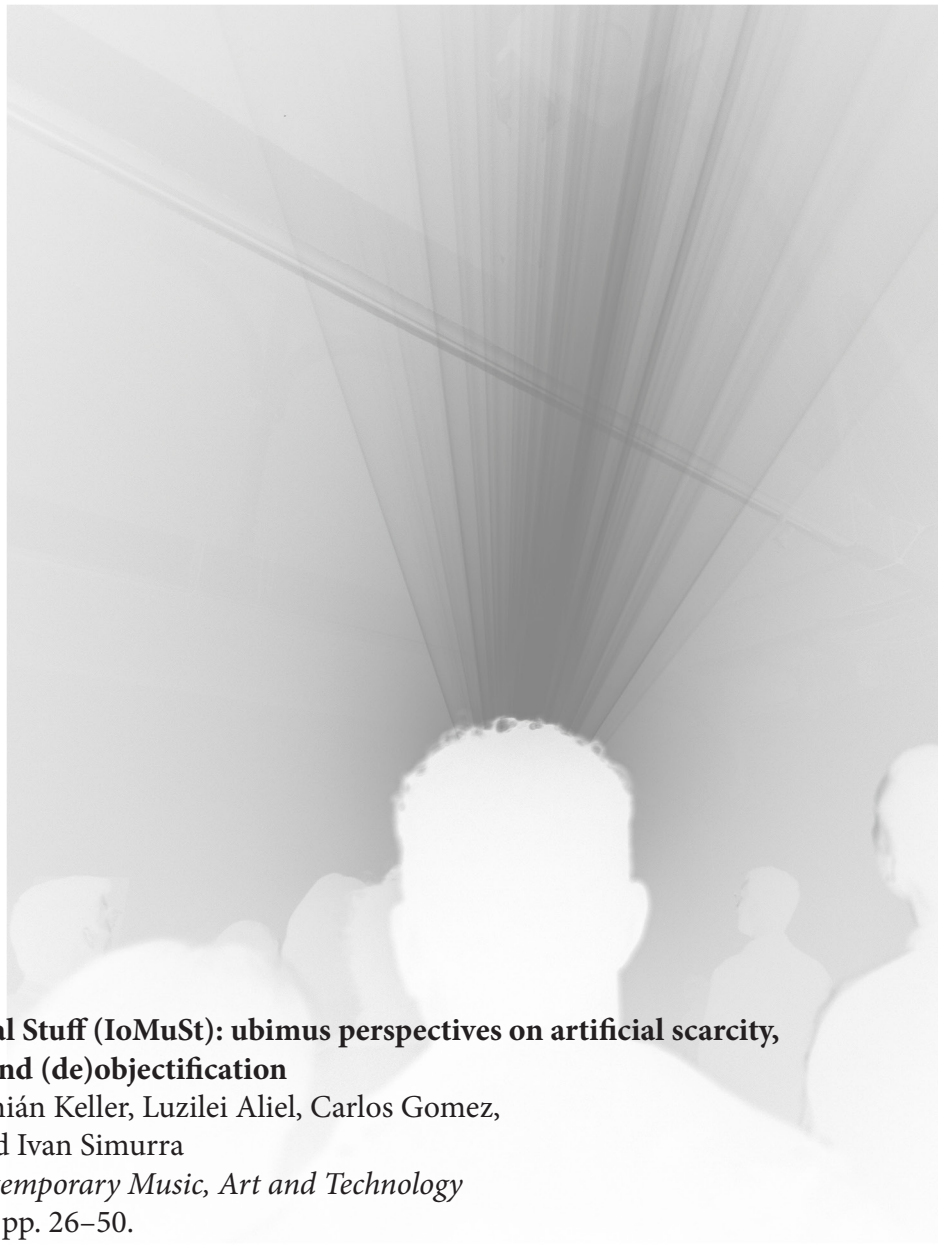

The Internet of Musical Stuff (IoMuSt): ubimus perspectives on artificial scarcity, virtual communities and (de)objectification

Marcello Messina, Damián Keller, Luzilei Aliel, Carlos Gomez,
Marcos Célio Filho, and Ivan Simurra

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Marcello Messina*
Southern Federal University (SFEDU), Russia
Amazon Center for Music Research (NAP)

Damián Keller
Federal University of Acre (UFAC), Brazil
Amazon Center for Music Research (NAP)

Luzilei Aliel
University of São Paulo (USP), Brazil
Amazon Center for Music Research (NAP)

Carlos Gomez
Federal University of Paraíba (UFPB), Brazil
Amazon Center for Music Research (NAP)

Marcos Célio Filho
Federal University of Paraíba (UFPB), Brazil
Amazon Center for Music Research (NAP)

Ivan Simurra
Federal University of Acre (UFAC), Brazil
Amazon Center for Music Research (NAP)

THE INTERNET OF MUSICAL STUFF (IoMuSt): UBIMUS PERSPECTIVES ON ARTIFICIAL SCARCITY, VIRTUAL COMMUNITIES AND (DE)OBJECTIFICATION

Abstract: Part of the recent developments in Ubiquitous Music (ubimus) research involve the proposal of the Internet of Musical Stuff (IoMuSt) as an expansion and complement to the Internet of Musical Things

* Authors' contact information (in order of appearence): marcellomessina@mail.ru, dkeller@ccrma.stanford.edu, luzaliel@gmail.com, cmgarun1@gmail.com, marcoscelio@gmail.com, ieysimurra@gmail.com.

(IoMusT). The transition from IoMusT to IoMuSt entails a critique of blockchain and non-fungible tokens (NFTs) as technologies for allotment, disciplination and regimentation of formerly open and freely accessible artistic web content. In brief, the replacement of the operative concepts constructed around "things" with strategies based on "stuff" highlights the underlying interconnected processes and factors that impact interaction and usage, pointing to resources that become disposable and valueless within an objectified and monetized musical internet. This conceptual and methodological turn allows us to deal with distributed-creativity phenomena in marginalized spaces, highlighting the role of resources that are widely reproducible, fluid and ever-changing. In this paper, we address IoMuSt-based responses to issues such as the artificial production of scarcity associated with the application of NFTs. The selected musical examples showcase the meshwork of dynamic relationships that characterizes ubimus research. In particular, we focus on a comprovisation project involving VOIP visual communication through Skype, Meet and Zoom, a ubimus experience involving a Telegram chatbot and a set of musical experiments enabled by an online tool for remote live patching.

Keywords: ubimus; NFTs; Internet of Musical Stuff; (de)objectification.

Introduction: Is ubimus made of things?

This paper explores the implications of the adoption of the Internet of Things within the context of ubiquitous music making (ubimus), through the analysis of three artistic and technological projects: *Beat Byte Bot*, intercontinental live patching and *Ouija*. Their selection is based on the contrast of aims and resources, highlighting the ability of ubimus frameworks to support diverse aesthetics within a community-constructed and shared knowledge base. We elaborate the concept of *stuff*, as a counterpoint to the increasingly reified discourse of networked things. This perspective opens the opportunity to engage with some of the contradictions of market-oriented technological designs and their negative consequences on artistic creativity, collaboration and sustainability.

The expansion of the access to consumer-level technology in peripheral countries and particularly the emergence of communities of practice based on open-source support and production of know-how have triggered a change in the music field toward a democratization of the access to creative music making. This is the context that enabled the emergence of the ubimus community (Keller et al. 2014). The key objectives of this movement – namely more inclusive, creative and relaxed participation in music-making and an active pursuit for everyday contexts suitable to creative practice – have been positively assessed by authors

not directly involved in ubimus activities. Despite this positive outlook, ubimus researchers have identified a growing tension within the field. This tension is the result of a tendency of part of the musical and technological practitioners to cling to genre-based designs involving the use of 'notes', 'instruments', 'orchestras' and similar notions inherited from European 19th-century acoustic-instrumental approaches.[2] In some cases, this perspective is used to justify long-held myths such as the existence of the creative genius (cf. Weisberg 1993 for a critical analysis of this aspect) or its performatic counterpart, i.e., 'the virtuoso' (Wessel and Wright 2002).

According to Keller and Messina (2022), an open research issue in ubimus is how to approach diverse musical traditions and cultural contexts without subscribing to the prescriptive or culture-cleansing tendencies that have plagued 20th-century music theory. An interesting path is suggested by Kramann's (2021) piece *In X*. Kramann incorporates constraints in his generative processes to emulate the techniques applied by Terry Riley's *In C*, while avoiding the mold of yet another stylistic study. The objective is to create a new musical process with its own internal logic that establishes an open dialogue with the extant repertoire. In a sense, Kramann's perspective is similar to the adoption of ubimus archaeological methods in current creative practices (Lazzarini and Keller 2021), as exemplified by the live-coding examples proposed by Azzigotti and Radivojević (2022) and enabled by the M5live prototype. The authors base their work on a replica of one of the first acoustic compilers (MUSIC V) to deploy their live-coding practice on a web-based platform. Thus, they ground their artistic proposal on a sustainable approach to technological usage, an approach that may encompass a wide diversity of aesthetic outcomes.

Despite these examples, there is an unsolved tension between supporting established genres and expanded forms of creativity. We believe this conflict of aims will worsen as new research threads that engage with past music-making increase their presence in ubimus. Hence, a potential limit for technological diversity may be slowly emerging: How innovative can our methods become before they lose relevance and relatedness to the extant musical-knowledge base? Are we hitting a limit in the rate of technological obsolescence and is this process starting to take a toll on musical innovation?

Focusing on creative music making as an activity has several implications on the study of material resources (Barreiro and Keller 2010). Ubiquitous music phenomena involve both the objects available locally and the materials accessible by means of technological infrastructure. Therefore, two types of resources have been proposed: 1) the resources present on site, defined in the creativity

2 See critical appraisals of the acoustic-instrumental views in Bhagwati (2013); Bown et al. (2009); Keller (2000).

literature as the place factor (*collocated resources*), and 2) the materials accessed through creativity support tools (which may or may not be collocated) (*distributed resources*). We expand this analysis by focusing on the temporal dimension and on the impact of sharing on the characteristics of the resources.

Following economic approaches to creativity, ubiquitous music research has introduced methods to deal with the dynamics of sharing material resources (Keller et al. 2014). Material resources may be *rival*, *non-rival* or *anti-rival*. Rival resources lose value when shared. Non-rival resources can be widely distributed without losing value. Sonic information is a good example of a non-rival resource. Sonic information can be freely shared without any impact on its social value. Contrastingly, if a food stock is partitioned within a community its value is reduced proportionally to its depletion rate: an empty food stock has no social value. Because digital resources can gain or lose value depending on their context of usage, rivalry is not exclusively determined by the characteristics of the resources. This aspect is addressed in the musical examples, as it constitutes an important factor in shaping the properties of the materials and the stakeholders' behaviors.

Another conflict is also manifest in recent ubimus proposals. The multiplicity of musical practices and the creative strategies adopted by grassroots initiatives puts pressure on the ongoing attempts to concentrate digital resources and services in the hands of a few corporate conglomerates. This struggle between center and periphery pre-dates the COVID-19 pandemic (Santos 2011), with detrimental consequences to everyday contexts that were previously untouched by information-technology initiatives. Domestic settings are a case in point. They have become a privileged venue for music making, involving specific creative methods and strategies for sharing that may enrich current and future musical developments (Keller et al. 2022). For instance, as Maciel and coauthors (2022) suggest, some social-network formats adopted by emerging artists are gaining traction because of the presence of ubimus techniques. These practices treat the limitations of online music making as opportunities for creative action rather than as an obstacle for in-person instrumental performance.

Despite the positive contributions of these grassroots initiatives, the increased reliance on network-based resources by multiple practitioners has spiked the voracity of the corporate conglomerates. As Santos (2011) predicted, globalization does not only imply a concentration of assets by a small number of financial centers. It also involves the deployment of information infrastructure as an attempt to secure more digital resources. A recent development of this predatory strategy is exemplified by the marketing of non-fungible tokens (NFTs). Non-fungible tokens are used as unique identifiers of digital resources. They incorporate the logic and technology of cryptocurrency, namely, blockchain (Chohan 2021). Overall, the potential impact of a widespread monetization of the digital assets

can be disastrous for community initiatives such as ubimus, with particularly pernicious effects on low-income and peripheral countries.

Things vs. Stuff

The Ubiquitous Music Group (g-ubimus) has fostered the expansion of a thread of ecologically grounded artistic proposals that dates back to the late 1990s (Keller and Lazzarini 2017). For instance, as a conceptual grounding for her artistic practice Teresa Connors' thesis on Ecological Performativity draws upon a philosophical school called Object-Oriented Ontology (OOO, cf. Morton 2011). Also known as "speculative realism", OOO takes as its starting point the conviction "that real things exist – these things are objects, not just amorphous 'Matter,' objects of all shapes and sizes, from football teams to Fermi-Dirac condensates or, if you prefer something more ecological, from nuclear waste to birds' nests" (Morton 2011, 165).

So long as we stick to material reality,[3] we may agree with Morton's premises. The identification of discrete things from an otherwise undistinguished continuum (cf. the "amorphous matter" cited by Morton) is instrumental to the development of verbal languages. According to Ferdinand de Saussure, "if words stood for pre-existing concepts, they would all have exact equivalents in meaning from one language to the next; but this is not true" (Saussure 1959, 116). An opposite, Platonic standpoint, postulates the pre-existence of things to human consciousness and, therefore, to language (cf. the allegory of the cave in Plato's *Republic*: Plato 1938, 119-140). Within ubimus, the formulation of Creative Semantic Anchoring (ASC, from the original Portuguese) makes us stand with Saussure rather than Plato (cf. Simurra et al. 2022; Keller et al. 2020; Keller and Feichas 2018; Messina and Mejía 2020). Based on the usage of verbal materials to facilitate creative processes, ASC relies on the semantic content of words as a replacement or supplement to the symbolic systems that are traditionally associated with musical practices (e.g., common-practice notation), pointing to a *radical* usage of verbal resources as musical material (cf. Simurra et al. 2022). In this sense, we argue that ASC may also replace the Platonically[4] fixed, or ab-

3 While we defend the concept of reality in the context of our critical discussion of ontologies, we need to acknowledge that this term has been used in problematic ways in the field of computing. In this sense, we subscribe to Weiser's early critique of virtual reality as a tool that "as the goal of fooling the user – of leaving the everyday physical world behind", something that "is at odds with the goal of better integrating the computer into human activities, since humans are of and in the everyday world" (Weiser 1991, 76).

4 On the strongly Platonic derivation of traditional musical categories, see for example Goehr (1992) and Cook (2013).

solute, musical categories with the contingency, conventionality, flexibility and negotiability of verbal meaning.[5]

Back to things, on top of their linguistic importance (whether from a Platonic or a Saussurean standpoint), they are paramount to "stabilise human life insofar as they give it a continuity" (Han cit. Borcherdt 2021). Things – from personal objects to public monuments – carry historical and affective memories, helping human beings to hold onto their collective, familiar and individual pasts (cf. Nora 1989; Sherman 1995; Pugliese 2007). Therefore, removing the presence of material referents from daily life may reduce our ability to establish emotionally meaningful associations among objects and beings. Rather than increasing participation and presence, a by-product of the usage of digital representations may entail a reduction of socially meaningful engagement. Han may be right when he argues that "the digital order *deobjectifies* the world by *rendering it information*" (Han cit. Borcherdt 2021, italics in the original). Despite the loss of memory, knowledge or insight that this deobjectification entails, as researchers in the field of the digital humanities we cannot refrain from highlighting the potentialities of a digitally interconnected world.

In his critique of intellectual property, Puckette suggests that while physical goods need work and raw materials to be reproduced and distributed, "information, in the form of a bit stream for instance, can be copied as many times as you wish, at almost no cost" (Puckette 2004). In other words, Han's "digital order" may challenge capitalism and monetary power by introducing "zero-value commodit[ies]" (Puckette 2004) that are unlimitedly reproducible and shareable. Moreover, the open-source movement to which Puckette fervently subscribes, prescribes that programs can and should be constantly modified, upgraded, improved and reconfigured by users or developers (Perens 1999).[6] It is precisely this collective praxis of continuous modification that deobjectifies the entities that populate an open-access digital ecology. A tool such as Pd, the open-source software featured in Puckette's production and manifesto, ceases to be a singular, self-contained object, to become a universe of different versions, branches-in-progress, spin-off designs, customized libraries and (as a *sine qua non* condition) a community-shared asset. The initially clear-cut object Pd pulverizes into multiform and not-immediately-discernible *stuff*. This process of deobjectification results perhaps in what Morton calls "amorphous matter", with the added bonus of overcoming scarcity and ensuring free access.

5 This notion may be expanded to the realm of infrastructure for creative practice, if infrastructure is understood as a process of negotiation rather than as a given constraint.

6 This need for a community-oriented support of technological assets has slowly but consistently been acknowledged by the corporate stakeholders. The expansion of open-source commercial platforms and the various attempts to hijack unpaid work by means of crowdsourcing are illustrative examples.

According to Puckette, monetizing digital information such as software makes the assets artificially scarce, undoing precisely the aforementioned potential for community sharing (2004):

> Physical goods can only be in the possession of one person at a time; if I have a loaf of bread, I would still have to work to produce a second, identical loaf. If two people want the same loaf, they can't both have it. Material obeys conservation laws. Information and ideas don't obey any such conservation law; more ideas can come out of a system than went in. Information, in the form of a bit stream for instance, can be copied as many times as you wish, at almost no cost. [...] [Intellectual property] effectively makes a zero-value commodity cost money by making copies artificially scarce. All the billions of dollars worth of 'software' are intrinsically worth nothing at all, and [intellectual property] law's only purpose is to make them cost money instead of being free (Puckette 2004).

Puckette's critique of the artificial production of scarcity through the monetization of intellectual property is also applicable to non-fungible tokens (NFTs). As a subcategory of the same blockchain technology used to mint and exchange cryptocurrencies, NFTs target the multimedia digital-art market – initially mostly visual but potentially applicable to sound files, music tracks and other web resources, i.e., typical tools of the trade for artists.

Chohan (2021) states that "the primary interest in NFTs emerges from uses that involve creating scarcity to ascribe value to code-built digital objects" (Chohan 2021, 3). As implied by the corporate discourse of a blockchain colossus like Ethereum, NFT-based scarcity is also secured through the deployment of labels such as "ownership", "the real thing" and "the market value":

> The creator of an NFT gets to decide the scarcity of their asset. For example, consider a ticket to a sporting event. Just as an organizer of an event can choose how many tickets to sell, the creator of an NFT can decide how many replicas exist. Sometimes these are exact replicas, such as 5000 General Admission tickets. Sometimes several are minted that are very similar, but each slightly different, such as a ticket with an assigned seat. In another case, the creator may want to create an NFT where only one is minted as a special rare collectible. [...] Naysayers often bring up the fact that NFTs "are dumb" usually alongside a picture of them screenshotting an NFT artwork. "Look, now I have that image for free!" they say smugly. Well, yes. But does googling an image of Picasso's Guernica make you the proud new owner of a multi-million dollar piece of art history? Ultimately owning the real thing is as valuable as the market makes it. The more a piece of content is screengrabbed, shared, and generally used the more value it gains.[7] Owning

7 See definition of rivalry in the introduction to this article and in Keller et al. (2014).

> the verifiably real thing will always have more value than not (Ethereum n.d.).

The "real thing" as employed by Ethereum emerges in terms of what Levinas calls "ontological imperialism" (1979, 44-46), instrumental to the neutralization of otherness, or, in Levinas's own terms, the "reduction of the other to the same" (1979, 43). This neutralization is implemented via the usage of operative terms like "market value" and "ownership". By assigning social labels to entities that without the labels are immaterial and unlimitedly reproducible, NFTs prepare the ground for the allotment, disciplination and regimentation of a network-based capitalist economy.

Our efforts within the ubimus community are not based on the identification or idolatry of "real things" as enablers of digital interactions, collaborative processes and distributed agencies that characterize our activities – we prefer to use the concept of "stuff" when talking about interconnected creative actions. In general, we argue that digital interactions do not need the fixedness of "things". These processes can be encouraged through free and ongoing exchanges of *stuff*. Things are vulnerable to the imposition of hegemonic territorialities and are subject to reification, objectification and – in the context of blockchain and NFTs – monetization. Contrastingly, stuff is pliable, it is fairly amorphous, it changes with usage, it relies on context to acquire meaning, it may be persistent or volatile depending on the demands of the stakeholders, it supports handling through flexible temporalities, it incorporates value through sharing and it adapts to non-hierarchical territorialities. We will try to illustrate the characteristic flexibility, volatility/persistence and amorphousness of stuff with regards to our case studies: for instance, one of the key features of the intercontinental live patching sessions is the intermingling of persistent and volatile resources in terms of digital infrastructure, ownership/authorship attribution and aural results; another example, *Beat Byte Bot*, with its open-ended architecture, could be described as a flexible and amorphous agglomeration of stuff, rather than a demarcated, autonomous thing.

Recent ubimus research has advocated for the adoption of the IoMusT, namely, the Internet of Musical Things (Turchet et al. 2018). As far as our group is concerned, the validity or productivity of such a proposal is by no means under review. Nevertheless, there are caveats that need to be considered. In this paper we introduce a complementary and phenomenologically different construct, namely, the Internet of Musical Stuff – IoMuSt (Messina et al. 2022). Being a community-oriented entity, musical stuff may feature emergent relational properties that only become accessible through deployment and usage (Keller et al. 2015). Enlisting a set of qualities demands several iterations of usage involving diverse stakeholders and contexts. Furthermore, a fixed set of characteristics

can hardly be established because its functional properties depend on the local resources. In line with the parsimony suggested by the ubimus methods, we discuss key characteristics that have emerged in recent ubimus projects. These are, by necessity, subject to revisions while this research gathers weight through field deployments. Let us consider volatility and persistence.

Temporalities of creative resources

According to Keller et al. (2014), the material dimension of ubiquitous music ecosystems encompasses the sound sources and the tools used to generate creative musical products and the material results of the musical activity. The material dimension may provide the most direct window to experimental observation in creativity assessments. For instance, Dingwall's (2008) generation and development stages can easily be assessed by measuring the quantity of the resources produced. *Putting the pieces together* involves selection, grouping or disposal of resources, therefore both objective and subjective strategies are feasible. Objective assessments target the resource yield and consumption as a function of time (Ferraz and Keller 2014). Subjective data can be captured through qualitative or quantitative feedback from the participants.

Bennett (1976) suggests that musical creative processes start from a single germinal idea. Collins (2005) also adopts this view but allows for several musical ideas (labeling them themes or motifs). Contrastingly, the models of Hickey (2003), Burnard and Younker (2004), Chen (2006) and Dingwall (2008) feature exploratory activities as preceding the selection of materials. The methodological difficulty resides in the task choice for creativity assessments.

The underlying hypothesis is – following the models of Hickey, Burnard and Younker, Chen and Dingwall – that both restricting and yielding access to materials are central strategies. Therefore, if the experimenter selects the materials or the tools, she is taking the place of the stakeholders. The results cannot be used to determine whether the activity begins by exploration or by a well-defined plan with a fixed objective. Furthermore, when the musical materials are given, it is not possible to draw conclusions regarding how the material resources were collected. This methodological problem has been labeled *early domain restriction* (Keller et al. 2011).

Xenakis (1992 [1963]) suggested that creative musical activities may occur in time or out of time. This idea has been adopted by the human-computer interaction literature under the labels of synchronous and asynchronous activities. Applying this notion to material resources introduces a new target for experimental study. Some materials may only become available during the creative activity and cannot be recycled for future use. Other resources may be iteratively used

when engaging asynchronous creative work. Examples of the former are the improvisatory performances based on network infrastructure. Each participant's action depends on the sonic cues provided synchronously by the other participants. These sonic cues are only available in time, therefore they can be classified as *volatile material resources*. Other resources can be incorporated in the context of iterative cycles of creative activity. An example is provided by the concept of musical prototype (Miletto et al. 2011). A musical prototype is a data structure that supports actions by multiple stakeholders enabled by network infrastructure. According to Miletto et al. (2011), a single creative product is shared by the participants engaged in the activity. Participants can also comment on their actions and on their partners' actions (more on this below). Creative decisions are the result of a cumulative process of material exchanges that can last from a few hours to several months. Hence, a musical prototype can be classified as a *persistent material resource*.

Several theoretical proposals on creativity label the results of creative activity as 'products' (Kozbelt et al. 2010). If we take into account the ongoing mutual adaptations among agents and objects during creative activities (Keller and Capasso 2006), a functionally oriented description of the material resources becomes necessary. Material results may be either resources or products depending on their role within the context of the activity. For example, the sounds collected in San Francisco's Bart transportation system (also known as metro or subway) serve as the material base for the creative product *Metrophonie* (Keller 2002). The same collection of sounds was expanded through ecological modeling techniques (Keller and Berger 2001; Keller and Truax 1998) to be employed as material resources within the multimedia installation *The Urban Corridor* (Capasso, Keller and Tinajero 2000).[8] In *The Urban Corridor*, the actions of the participants shape the organization of the multimodal experience (Keller, Capasso and Wilson 2002). Every instance of the piece produces a personal creative product, different each time the installation is visited. Thus, instead of being delivered as a definitive creative product, the sonic sources of *The Urban Corridor* are available as material resources for the creative actions exerted by the audience. While in *Metrophonie,* the resources can be separated from the creative products, this separation is not possible in *The Urban Corridor*. In the latter, the sound sources are also the materials and the creative product is equated to the emergent relational properties of the interactions among the multiple agents within the installation space. *The Urban Corridor* furnishes an early example of the creative usage of *stuff*.

8 See documentation and examples in http://www.capassokellertinajero.com/.

Resource sharing and rivalry

As implied by the discussion proposed by Puckette, there are some interesting observations to be gathered through the application of rivalry in ubimus design. Resources for creative activities can be characterized by their level of relevance and originality (Weisberg 1993). In the context of group activities, these two factors constitute opposite forces (Ferraz and Keller 2014). Creative resources that are unique and have not been shared among group members keep their creative potential and have a high level of originality. Through sharing, original resources lose their creative potential while they gain acceptance among group members. The most relevant resources are the ones most widely distributed with the highest social acceptance. Therefore, since creative rival resources lose value through social acceptance, they can negatively impact originality. On the other hand, creative non-rival resources can be freely distributed without affecting originality. Given that non-rival resources can be widely shared, they can attain higher levels of relevance than their rival counterparts.

If audio-processing techniques are excluded, sound samples can be classified as creative rival resources. The novelty of the creative products that use samples decreases proportionally to the number of copies of the original sounds. Deterministic audio-synthesis models have similar properties. Since they generate the same sounds for a fixed set of parameters, they can also be classified as rival. Contrastingly, physical objects produce different sonic outcomes each time they are excited, the events can be classified as non-rival. On a similar vein, an ecologically grounded synthesis algorithm can render multiple events without producing repeated instances (Keller and Truax 1998). Other timbre-based musical practices – such as the use of distorted guitar sounds – are also examples of non-rival strategies.

Summing up, the application of the quality of rivalry within the design of ubimus ecosystems furnishes interesting perspectives to refine both the planning and assessment strategies. There is an intrinsic compromise between the availability of material resources and their level of originality. Original resources tend to be scarce. Thus, the number of copies and the ease of access is inversely proportional to the level of originality. This relationship does not hold for sustainable generative strategies, such as ecologically grounded synthesis. Furthermore, anti-rival resources tend to reinforce their acceptance within the community. Thus, they increase their relevance. The complex dynamics among these factors are slowly being unveiled. The examples presented in the next section feature specificities that point to opportunities to increase the relevance and originality of the processes and products without falling into the trap of monetization.

Ubimus cases and IoMuSt

Beat Byte Bot

Developed by Gil Panal and Luís Arandas, *Beat Byte Bot* is a Telegram-based tool for web-based audio management that draws upon several features of chatbots (not only text and media interaction, but also the time-tracking of multimedia messages) to create volatile and collaborative user-generated audio databases (Panal and Arandas 2021). The telegram chatbot here functions as the entry point to multiplatform, open-ended modular architectures that incorporate a server API (Heroku) and an external database (Firebase), which may be further augmented by, say, multitrack waveform editors and tools for signal processing. The potential support of *Beat Byte Bot* ranges from instant collaborative track mixing to collective remote composition and asynchronous improvisation, through to the quick establishment of creative audio communities (Panal and Arandas 2021).

We argue that the agility and versatility of the audio sharing modalities (via such commonly used infrastructure as an instant messaging tool), the creation of shared and volatile databases, and the open-endedness of the architecture, all contribute to place *Beat Byte Bot*, together with its potential collective activities, within the territory of stuff rather than that of things. Furthermore, its chatbot operationality allows for the easy integration of verbal content, making it possible to associate the tool with ASC-based developments.

Despite its potential, there are several caveats that the usage of automated dialogue might present when attempting to support group-based creative endeavors. The current functionality of the system targets straightforward choices of readymade sounds. Achieving meaningful selections may seem simple when the participants are faced with a finite set of contrasting choices. But what happens when the categories are not clearly delineated or when they reject clear-cut classifications? Furthermore, consensus-building is among the most complex problems faced by collective endeavors. This activity usually relies not just on verbal exchanges but also on body gestures, intonation, non-verbal cues and other meta-language exchanges. How to incorporate this type of information into chatbots is still work-in-progress.

Intercontinental live patching on Kiwi

Among the recent instances of ubimus research relevant to network-based interaction, we can mention an intercontinental live patching experience (Mes-

sina et al. 2019) using the software Kiwi. Kiwi is a visual-programming environment that replicates the functionalities of patching[9] software like Max and Pd (Paris et al. 2017), while supporting synchronous remote collaboration, whereby several users can work simultaneously on the same project from distant locations, similarly to what happens with Google Docs.

The intercontinental live patching experience involved two academic groups based in three different universities between Brazil and France, namely, the Live/Acc/Patch research group from the two Brazilian Federal Universities of Acre and Paraíba, and a working group based at the University Paris 8 in France, gathered around the undergraduate module *Introduction à la programmation avec Kiwi, Max et Pure Data 1*.

Encouraged by the idiosyncrasies of the Kiwi infrastructure, the participants adopted an entirely open, collaborative and non-hierarchical approach. Such an approach might be considered a bug by some software developers, for whom it is desirable that the author of a document "authorizes" or "blocks" the collaboration of other authors. In Kiwi all the participants retain the same, unrestricted access rights. In addition, the operations on each patch do not leave genealogical traces, that is, it is very difficult to ascertain who created a specific object or added a specific comment on a patch. As a result, potential hierarchical barriers are totally avoided. Subverting the logic of scarcity and aforementioned social labels of "ownership", this open, collaborative and non-hierarchical approach forms one of the pillars of what we call IoMuSt.

One of the main characteristics of our Kiwi experience was the conflictual territoriality that emerged from the simultaneous activity of different agents over a common and limited virtual resource (the screen, or the patch canvas). Despite the disputes, however, the non-hierarchical nature of the infrastructure impeded the establishment of power imbalances, something that perhaps could have happened if the design adopted a strictly enforced policy of resource ownership and access.

Ouija for Strings and the Internet

Written by Luzilei Aliel, *Ouija* is inspired by the Ouija board, a flat surface with letters, numbers and symbols. In Ouija sessions, various individuals try to communicate with spirits or supernatural entities by answering questions in a conversation between different existential planes that communicate through the

9 The term patching has been incorporated from the visual metaphor adopted by Puckette in his design of Max. The patcher or patch refers to the virtual window where the code objects are inserted.

movement of a glass. We use the reference to the Ouija ritual in a form of interactions between agents via the Internet. One of the aims of the *Ouija* project is to make music based on teamwork infrastructure without imposing "rules" or restrictions such as synchronicity or hierarchy in the interaction.

The two performers who participated in *Ouija* are professional musicians, with higher education and training in contemporary music (at PhD level). Agent A was 32 and B was 28 at the time, both men. A is a cellist. B is a violist. The session took place in two locations: São Paulo, Brazil and Bowling Green, United States. *Ouija* is designed for strings, electronic sounds and online communication via VOIP protocol (e.g., Skype, Meet, Zoom). Zoom was chosen over other similar tools because of the subjects' familiarity with its usage and by virtue of its audio and video recording support.

In terms of electroacoustic materials, we developed a soundscape to simulate the mystical atmosphere of a Ouija session. This soundscape is composed of a track of recorded sounds, which helps to establish an auditory relationship between the performers, to compensate for the impossibility of listening in person. Three sound sources were used to generate the track: radio noise, glass sounds (glass) and voice.

Radio noise was generated from white noise processed via granulation. This noise represents the "tuning" or connection between the spirits and the performers. As a formal function, noise determines the beginning and end of the part, acting as a time cue in the guide plane. The glass sounds were recorded using a crystal glass. They were subdivided into three types: resonant shorts, non-reverb shorts, and long (scraping). The selection of materials with the best quality and sound definition was carried out in improvisation sessions. In terms of verbal material, three words were used – one for each subgroup: 1) /resonant/, 2) /glass/ and 3) /scraping/. The three words were processed by a text generator based on Markov chains, on the PHP Markov chain[10] text generator platform. Although the system is simple, it provides quick features for building text threads.

The electroacoustic track has two functions: 1) to establish sound connections unrelated to gestural and visual interaction, and 2) to establish a time frame for the contingent elements of the piece. These features work as hybrid strategies between synchronicity and asynchronicity.[11] Although the agents are not acting synchronously due to the delay caused by the internet connection, the electroacoustic track can be triggered by both agents (each on its own player) with a smaller temporal variation than the latency of the remote support, allowing

10 https://projects.haykranen.nl/markov/demo/.

11 Recent ubimus developments, centered on quasi-synchronicity, include Messina et al. (2019).

both start and stop performance via synchronization mechanisms. This strategy enhances synchronous thinking, without framing the *Ouija* project proposal in traditional performance, and allowing the reuse of resources.

In terms of instrumental materials, the *Ouija* project used the method of guidelines modules (Aliel 2022), which are indicators represented by capital letters in the *Ouija* score. Guideline modules are structures that are at a boundary between compositional resources and improvised interpretations and actions. The information contained in each module offers a general indication of the agent's or instrumentalist's behavior, but at the same time allows a process of choices and variations to take place based on the performer's desire. The modules include technical aspects and indications of procedures.

The score of *Ouija* uses three types of guidelines: 1) description of technical aspects related to the instruments; 2) musical parameters; 3) subjective instructions. In the first case, technical references are common to most stringed instruments. For example, *sul tasto*, *pizzicato*, etc. In the second case, we insert parametric references, groups of musical notes or dynamics. For example, in the letter E a musical scale is indicated and a general dynamics in piano is requested. In the third case, we create subjective phrases so that the performers freely choose their actions. For example, "play as if the sound tells something". These verbal commands allow for general indications, which can sometimes seem surreal or incoherent, and are intended to generate new material by making the most of the agent's interpretation, in line with the aforementioned ASC (Creative Semantic Anchoring) rubric. These phrases consider the individual actions of the agents that can specifically contribute to the flexibility of the work. We can consider two perspectives for this approach:

1. Highly delimited motor responses – "play until the sound says nothing more" – in this context, "play until" is easily understood and generates relatively quick responses. Therefore, it also serves as a guideline applicable to "laypersons".[12]
2. Subjective or unforeseen responses – "the sound says nothing more". Here, a singular moment is suggested to the individual who will produce the action. There is no predetermination of right and wrong (as in 1).

12 Our interest for such a composite and, indeed, poorly described social group roots in Milton Babbitt's well-known essay *Who Cares if You Listen?* (1998 [1958]), and needs to be understood as a critique of the more or less overt elitism incorporated in some narratives of musical creative practice. In an openly polemical move, we decided to keep using the adjective "lay" with reference to Babbitt's exhaustive mention of the "layman", despite the fact that we find the term highly charged and stereotyped.

When playing *Ouija*, the performers must turn off their microphones, keeping the cameras on, in a way that they cannot hear the partner's sounds but can (and should) see his/her gesture performance. A pre-recorded track is heard by the instrumentalists to establish a minimum common ground between the participants.

The experiment featured two online sessions on the Zoom platform. The total duration of each session was 15 minutes, with 5 minutes of musical performance and 10 minutes of discussion about the session. The participants had access to a score and a pre-recorded track. However, no prior practice or preparation with the *Ouija* project materials was done prior to recording.

Interviews were conducted with the two performers shortly after each session, with the aim of gathering information on the spot, focused on immediate reactions, rather than analysis or reflection at a later time when they could reconsider and reinterpret their experience (see Menezes 2010 for an alternative methodological perspective).

Results. We edited two versions of each session. One version shows how the session took place without the performers hearing each other. The second version includes the mixing of sound and visual materials used to evaluate the results.[13] In both sessions, we found moments of similar musical responses. Both technically and sonically, the interactions become integrated, giving the impression that they are performing a pre-composed process.[14] These interaction strategies are based on gestural imitation and framed by the visual information to minimize the lack of shared instrumental sonic outcomes.

Final Remarks

Within the sphere of interconnected musical practices and processes, replacing the notion of "things" with that of "stuff" leads to new perspectives on artistic, philosophical and political outcomes. This conceptual shift could eventually foster and shape future ubimus initiatives. A fixed ontology of the musical internet is supplanted by a phenomenology of ever-changing entities featured in distributed creative interactions (cf. Messina et al., forthcoming). Intensive exchanges of data, together with ongoing modifications of the creative outcomes and processes, preclude the segmentation and classification of fixed "things" in the three cases documented in this paper.

13 Session 1 and 2 – Sound and visual mixing: https://youtu.be/2H7kMc82MpU and https://youtu.be/UksUyIgHdG4.

14 As examples, we can demonstrate in session 1: from 1:06 to 1:19 minutes, melodic counterpoint/tremolo; from 2:01 to 2:21, circular arc – spazzolato/pizzicato; from 4:06 to 4:34, pizzicato/ricochet. In session 2: from 1:07 to 1:42, melodic counterpoint; from 1:50 to 2:04, pizzicato; from 2:26 to 2:46, overpressure/glissando; from 4:11 to 4:25, pizzicato/ricochet.

Remote and collaborative patching on Kiwi from a number of different terminals, for example, yields different parameters and audio signals, as these are only kept locally. Interestingly, this usage features very different aural results on different settings due to the local infrastructure and to the specific context of the musical activity. Here the pliable nature of the dynamic and collaborative patching is expanded by the nature of the aural outcomes, different from computer to computer, from ambience to ambience, from stakeholder to stakeholder, despite coming from the very same programming structure. Applying the logic of the NFTs to this case is then very difficult, if not impossible. Where is the "real thing" advocated by Ethereum here? The patch is constantly modified, augmented, reduced and restructured by the participants, potentially providing as many audio results as there are participants. How could we possibly go about tokenizing a Kiwi patch? Which of its multiple aural manifestations should become the one and only "real thing"?

It is no coincidence that all the three cases exemplified here rely on different infrastructures for remote communications, perhaps all subsumable under the wide umbrella-term of "social networks" or "social media".[15] We would argue that *Beat Byte Bot* definitely falls within a hard definition of social media, for operating on such a widespread instant messaging tool as Telegram. The VOIP technology used in *Ouija* also falls within this category, although the adoption of VOIP tools such as Skype happened a few years before the explosion of social media/networks and the entrance of this terminology in our daily life.[16] Kiwi, on the other hand, relies on a small-scale virtual community with features of mainstream social networks. The tool, however, lacks user support through quick chat to communicate while patching. As a matter of fact, during the remote live patching experience, participants resorted to writing comments directly on the patching canvas to compensate for the lack of verbal communication.

Among the early ubimus practitioners, Miletto et al. (2018) proposed an alternative to the problem of verbal messages in remote collaborative music making: their project CODES explores precisely the concept of "social networks" as an environment for collective music making that allows for text exchanges within a collaborative-sharing thread. In fact, the establishment and nurturing

15 Van Dijck's (2013) categorization of social media distinguishes social network sites, sites for user-generated content, trading and marketing sites, and play and game sites. However, as this categorization might have been formulated some time before the mobile-platform boom, it does not take account more recent instant messaging services like Telegram and WhatsApp (cf. Sutikno et al., 2016).

16 Skype entered the market in 2003. Van Dijck (2013) indicates 2006 and 2010 as key moments in the transition towards the protagonism of social media. Edosomwan et al. (2011) focus on the period between 2005 and 2010 as a crucial and foundational period in the history of social media, despite the fact that these technologies may have been around for much longer than that.

of virtual communities is precisely one of the keys of the creative and intellectual endeavors within the Ubiquitous Music Group. Pimenta et al. (2014), for example, focus on the potential embedded in Web 2.0 applications, in terms of the creation of sharing networks for novice-oriented computer-based musical activities. Their target is to alleviate and eventually overcome the implicit restrictions of activities tailored for professional artists and trained performers. The authors, in turn, associate this to Brazilian cultural traits such as cooperation, flexibility, cross-cultural diversity and creativity. Reading these statements in the context of the political developments happening in Brazil since 2016 sharpens the contrast with the current ethical, social and environmental crises that affect this country.

Apropos politics, we need to stress, once again, that the Internet of Musical Stuff (IoMuSt) rubric is, by all means, a political proposal, that – in line with the principles that characterize ubimus – envisages interconnected virtual communities, the free exchange of intellectual and creative processes and the overcoming of paywalls, restrictions and predatory monetizations. We agree with Puckette as to the shortcomings of intellectual property, while we also subscribe non-negotiably to the principle of intellectual and authorial attribution as a necessary feature of any type of content sharing in ubimus. The whole NFT agenda seems less interested in protecting authorship than in protecting *ownership*. On the contrary, IoMuSt wishfully contemplates a collective liberation from ownership, property, monetization and paywalls in a future digital world.

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THE INTERNET OF MUSICAL STUFF (IOMUST): UBIMUS PERSPECTIVES ON ARTIFICIAL SCARCITY, VIRTUAL COMMUNITIES AND (DE)OBJECTIFICATION (summary)

Part of the recent developments in Ubiquitous Music (ubimus) research involve the proposal of the Internet of Musical Stuff (IoMuSt) as an expansion and complement to the Internet of Musical Things (IoMusT). The transition from IoMusT to IoMuSt is mediated by a critical discussion of ontologies, whereby we may agree to the segmentation of material reality into compartmentalized elements, referred to as "things". In this sense, drawing upon a heterogeneous corpus of philosophical, linguistic and critical works, we highlight the importance of "things" in terms of personal and historical memory, language and semantics, etc. Nevertheless, we take a cue from Han's remarks on the deobjectification of the digital world, in order to reflect on the potentialities that this entails in terms of interconnected creative resources. We then rely on Puckette's critique of intellectual property, on Levinas's critique of ontology and on the shortcomings of the corporate discourse of blockchain giant Ethereum in order to stage a critique of blockchain and non-fungible tokens (NFTs) as technologies for allotment, disciplination and regimentation of formerly open and freely accessible artistic web

content. In brief, we advocate the replacement of the operative concepts constructed around "things" with strategies based on "stuff", a move that highlights the underlying interconnected processes and factors that impact interaction and usage, pointing to resources that become disposable and valueless within an objectified and monetized musical internet. Things are vulnerable to the imposition of hegemonic territorialities and are subject to reification, objectification and – in the context of blockchain and NFTs – monetization. Contrastingly, stuff is pliable, it is fairly amorphous, it changes with usage, it relies on context to acquire meaning, it may be persistent or volatile depending on the demands of the stakeholders, it supports handling through flexible temporalities, it incorporates value through sharing and it adapts to non-hierarchical territorialities. This conceptual and methodological turn allows us to deal with distributed-creativity phenomena in marginalized spaces, highlighting the role of resources that are widely reproducible, fluid and ever-changing. In this paper, we address IoMuSt-based responses to issues such as the artificial production of scarcity associated with the application of NFTs. The selected musical examples showcase the meshwork of dynamic relationships that characterizes ubimus research. In particular, we focus on: (1) *Beat Byte Bot*, developed by Gil Panal and Luís Arandas, a Telegram-based tool for web-based audio management that draws upon several features of chatbots to create volatile and collaborative user-generated audio databases; (2) a set of intercontinental real-time live patching sessions between Brazil (Federal University of Paraíba and Federal University of Acre) and France (University Paris 8), enabled by Kiwi, an online tool for audio-based collaborative visual programming; (3) *Ouija* by Luzilei Aliel, a comprovisation project involving VOIP visual communication through Skype, Meet and Zoom, and a set of musical experiments enabled by an online tool for remote live patching. We conclude by reflecting on the new artistic, philosophical and political perspectives that are opened by the replacement of the notion of "things" with that of "stuff" in digital settings.

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