Report from the EU H2020 Research and Innovation Project Artsformation:
Mobilising the Arts for an Inclusive Digital Transformation

Artistic Skills and Capabilities for Navigating the Intersection between the Arts and Digital Technologies

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Introduction

The exponential development of digital technologies in contemporary society has led to possibilities for digital creative production expanding just as rapidly. Artists working with digital tools traverse this complex territory of digital transformation, needing to adopt and develop skills and capabilities in response. This report will map out forms of digital skillsets and capabilities that contemporary artists themselves consider indispensable for pursuing a career at the intersection between digital transformation and the arts. The skillset and capabilities we thus present in this report have been identified in a bottom-up manner by artists who the members of Artsformation have interviewed over the years (see the method section for more details). Having the ability to speak directly to ethical questions regarding data practices as critical, autonomous actors, while at the same time being embedded in the structures they critique, artists occupy ambivalent and intersecting spaces in between aesthetics, ethics, politics, economies and technologies (Stark and Crawford, 2019). As crucial stakeholders in the mobilization of the arts for more equitable and fairer digital transformations, the artists have a privileged vantage point as to what types of competencies are needed to successfully deploy arts for the achievement of desirable ethical, social and cultural goals. This report will thus outline three distinct yet overlapping sets of competencies (Figure 1) that transpire from our conversations: 1) technological skills; 2) relational skills and 3) business skills.

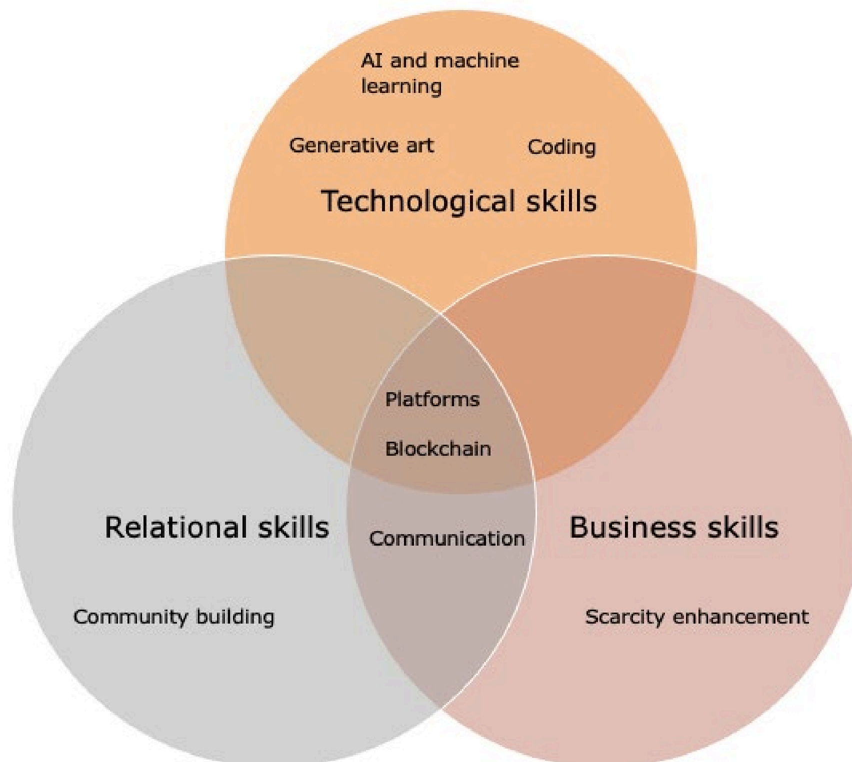

Figure 1: *Visualization of skills and capabilities as developed within overlapping fields*

While new technologies offer numerous tools for artists and creatives, they can also create large digital divides and pose distinct dangers to artistic practices. As technologies develop, acquiring new technological skills is vital for artists to be able to participate in digital art fields, and expand their practice. Artists are usually at the forefront of adopting new technologies, offering alternative lenses to look at emergent technologies, making their perspective vital during transitional times (Alacovska et al., 2020a). Accordingly, this report will be touching on **the technological skillsets** developed and needed by artists such as most notably in the fields of creative coding, generative art, AI and machine learning technologies, blockchain, as well as social media platforms.

The second type of skillsets presented are **the relational skills.** Sharing knowledge and ethical sensibilities collectively, through a reclaiming and re-appropriation of digital technologies, can make the arts a structure of collective imagining and forging of better futures, according to Stiegler (2013). Stiegler for example sees humans as developing entangled with technologies, creating new histories of art as histories of human capability (Stiegler, 1998). As computational tools become increasingly central to artistic practices, creative spaces can become zones of community engagement wherein the creative potential of technologies are developed, expanded, and criticized (Stark & Crawford, 2019). However, the use of data tools makes artists embedded in harmful power practices, which require advanced technical literacy to counteract (Stark and Crawford, 2019). Engaging hopefully and relationally with uncertain technological presents and futures situates artistic practices as models of action within the real (Alacovska et al., 2020a, Alacovska et al., 2023). We see emergent blockchain technologies and social media platforms as examples and spaces for artistic community building and engagement that necessitate copious amounts of self-presentation, self-branding and market positioning online.

As the digital technologies become spaces for development of new forms of monetization of art, as well as an expansion of the arts market to an online space or so-called platforms, the third set of skills that the artists identified as crucial for are **the business skills.** Seeking to sustain their practice, many artists, sometimes ambivalently, adopt online and digital business models in response to these developments, which in turn affect their practices. These business models can be understood as conventional business models, as well as sustainability-oriented models, making the context of digital technologies a way to rethink artistic business models in general. We will be looking at the problem of creating value in digital art, as well as discussing some common business models for artists engaging with digital tools, such as online sales, self-commodification, and economization of subjectivity, such as on social media, as well minting NFTs and utilizing blockchain technology to create communities and fund mutual aid.

We see these threefold set of skills and capabilities not as isolated entities but as mutually reinforcing capabilities traversing the fields of technology, social network management, and business. While impossible to disentangle completely, the report will elaborate on the themes of technological, relational, and business skills and capabilities separately, as well as pointing out the ways in which these interlace, and how skillsets and practices are derived from a combination of these.

Methodological Considerations

The empirical data upon which this report builds consist of 82 interviews with (48 male and 34 female) artists who self-define themselves as engaging with arts at the intersection with digital technologies. Given the general tendencies in the arts fields for the artists to define themselves with multiple and often incompatible work identity labels (Hannekam, 2017) or so-called 'slash identities' bisecting varied tech-business-arts domains (Scott, 2012), our informants have self-declared themselves as 'artists-cum-digital-entrepreneurs', 'digital-artist-cum-tech-educator', 'NFT artists', 'metaverse-performance-artist', 'installation artist', 'blockchain-cum-cryptoartist', 'critical dataset artist', 'anti-surveillance artist', 'feminist technicist', '3D animator' and similar.

Initially, the artists were recruited though the Artsformation consortium, most notably though our four artistic practitioner partners who leveraged their networks of collaborators, affiliates or colleagues. Subsequently a snowballing was used to reach out to informants in order to ensure the greatest possible degree of sample diversity and inclusiveness, including gender, race, ethnicity, disability status and age. The interviews lasted from 35 minutes to 2,5 hours. All but 11 interviews were recorded with a prior written permission of the interviewees. All interviews were transcribed. The interviews were conducted in English, Danish, Norwegian, Spanish and Serbian by the authors of this report. Each author provided translation in English of the interviews conducted in languages other than English.

All the interviewed artists signed an informed consent form. We have preserved the anonymity, confidentiality and privacy of our respondents as per the guidelines of the European Data Protection Regulation (GDPR) and the responsible research data management procedures outlined in three FAIR principle (Findable, Accessible, Interoperable and Re-usable Data Publishing principle)[1]. In the write up of the report, we have thus removed identity markers, refrained from geo-referencing, anonymized relational data and used pseudonyms. A unique record of the original values of pseudonymized data is paced on a secured data storage sever hosted by the Copenhagen Business School.

In addition to the original interviews, we have consulted publicly available reports, personal blogs and secondary interviews. Given a high degree of professional self-reflexivity within art-worlds and creative industries, as McRobbie (2016) has argued artistic subjective accounts publicly circulating on social media, trade press magazines and newspapers, can provide a privileged entry point into the livelihoods and career trajectories of creative workers, who per definition of their job, strive to be highly visible in the publish sphere.

[1] See Force11/ Guiding Principles for Findable, Accessible, Interoperable and Re-usable Data Publishing version b1.0 https://www.force11.org/fairprinciples and http://www.datafairport.org/

Technological skills and capabilities

Coding and generative AI skills

When artists work with code, it can be seen as material, or tool, similar to other artistic mediums (Alacovska et al., 2020a). Code-based art or creative coding bears ties to art-based hacking practices based on values of free knowledge and software, as well as to avant-garde critiques of capitalism, in which daily life is infiltrated to disrupt everyday oppressive patterns (Susik, 2020). One artist interviewed, Adam, stated that technological development has created opportunities for artists to be hacking and repurposing technologies for emancipative means. Learning coding languages can have an emancipatory potential with possibilities for creative creation beyond established digital formats, making artists capable of programming tools to meet their own needs. Many artists make artworks in which the code itself is experienceable, in a way which it is usually not for non-programmers. Making internal systems visible can bring upon reflection in audiences and can be seen as a way of politicizing digital aesthetics by disrupting data habits, again drawing upon avant-garde practices (Stark and Crawford, 2019).

Artist Anne developed her coding skills through working with generative art, a code-based digital artform in which new expressions are generated, making artistic use of computer automatization in some part of the process (Boden & Edmonds, 2009). Tapping into code's generative potential, artists can create works that both are imaginative and playful, as well as have a rarified and original quality, which can enhance public and commercial interest. Anne describes her introduction to generative art as follows:

I then found out that there is this platform where you can make generative art, which is a certain form of art where you write, or program, your art, so that it generates new expressions, so in practice there can be something like me making an artwork with circles, and then I can say, there should be a circle in every corner of the screen, but I don't choose the color in advance, the color can be anything. So when you buy an artwork, […] the circles are there, as promised, but the colors are different. (author's trans.)

Anne comes from a technological background, and described working with code as a no-brainer, as she says that it is where she feels she can do something other artists cannot, giving her an opportunity to create something exciting and new. Coding and other digital skills are not usually taught in art schools or courses, and many digital artists therefore come from other backgrounds, or are self-taught. Artist Maya speaks on how artists can go about learning coding languages and the difficulties that might come with it:

"*I would say that maybe for most technologists, the opening happens with learning just one language and learning just a few simple skills, but there's also creative coding languages, things like processing that are specifically designed for artists, so that's interesting too. I think it definitely starts with curiosity, a willingness to learn, and then I think also just being able to admit you don't know and be comfortable with that, and that can be really, really hard. I think I've met many people and have pushed them into the direction of coding, and it has to have taken a little bit of a push because it's such a new territory."*

Learning to work with code as material can be uncomfortable for artists if they do not feel at home in the field. However, Maya highlights further how developing coding skills as artists through playful practices can make room for critical aspects within the work.

Creative coding is also possible to combine with other technologies, such as blockchain technology. Anne has been working with this combination in her generative art projects, where images are generated at the moment of purchase, in relation to the programmed set of rules. While code can create virtually anything, NFT-technology binds the work on the blockchain at the time of purchase, so that it cannot be changed after, Anne describes. She speaks of this combination of technologies as exciting, creating a productive limitation.

Machine learning and neural networks programming skills

The explosion of advanced media-generating AIs and machine learning technologies within the last couple of years has resulted in many artists adopting these technologies in their practices. Artistic use of these technologies is contributing to a reshaping of our understandings of media and its cultural meaning (Lee, 2020). Many visual artists have taken an interest in machine learning's aesthetic and processual capacity, as related to human vision, and their novel use often provide vital counter-narratives to strictly tech-world perspectives (Lee, 2020). Danish artist and writer Amalie Smith is one of them, and in 2018 she finished the works "Machine learning I, II & III"; a series of tapestries with imagery created using Google's DeepDream, a neural image-generation network. In an interview with Marie Høst for danish radio station 24syv, Smith describes her process with working with the neural network and adopting a computer's vision of images:

[…] What you do is that you train them on all kinds of different databases, and then you try to form them in that way through training them on the right things. And then you throw them out if they don't work, and make new ones, and it's actually a very trial-and-error based way they work with these neural networks. […] When you don't program, one of the ways you can change these networks is to create visual outputs, to see what it can see. It is a way, one shouldn't call it programming, but a way of engineering, or forming the network, using the visual output. (Høst, 2020, 18:03, author's trans.)

Artists like Smith who train neural networks themselves develop an understanding of how images are seen by the computer through a trial-and-error effort, as she describes. As media-generating AIs invite an uncontrollable element into the creation of art, artists familiarize themselves with these tools as they use them over time. Lee (2020) describes the obscurity of neural networks and machine learning processes as necessitating higher degrees of knowledge and interpretation for audiences meeting synthetically produced images and media, as these processes engage with high levels of abstraction and discrepancies with analogue media production, complexities which are relevant for artists producing these works as well. Smith describes the process of working with the neural network as a back-and-forth-process, in which she gives the algorithm material to process, and then deciding upon the output, giving the network new reference-photos, and repeating the process (Høst, 2020). In her case, the final work wouldn't have been possible without the neural network technology, because although she made decisions throughout the process about which direction to pursue, these decisions were based on the computational output (Høst, 2020). She describes how the computer's neural vision came

up with aesthetic possibilities she had not been able to create on her own (Høst, 2020). Another artist, Agnes, who also works with training her own AI-models, describes the feeling of the machine becoming an autonomous and playful partner in art-making and learning, expanding her practice:

"It's a part of myself just displaced from myself. It's the digital me that I look [at] and it's a kid because it's pretty new, and I have to teach her something. But actually, she's teaching me something. She's teaching me how to approach her, and going against what I'm supposed to use is allowing me to have a human relationship with something that it's not human."

Artist and musician Holly Herndon reflects on how AIs trained on images from the internet works as a sort of distributed archive, which lets artists collaborate fluidly with any other artist or image-maker, in an interview with the NFT-platform Foundation (Howard, 2021). She and her partner, Mat Dryhurst, interdisciplinary artist, writer, and technologist, are influential forces within the field of digital technologies and the arts, speaking and writing on various themes of digital transformation and are in general champions for the potentialities of new technologies for artists. In a podcast interview with the Culture Journalist, Dryhurst speaks to how AIs can be used as a tool in the creative process, rather than just as machines which spit out fully formed works (Domanick & Friedlander, 2022). Like Smith and Agnes, he highlights how the uncontrollable elements of the AIs can generate new ideas:

"These tools are actually really useful as auditioning systems, think about the benefit to writer's block, […] I mean, we've been doing this a little bit with some of the music. There are models there where it's like, where would I take this, if I train my own model, […] I've got this kind of loose idea like, maybe I can audition a couple of directions this will go, in order to kind of help me with a little breakthrough in the studio or something like that. There's so many ways this will be integrated […]" (Domanick & Friedlander, 2022, 58:24)

A rising fear within the art world as AI technologies develop has been the removal of what is perceived to be artistic skill from the creation process. Many also seem to fear a homogenization of expression as more artists use the same generational tools. Dryhurst expresses on the other hand an optimistic view of the use of image-generation software in art:

"I think for example that really, really easy generations, I call it like the slot machine dynamic of typing in a prompt and getting an image out, I think there's a really short shelf-life for that. I think that, more realistically, what's going to happen is that this is just going to be a new tool that creative people have at their disposal, to be able to prototype things really easily […]. And I think the advent of these tools just sort of changes our understanding of what being really good means, and I don't see a world where all imagery in five years is going to look like a Midjourney-generation." (Domanick & Friedlander, 2022, 32:31)

Artist Charlotte emphasizes the ethical dilemmas when working with AI, as advanced models often work in opaque ways, even to the programmers themselves, as so-called black-box algorithms. This incomprehensiveness of AIs is both an interesting prospect for artists, as well as raising questions about responsibility and ethics when using these tools.

Anne also speaks to how artists also should be critical when adopting these new image-generation tools, as they are not innocent artistic mediums, but software provided by companies with certain intentions. She says:

"[…] I hope that artists who are not digitally educated also will make more of an effort to understand the background of the technologies they work with, and how they work, for instance how Dall-E or Stable Diffusion work. I think artists generally do that, when they work with a tool, that they begin to nerd it and understand it, but perhaps the political framework for it, what it means when they choose to use Dall-e, which is owned by a company which is very secretive, opposed to using Stable Diffusion, which is an open source-platform. […] Because right now, we are in a transitional time were these artificial intelligence-companies take up more and more space, and they all sort of fight to become the firm which will own the marked, so it's quite important what we choose as artists, because it is to a large extent us they are dependent upon to legitimize their technologies and their business models."

As AIs provide new visual possibilities, Dryhurst speaks to how the way to generate images in many of these programs is to give the generator textual prompts in which you describe what you want to see appear (Domanick & Friedlander, 2022). This differs from the work of Smith with the neural network, where she trained the algorithm herself by feeding it images, which then created outputs. With image-generating software such as Dall-e, Midjourney and Stable Diffusion, the internet has been trawled for enormous amounts of images with metadata to create the most precise image possible based on the prompt. What arises here is, in a way, a new artistic medium, the prompt, which must be written as precisely as possible to generate the wanted imagery. This "sculpting" of text requires training, as well as a knowledge of the workings of the image-generation system, and how it responds to certain kinds of text. One might say, in these instances, that the artistic skill of image-making, when compared to traditional fine arts, has moved from the physical creation of images to artists having to develop intricate textual skills in relation to the software. This is what Dryhurst might refer to when he says that these tools "changes our understanding of what being really good means" (Domanick & Friedlander, 2022); that the qualitative decision upon artistic skill moves from one area of artmaking to another. He speaks further on prompts and their potential:

"Prompts themselves, I think, will be an aspect, fundamentally connecting the way in which we fluidly tend to express ourselves, which tends to be through language oftentimes, with the ability to generate something for people to look at or experience or watch or whatever, and we're gonna see more of that." (Domanick & Friedlander, 2022, 1:02:59)

Dryhurst addresses that even though the advent of new digital technologies requires artists to learn new digital tools, what will actually be a continuous thread in artistic creation beyond digital transformation, is the artistic ingenuity which will harness new tools to artists own unique advantage (Domanick & Friedlander, 2022). One can see this reflex throughout modern art history, as artists, when they feel a medium becomes too effortless, or the outcome too predictable, rather explore the inherent limitations in a medium to create more surprising works. Anne speaks to this disruptive and idiosyncratic potential inherent in the creation of prompts when artists play with the potentialities of the generation software as co-creator:

Recently I saw that there was someone who had made a prompt for Midjourney, which is on a Discord-server where you can see others prompts, and it was like, gibberish, which was just really cool, but what happens if you could make it make gibberish, what will it come up with, that kind of thing I think could be really exciting, and I'm also really excited to see, the graphic artists who can start using it as a tool, what they come up with. (author's trans.)

But as Dryhurst further states, to allow for artistic innovation, it requires artists familiarization with these tools; knowledge that can be hard to come by, as it requires the support from a community or personal ability to develop the technical skills required:

"[…] so that's why I'm not scared and more excited. The challenge more is just like, to get people on board and familiar with the concepts, and get tools in their hands so they can start breaking them and start experimenting with all the different shit you can do with them, and trust me, you can do so much more with this, than you can do with an analogue sampler." (Domanick & Friedlander, 2022, 56:41)

Relational skills and capabilities

For many in the creative field, the social, political, and imaginative potentialities of art, developed through and around communities, are the driving force behind their practices; these mutual dependencies and solidarity within artistic scenes forming the basis of much creative work (Alacovska, 2019; Alacovska & Bissonnette, 2021) that has now been transformed into a veritable type of 'relational work' requiring a careful enmeshment of professional and personal connections (Alacovska, Bucher and Fieseler, 2022). Following the organizational turn in contemporary art, many artists also center their work around relational organizing, or develop organizing strategies around artistic works in turn (Holm & Beyes, 2022). Artistic organizations can be seen as entrepreneurial and have both aesthetic and political dimensions, as new aesthetic forms can generate new imaginaries and experiences of organizing (Holm & Beyes, 2022). For many digital artists, communities are online based, where they develop digital affectual networks of care and artistic production. Such relational contexts are vital for creative workers, as they uphold career sustainability IRL and online, usually being informally governed, interconnected spaces between markets and non-markets (Alacovska, 2018).

Collective tools and shared knowledge are the basis for much of digital art production, and the development of artistic technological tools are usually happening beyond the confines of fine art worlds (Susik, 2020), making them hard to acquire in traditional settings such as art schools. Developing skills in collaboration happens both formally and informally in artist-tech spaces, blurring the line between hard technical skills and soft social or artistic skills (Andersen et al. forthcoming). Artist Dan spoke on this, when he states the need for collaboratively built and experimental spaces to be safe and good learning environments. Artist Josie highlighted how developing and practicing other artists' tools and methodologies is key when dealing with digital technologies, and when creating an inclusive digital era for artists. Josie also spoke on how artistic communities having tools and technologies for imagination make them generators for other models for what success can look like outside new liberal capitalist frameworks: "I

think there's something profoundly reassuring when people come together to basically share space and time together to think and unpack not only their relations to themselves but to the world." Artists can forefront social transformation and new imaginaries through new aesthetic and organizational forms, in ways that these new forms redistribute and express what is deemed possible (Holm & Beyes, 2022). Protecting and uplifting other artists through developing hopeful mutual dependencies can be seen as a logic of care underpinning creative work, one which helps combat precarization and alienation (Alacovska, 2019; Alacovska & Bissonnette, 2021).

In the context of digital art, artist communities can also be spaces to develop and practice criticism (Alacovska et al., 2023). In some way becoming embedded with power structures underpinning digital technologies, artists face uneasy territory as they engage with them. Artist Jaden, calls for extended critical interrogation of digital tools within the arts, and speaks about communities as the starting point to extend and develop this criticism:

"[…] it's been so difficult to find artists that are not only using digital tools but also questioning at the same time, but at the same time working in an embedded practice, you know. So, we have many, many tons of artists in the field of social practices, others that are starting to use and question these digital issues, but we are still struggling to find the meeting point, right? So going to a community or being part of a community and starting to question these things […]"

Jaden is explicit about not hierarchizing collective practices over other, but rather highlights how artistic practices are inherently embedded within society and thereby has the potential to contribute positively to it, especially as respondents of changing and emergent culture:

"Artists are responding to the times as always artists have done, they have been responding to the time and being contemporary today. I think it's a lot about taking care of society. It seems society as your element to work with. So, that implies to be engaged to be embedded, to feel yourself as part of something that you are part of society and as an artist, you can well, if you want, you can contribute to this society in a different way."

This speaks to what artist Stella describes as the most important skills artists need, which is "perseverance and adaptability and human skills". Agnes also touches upon how relational skills are vital to gather funding, which might oppose reclusiveness for artists working alone:

"[…] But social relationship, unfortunately, meaning not the nice aspects of it, but the PR of it. Meaning, okay, I need funds. I'm enough brave to go and ask them. Ask someone to engage. So, the engagement of the political situation in which you can find yourself or the local art community in terms of resources, I'm not really good. I'm a solo animal, so I'd rather stay in my studio for hours and days and months and then I – "Oh, yeah, I should have asked this" […]"

Managing relations on the blockchain

Apart from blockchain technology's potential for expanding digital art practices, and monetization of works, which we will return to, blockchain technology also has community building potential. For instance, as NFT-trades are decentralized and disconnected from traditional art institutions, trading and communication happens within online space on various platforms. The NFT space is a heterogenous community, or as photographer Dave Krugman described it an interview with Rolling Stone Magazine, a "mycelium - the interconnected fungus network that

forms a community in the way tree roots interconnect with each other" (Dvoskin, 2022). Within these networked groups, communities are founded for artists to sell, buy, and collaborate on each other's work. Anne highlights the communal aspects of the NFT space, in which she has created connections both with other artists and patrons of her work:

"So what I've experienced with generative art and the NFT-space is that, especially on the blockchain, that there's a great community, and the people who actually buy my art, that they're really nice, and they write nice things about my art and stuff like that. The relationship I get to the people who buy my art is really cool, and you can get that with digital technologies which is a bit difficult otherwise, in the analogue space. (author's trans.)"

A way for artists to structure collaborations through blockchain is by creating DAOs, or decentralized autonomous organizations; forms of internet-based organizations in which people can coordinate their work (Catlow & Rafferty, 2022). DAOs are collectively owned and member-managed, usually through voting systems, and can have built in treasuries accessible through the approval from the group, creating radical forms of artistic grassroots organizing online (Catlow & Rafferty, 2022). Researcher Nathan Schneider writes that DAOs resemble and are built on the organizational principle of friendship, relationships which for artists usually already are a preconceived structure in which their work to be developed and received (Catlow & Rafferty, 2022). DAOs can therefore be seen as a way of technologically formalizing artistic translocal friendships and network structures for collaboration and collectivity, creating "resilient and mutable systems for scale-free interdependence and mutual aid." (Catlow & Rafferty, 2022: 27). Herndon is a public champion of DAOs potential, and although these organizations can also develop as platforms for monetization, what she states in the interview with Foundation, is that what she is most excited about with the technology was the collaboration angle (Howard, 2021). Herndon addresses how DAO-infrastructures have implications for real-world relationships and real-world art making, creating community spaces for radical change (Howard, 2021), resonating with Adam, who stated how digital commons can be a site for making change in the offline world.

Doing relational labour on digital platforms

As mentioned, skill and competence-building in the digital art field comes to a large extent from artistic communities themselves, who engage in networked knowledge exchange and collaborative learning practices, often online. Digital community spaces might be crucial for artists to develop their practices, as technical artistic knowledge in many cases is not available through other channels. Such global digital artist communities develop and exist to a large extent on platforms such as Instagram, Twitter, Discord and Telegram, making social media use and presence vital in upholding and expanding artistic practice, especially within the digital arts field, where analogue communities are scarce. Adam addresses how the flourishing of different platforms, especially post-pandemic, has led to the possibility of bringing more work-formats online:

"We're in an interesting moment where, there was this force to use things like, Zoom […] and conference calls, and distance kind of technologies to bring people together. We found interesting ways of working with, whether it was like creating virtual studios using Pendle or whether it is using the breakout rooms in Zoom in a sort of way that they weren't intended."

The platformization of online life, permeating the social as well constructing new value regimes and economies (Dijck et al., 2018), has had deep effects upon artistic production and reception. Adopted at large by artists, social media platforms are used to communicate and spread work, as well as develop online networks between artists themselves. Being heavily reliant upon platforms for community-building, can be a double-edged sword, as it exposes artists to oppression by computational systems (Wiehn, 2022). Reliance upon platforms creates intimacy between user and platform algorithms, becoming space in which power exerts itself (Wiehn, 2022). This is shown for instance in clashes of value interest which frequent on platforms, as users trade in personal data, feeding their governing companies (Dijck et al., 2018). Users, and especially precarious artists, manage complicated territory in terms of data ownership, standardization of content, and censorship, as mentioned. Artist Anne describes her ambivalent relationship with Instagram as a platform, where the relational and communicative aspect trumps her hesitations:

"I find myself struggling with making things look neat, to make formats fit and make sure that photo-sizes, and video-sizes, are the right ones and stuff like that. It is not a platform I feel particularly free on, I feel more that I'm in Instagram because it's a good idea and that I can reach some people who I otherwise wouldn't reach, so I can give people a place to find me, which isn't my website, because websites don't really work as well as they used to, or it's not really something people use. (author's trans.)"

Paradoxically, heightened connectivity because of social media platforms does not necessarily leads to collectivity (Dijck et al., 2018). One reason for this might be, that as social media platforms are connected to individuals' personal identity, the platform ecosystems has heightened individualized economies in which artists become personal brands. Developing new artistic organizational forms, although reliant on platforms, can be seen as pragmatic and hopeful ways of counteracting fictions of individuality which serves neoliberal means (Catlow & Rafferty, 2022). Dan also speaks to how connectivity through platforms are practical and vital means in which he can work with other artists globally:

"Because if, for example, if we are confused in work, we are in different places, how do we communicate? We have a WhatsApp group and we have MIGO and beside those tools we begin to plan projects because it would be more difficult otherwise, of course sometimes I invite them to the house then we gather in a week together and is that also very important? Then I think that digital tools bring many good things to develop projects of this type, right? To create communities, networks in different places like what I told you, I mean, for me it is very important in my practice […], it's like creating a network to strengthen and join other networks that are dealing with some problems that are very concrete and of large scale, right?"

Adam points out, that emergent technologies also create online spaces for connectivity and care beyond conventional 2D formats of social media, extending notions of public space:

"[…] someone who has an interesting collective called Conjunction who are kind of using a sort of VR space as a kind of space for their collective to hang out in, and start to think about ways of sharing knowledge, and kind of caring for each other in this virtual space. I think there are going to be people in this embedded arts practice residency, and lab that are kind of thinking about social media, but also kind of virtual spaces as public space that could be disrupted."

Business models development skills

Although there is no unified definition of the term 'business model', common to most usages is that it is a description of how a business enterprise makes money and how the business sustains itself in the face of competition (Petrovic et al., 2012). Applied to the visual arts, and digital artists in particular, business models can be a problematic concept. Over time most artists will need to generate a sustainable income from their practice to warrant or permit artistic activity. At the same time, numerous studies have documented artists denial of the economy (Abbing, 2002; Velthuis, 2005) even if only in rhetoric (Velthuis, 2005). Artist May reflects on this, at times harmful, denial of the question of economy for artists:

"I actually usually would suggest, especially for artists that are starting out, take care of yourself. At the end of the day, you need to have a place to live, you need to eat food. I'm so against the starving artist narrative, I think that's so harmful and hurtful to many beginning artists. The way to do it is just like I said with making artwork, if you have a goal which is to be a self-made artist and to be using that as your primary method of making money, there are many steps along the way to accomplishing that."

As mentioned, studies of artistic labour also find artists are motivated by a range of economic and non-economic factors and so their choices typically do not strictly align with profit maximizing behaviour (Throsby, 2010). Adding to the complexity of applying business models to artistic activity, the choice of business models reflects a range of economic and sociological incentives, logics, and norms. So artist business models not only reflect different approaches to value creation, but they also reflect different logics of economic, social, and cultural consecration across sub-fields of art (Bourdieu, 1993). For actors positioned in the subfield of 'large-scale production', immediate commercial success is sought by actors and recognized by colleagues, and so this logic will be reflected in the business models employed. In the subfield of 'restricted production', immediate success would be understood as suspect by its actors. Bourdieu (1996) characterizes the devotion is expected and celebrated in the subfield of restricted production as 'Christ-like' - you are expected to sacrifice yourself in the first stage of your career if you are to become a saint in the next. For younger artists in the subfield of restricted production, business models typically take a longer-term view towards the realization of economic value creation for the artist, emphasize creation of both cultural and economic value creation.

Despite these complexities, there are a range of logics artists follow to sustain their practice, so the studying these logics through the lens of business models offers insight into the impact of digital technologies on the ways artists work and are recompensed and whether technology is making it any easier to work as a professional artist.

Conventional definitions of business models emphasize the value created for the company and its customers, and the key processes and activities that make this possible (Freudenreich et al., 2020). Illustrative of this approach, Johnson, Christensen, and Kagermann (2008) propose business models consist of four interlocking elements relating to the creation and delivery of value that occurs between business and customer: i) a description of the 'customer value proposition' or the solution to the customer's problem; ii) a 'profit formula' which describes how the company makes money for itself or its shareholders while delivering value for customers; 3) 'key resources' or assets which enable creation and deliver of the value proposition to customers;

and 4) key processes that allow the business to successfully repeat and scale the delivery of its value proposition. Conventional business models typically conceptualize value creation as unidirectional (Freudenreich et al., 2020), with some stakeholders contributing to value creation while other stakeholders (e.g. customers) benefiting from the value created.

In addition to convention definitions of a business model are 'thicker' definitions such as sustainability-oriented business models. Here, the concept of value creation includes other non-economic values such as ecological and social value (Freudenreich et al., 2020). In the context of the visual arts, we might also add cultural value. By broadening the concept of value, sustainability oriented-business models place greater weight on a range of stakeholder groups beyond the focal business and customer groups. Within sustainability-oriented business models, value creation can be understood as breaking from a unidirectional concept to something created both with and for individual stakeholder groups (Freudenreich et al., 2020).

Depending on the question raised, both conventional and sustainability-oriented business models can be of relevance. If we are interested in knowing the logics by which artists working with digital technologies can sustain themselves by making money, conventional business models may suffice. If we are interested in exploring the logics by which artists working with digital technologies can sustainably creating economic and non-economic value, then application sustainability-oriented business model methodologies will be more fruitful.

Digital art and the problem of value capture

As most introductory microeconomic textbooks will affirm, scarcity is a fundamental concept to the realization of economic value. Particularly true for the visual arts where there is often great uncertainty around value concepts, scarcity has been a critical 'tool' for creating economic value. Illustrating this point, artists working with duplicative media (photography, lithography, woodcuts, casts, etc.) typically destroy plates at the end of a strictly limited run to limit over-production. In this context, the non-commodity quality of digital art - endlessly reproducible, infinite in supply, floating across platforms unrestricted by ownership claims (Reckwitz, 2020) - has historically struggled to generate meaningful scarcity. Established artists have sought to impose scarcity on their otherwise effortlessly reproducible product though collector-oriented packaging of DVDs, artist signed certificates of authenticity, and other analogue means. With the exception of an elite group of artists with the brand and resources to protect it, we have seen digital art's price-value hovering around zero (Menger, 2014). To summarize using business model terminology, a fundamental challenge for digital art has been its inability to offer a meaningful 'customer value proposition'.

A second value-related problem is that digital art has historically faced significant conservation challenges, and this has in turn undermined digital art's market value. Particularly true of digital art produced for online display (i.e. net art), the qualities of site specificity coupled with the ephemeral nature of online architectures and communities contributes to the perception that digital art has a transient nature (Haynes, 2021). While net art is often documented, the record removes the work from its original active state and its time-based medium and is therefore is only ever a 'shadow' of the original. Problems of conversion are not limited to net art. File formats and the hardware running it can be rendered obsolete, and even if file conversion

methods can be used, the integrity of the 'original' is then threatened. A case in point is Cory Arcangel's *Super Mario Clouds* (2003), a video game-based installation that modifies Nintendo's Super Mario Bros. from 1985 so that the installation monitor only shows white clouds passing through a blue-sky background. While there is a free version of the artwork on the internet, the installation version of the artwork consists of both the artists code as well as the hardware (modified Nintendo game cartridge, Nintendo console and monitor). In preserving the integrity of the original, there is longer term risk of hardware failure and irreplaceability (Magnin, 2015). Conservational challenges associated with digital art have then undermined 'customer value proposition' by implying that either the collector won't be buying the 'original' or that there's a high risk an original will be unusable in the future.

Digital business models in the digital arts

While not exhaustive, the following are brief descriptions of important established and emerging digital business models in the digital arts, mostly in the form of digital painting, digital sculpture and 3D animation. These business models reflect a spectrum that runs from traditional analogue artworks that are disseminated and sold online through to assetized cryptoart. In presenting these business models we aim to provide insight into how digital technologies are changing the business logic of the visual arts and how newer business models are changing the prerequisite skills and capabilities of contemporary artists.

i. Online 'commodity sales'

Online 'commodity sales' disintermediates the traditional business model of selling artwork via a physical gallery or dealer. In this business model, artworks are sold on an artist's own website, a third-party platform, or on a gallery or auction website where perspective buys lack proximity to the work and the gallerist/dealer. We describe this business model as involving commodity sale as the artwork and its ownership is typically transacted as a single unit, albeit a typically 'unique' one.

For artists positioned towards the pole of large-scale production, online tools have the potential to improve the economic returns to artist through disintermediation where gallery representation is unavailable (Arora & Vermeylen, 2013; Hansson, 2015; Samdanis, 2016). This may particularly bolster the prospects for groups traditionally marginalized by an art machine that has historically favored the white male artist, through lower commissions (Tully, 2013), access to wider audiences (Hansson, 2015), and lower geographic restrictions to building artist networks and collaborative practices (Budge, 2013). From the perspective of customers, online dissemination and sales presents a customer value proposition through potentially lower prices, direct access to artists, avoiding the intimidation of dealing with galleries, greater pricing transparency, and ease of transaction (Booth and Røyseng, 2022).

ii. Self-commodification employing digital tools

In this business model, creative workers typically generate insufficient economic returns to sustain their practice using a conventional definitions of business models, and particularly so for actors positioned in the subfield of 'large-scale production'. However, in line with the broader definition of value creation recognized by sustainability-oriented business models, and where artists adopt the logic of Bourdieu's 'Christ mystic', artists perform unpaid and precarious work in exchange for either the intrinsic rewards of doing 'self-expressive' artistic work or the promise of hitting the future jackpot of fame and bounty (Hesmondhalgh & Baker, 2010; McRobbie, 2014; Mears, 2015; Ursell, 2000). As business model, artists use digital tools to primarily disseminate, but also sometimes sell, their arts practice. Social media platforms are of particular use to artist employing this business model. 'Customers' of this business model are better conceived of audiences, who are potential collectors, sometimes actual customers, and other artists and industry insiders. In the absence of regular economic returns from sales, artists subsidies are an important lifeline where available. With most artists overestimating their abilities through "individual erroneous expectations" (Menger, 1999, p. 570), and hence overestimating their future financial returns, this business model is an unsustainable one for most artists.

Although not necessarily directly creating sales, self-commodification by artists, usually employing social media platforms has for many become an inescapable strategy for communication of their work. As many gallerists and curators rely heavily on platforms such as Instagram to scout artists, social media presence can be necessary for artists to create opportunities for economic gain in the future. Artist Irene addresses the ambivalent nature of artists being reliant on platforms:

"For example, in the sense of social media, I know you buy into that. You become a part of it. And I think most of the people who work with are very critical of that, but it remains on the other hand, a really great tool to share and to connect. […] And I think that dialectic is something that comes up again and again. We'll say, 'Okay, we want to connect and we want to show, but what if we don't want to do it here?' There is no other medium. So I think it's nearly a political question, not because you're confronted with a monopoly. And here, I must say, at least for now, the guys we work with, I haven't found a solution, but I think maybe because there isn't, unless there's another platform there's no escaping. I mean, then we always use the same place."

On the other hand, social media can help artists who are not usually recognized by the traditional artworld to find audiences and gain support from the grassroots. Artists can even source continuous economic support through audiences built on platforms, through websites like Patreon, where fans give monthly donations usually in return for exclusive content, which can make many artists and creative workers less reliant upon income from sales or external funding.

iii. Digitally enhanced economization of subjectivity

Digitally enhanced economization of subjectivity can be understood as a business model that combines logics from online and offline 'commodity sales' with 'self-commodification employing digital tools'. In addition to the arts commodity, the 'authentic creative self' is managed—self-promoted and self-branded—'as a business' (Gandini, 2016; Scharff, 2016: 111). While processes of commodifying a combination of art and self is far from a new business model (e.g. Pablo Picasso, Salvador Dali, Joseph Beuys, Tracey Emin, etc.), they have proliferated and become more entrenched in the digital platform-based creative economy (Duffy, 2017; Qu et al., 2021). Placing this business model in context, scholars have theorized the 'commodification of the self', the 'commodification of femininity' and the 'commodification of domesticity' as processes entailing an aspirational, yet onerous, conversion of workers' 'authentic artistic' selves into sellable digital commodities (Duffy and Hund, 2019; Luckman, 2013). From the customer perspective, the value proposition is enhanced by a deeper and 'live' artist narrative, warts and all, that informs the work and adds to the conversation generate by the package. From an artist's perspective, higher sales are offset by higher costs of 'doing art' and corresponding compromises to artistic freedom. These higher costs include the arduous management of self-branding and the ceaseless demands of administering commercial partnerships and the 'monetization' of audience attention in algorithmic, advertisement-driven commodification processes (Arrigada and Bishop, 2021; Siciliano, 2021).

The communication of, and thereby commodification of, the authentic personal self is a prolific tactic in the social media space deployed by bloggers and influencers. These tactics often depend on creating feelings of intimacy and authenticity with viewers through dynamic and prolific visual content, which easily lends itself to the communication of brands and products (Lee et al., 2022). Artists can create social media bases for selling their work by adopting such influencer tactics and develop a strong personal brand. An artist who has been successful in this regard is the Danish ceramicist Klara Lilja, who has over 20 000 followers on Instagram. Although also posting images of her work to her feed, Lilja communicates most ardently with her followers through her stories, in which she almost daily posts lengthy stories documenting life in her studio, the process of creating works, and other everyday activities, as well as diving into wormholes of her own interest not directly relating to her artistic practice, such as videogames and manga, or topics such as motherhood and personal economy. Still selling her work through a conventional gallery, which she directs her followers to, Lilja utilize influencer tactics of creating a feeling of intimacy through her followers being able to follow her closely in her every day to create a base of buyers through social media. By developing a strong personal brand on social media, which then becomes connected to her work, buyers feel greater incentive to buy artwork from her than artists they have less familiarity with, as with other influencers, which intimacy and feeling of authenticity is utilized by brands (Lee et al., 2022).

iv. NFTs and blockchain technologies coupled with 'smart contracts'

As a solution to digital arts' scarcity related value problem (discussed above), NFTs use blockchain technologies to create a scarcity in the form of tradable rights providing documentation of legal ownership, access to and metadata covering digital art files (images, sounds, video, etc.) which might be otherwise often freely viewable and sharable on the internet. Responding to digital arts' second value-related problem, conservation of digital art, on-chain storage (i.e. the image and all its metadata exist on a blockchain) is consider the gold standard for ensuring longer-term availability and integrity (Balduf et al., 2022). Given the high cost of on-chain storage, NFT data is typically stored on the InterPlanetary File System (IPFS), a distributed peer-to-peer network whereby files are stored across multiple nodes, making them resistant to single points of failure such as server issues. While decentralized storage systems such as IPFS can have varying properties with regards to integrity and availability (Balduf et al., 2022), this digital art storage system provides a reasonably high level of conservation assurance of digital art for perspective buyers.

Resolution of digital art's value problems, as described, has a clear impact on digital arts' customer value proposition. But these elements alone are not sufficient to make digital art, as NFTs, a more compelling value proposition that analogue art forms which are by their nature less susceptible to these value problems. Thus, the attraction of digital art as NFTs as artistic business model must lie elsewhere.

From a customer value perspective, NFTs offer an unparalleled level of liquidity, the ability to convert the commodity into crypto-currency and subsequently traditional currency, compared to traditional art forms. Reflecting both the market's liquidity and low transaction costs, the average holding period for NFTs was 47 days in the second quarter of 2022 (Nonfungible.com, 2022). In comparison, the average holding period for western painting is around 10 years, and 3 years for Chinese painting and calligraphy (Zou et al., 2021). While factors other than liquidity impact the holding period of art, we can nevertheless say that NFTs offer, on average, improved market liquidity and price discovery (Mazur, 2021) compared to traditional art forms. NFT art also carries new risks, or at least sheds light on risks that were less observable in the traditional art market, which diminish the business model's customer value proposition. Improved transparency and price discovering, coupled with the democratization of who can mint NFTs, has art NFTs a particularly volatile market (Zou et al., 2021). According to basic financial theory, as captured by the Capital Asset Pricing Model, risk-averse investors (speculators) will choose assets that maximize their expected return subject to their risk tolerance. As a riskier instrument, buyers will demand higher expected returns to compensate for the risk of buying an NFT. With their current price volatility, this places a significant burden on NFTs to perform. Traditional artworks as investment object also carry significant risk, but the customer value proposition is arguably balanced by the aesthetic return of having the object to display (Spaenjers et al., 2015). With many NFT artworks freely available, the aesthetic compensation from NFT ownership is more questionable.

While NFTs can be argued to offer a customer value proposition that responds to the needs of a particular type of art buyer, the NFT business model is significantly more persuasive from

an artist's perspective. A critical feature of NFTs, thus far not discussed, is that they typically incorporate a 'smart' royalty sharing contract. Experimentation with intellectual property regimes which enable artists to benefit from future rises in the price of artworks predates NFT art. But for non-NFT art, sharing profits or resale royalties from visual artworks has proven cumbersome to realize in practice (Van Haaften-Schick and Whitaker, 2022), with artists working primarily in the medium of digital technologies being especially disadvantaged (Lotti, 2016; Whitaker, 2019; Abbate et al., 2022). Within the traditional art world, resale royalties were rarely paid, given high transaction costs and onerous logistical management, denying artists access to a fundamental funding mechanism (van Haaften-Schick and Whitaker, 2022). NFTs, through blockchain technologies, automates royalty management and payment upon resale. Stella points out how this is making blockchain an important tool for artists to regain economic agency and ownership over own work:

"[…] I think blockchain is important for is that it's really, usually blockchain technology cuts the middleman because -- so, cuts the intermediary, meaning that it will cut the galleries. It will cut the art handler. It will cut the art dealer. It will cut all of a series of people that taking a fee every time they are selling your work, and this is like giving complete control and power over your own assets and on your own artwork."

Stella also explains how the technology has a logistic advantage, as records of sales, authentications and so on are registered and kept automatically, payments and fees distributed automatically, relieving the artist's burden.

The coupling of digital art with smart contracts for royalty sharing changes the nature of the digital art good from 'commodity' to 'asset'. According to Birch and Muniesa (2020), the defining feature of commodities is that their economic value is determined at the specific point of exchange. Such is the case for most art in that economic value is revealed upon sale in galleries, art fairs, auctions and so on. Assets can also have their economic value determined at points of exchange, but they also differ from commodities in that they represent some ownable and tradable 'thing' that produces a revenue stream. Assets are not necessarily created or held for immediate or deferred market sales or market-positioning – as is the case for commodities - but for the durable extraction of future economic rent (Birch and Muniesa, 2020; Boltanski and Esquerre, 2020). Through the minting (publishing) of digital art as NFTs, artists enact a process of "turning things into assets" (Birch & Muniesa, 2020, p. 4), a process otherwise known as 'assetization'.

Amid the euphoria of the NFT market in 2020 and 2021, this business model offers a narrative of salvation for many previously struggling artists, a phenomenon Alacovska et al. (forthcoming) more critically describe as 'fictional expectations' of enduring economic viability and personal enrichment. Irene is critical about the widespread adaptation of NFTs, as she does not see the revolutionary potential in the furthered assetization of art, as well as pointing to how the saturated market has resulted in only a few actors making lots of money, mirroring the conventional artworld, instead of creating the revolutionary break the technology claims to. Digital artist Per, on the other hand, eloquently illustrates the expectation of personal and economic gain, fictional or not:

“One should be very far-seeing in the NFT space. The future value of crypto will increase over time. … A draught or tsunami may come to destroy it, but a seed will grow. So if I plant a seed today it will sprout. Then the first harvest will be meagre, the following one dismal. But one has to keep at it—watering, weeding, shading—and soon enough a good crop will materialize.”

Another artist, Nacho Frades, echoes this sentiment, as he describes the way to be successful in this new world is to “play the long game”; being patient and keep doing high quality works to impress a market that is gradually turning more demanding to satisfy (Alacovska et al., forthcoming).

As a genre of art that is both strongly associated with commercialization and where there has been greater democratisation of who feels welcome to make and buy art (Xu, 2022), the NFT business model - its logics and actors - aligns with the sub-field of large-scale production. The development of relationships between artists and buyers through the NFT-space seem to enhance personal and social reward for artists and buyers. In the conventional artworld, purchases are usually mediated by galleries or institutions, and in many instances happen through a more hierarchical structure, with institutions and buyers holding a higher position than the artist. In the NFT-space, buyers are to a larger extent mutuals within the same community. While visual artists have always treated the exchange of artworks among peers as both a shrewd strategy of securing future financial dividends and an incentive to enhance community by fostering a fellow artist’s stature and the success of peers, blockchain technologies have brought this community practice to the next level.

At the same time, it is a still immature market and there are signs that NFT’s democratizing promises may have been overstated. Commenting on a more sober NFT market in 2022, artist and gallerist Grace Blake notes (quoted in Xu, 2022), “No-one is going to buy NFTs unless they are marketed quite heavily and put in front of cultivated audiences”. The expectation of marketing sophistication also follows sales, with expectations of self-branding and self-promotion now explicitly enforced by crypto investors/collectors (Abbate et al., 2022) who not unlike major shareholders exert significant influence over digital artists.

v. Political and community oriented NFT business model

In their study of digital artists expectations and attitudes towards engagement with NFT markets, Alacovska et al. (forthcoming) observe that artists view their engagement in NFT art not solely as an individualistic enterprise but also as a contribution to, and membership of, a special kind of community. In other words, artists working in the NFT sphere often take the broader view of value creation typical of a sustainability-oriented business model. We have seen how DAOs can be an example of this kind of model. The creation of three non-economic values are of particular importance to artists working with NFTs. Firstly, and strongly tied to narratives to longer-term extraction of rents for NFTs as ‘assets’, is cultural value. Quite different to the notion of seeking quick profits by minting whatever is currently ‘hot’, more professional artists understand that economic returns are inseparable from cultural recognition. This is articulated by Thomas, an artist working with NFTs:

"Although I didn't come early to this space, I still believe it is the early days of NFT art and one has to hustle to make it. … It is in a way a legacy you can leave, an estate for your kids…Your career grows and your proceeds from resale grow as well. That is pretty amazing. It gives me a reason to perpetually grow my career."

The creation of values loosely connected to emancipation is also prioritized by artists working with NFTs. Merging ideas that range from the promise of financial and participatory benefits for formerly disenfranchised and marginalized black artists, to blockchain's promise of decentralized and pseudonymous finance and the prospect of 'a new artistic world emerging' from the establishment of an alternative currency system, artists allude to the collective social rewards from engagement with NFTs. Ina, another artist working with NFTs, captures this perceived 'payoff':

"NFTs are the most powerful gateway to a community. When we talk about NFTs people get really excited. NFTs are going to be the way the vast majority of people enter into what is called Web 3.0. We are building new economies not governed by countries but by people who share common values all over the world, who are living in situations where they do not have much control over their lives or daily economies and do not have opportunities to reach larger markets."

A third value prioritized by artists working with a 'political and community oriented NFT business model' can be termed the 'wellbeing of the artist community'. As a mechanism for creating this value, economic value created though NFTs can be a means for mutual aid and resource redistribution within artist communities. The importance of this less individualistically centred value is strongly connected to the technoeconomic imaginaries of blockchain as a counter-financialization mechanism. The actions of artist Laura illustrates an artist business model that derives value from the creation of both economic and social values:

"It is very difficult to see your own work as a speculative asset. Yet, the sales give us the means to live, and then also perhaps help others. It's true that without selling the artworks you wouldn't survive. … Then you become aware of how many people have helped you in your career by buying your NFTs and then you get the urge to share the profits. So the higher the price of your NFTs the more you can help other artists."

By employing a 'political and community oriented NFT business model', artists must still offer a plausible and competitive customer value proposition. Issues relating to this remain largely this same as was discussed in the 'NFTs and blockchain technologies coupled with 'smart contracts'' business model. What's different about the 'political and community oriented NFT business model' is the comparative importance of other stakeholders beyond the focal business and customers. In this business model, artists work in collaboration to shore up the emancipatory values associated with the NFT market. More successful artists working with NFTs seeks to create value for other artists by, for example, investing in their work or giving them and their work visibility. Others take a more traditional view of social responsibility, donating some of the proceeds from sales or royalties to charities.

Conclusion

The exponential development of digital technologies requires artists adopting skillsets and capabilities to utilize new digital tools and respond to a changing societal and market landscapes. The artists mentioned has, through personal work and communities, developed capabilities to use digital technologies either as tools in the creative process, or as whole frameworks for a new understanding of art.

Adopting digital tools in their practice might be outside the comfort zone of many traditionally trained artists, but also afford new possibilities for creation, exploration, and audience reach. Working with creative coding and generative art, as well as with machine learning technologies, artists can benefit from the expressive potential of randomizing and synthesizing features. This requires learning coding languages, or in the case with machine learning, becoming familiar with the computer's vision based on prolonged exchange with the machine. The widespread use of AIs has opened a new territory for artists to explore, especially regarding prompts having surfaced as a new artistic medium for artists to learn and develop.

Blockchain technologies such as NFTs and DAOs has furthered the possibility for online collectivity for artists, creating spaces for organizing and financial mutual aid. While being a contested territory, the NFT-boom has led to the market for digital art expanding rapidly, which again has resulted in many digital artists being able to monetize their work to an extent that was impossible before. Many artists also migrate their work to NFTs in order to experience greater autonomy, building on ideals of self-ownership.

Platformization of online activity has transformed the artworld, as artists have become heavily dependent on social media to communicate and sell their work. Successful use requires artists to become familiar with platforms' restrictions and algorithmic bias, to communicate and present their work in the best possible way. This can imply artists adopting means of self-branding and self-commodification, with the thought of reaching large audiences in mind. Platforms also expand the possibility for translocal artists communities to develop, which can create spaces for furthered collaboration, knowledge-sharing, and building of sustainable bases for mutual aid.

The cited artists are all working in the diverse field of digital arts and have touched upon which technical skills and capabilities they use and need in their work. In general, they have also reflected on ways of developing sustainable practices within community of other artists in a rapidly changing digital landscape.

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