

# the byzantine generals problem

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distant.gallery  
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featuring works by

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Ben Grosser  
Constant Dullaart  
DIS  
FaceOrFactory  
Kyle McDonald  
LaTurbo Avedon  
Moxie Marlinspike  
Nascent  
Rhea Myers  
Sarah Friend  
Sarah Meyohas  
Simon Denny, Guile Twardowski, Cosmographia  
Sterling Crispin  
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AKSIOMA

# THE BYZANTINE GENERALS PROBLEM

Domenico Quaranta

During the last few decades, the future as a dimension to project our hopes and dreams onto has gradually disappeared from our horizons. Our ability to imagine a time beyond the present has been progressively eroded by a series of historical events, apocalyptic angst and realisations: the feeling, exacerbated by the 2008 financial crisis, that there is no alternative to capitalism, to the point that we cannot imagine it ending;<sup>1</sup> the futuristic promise of the digital revolution being reduced to the banality of a daily routine infested with notifications, a “distracted present” that stops us from looking beyond the next five seconds;<sup>2</sup> the disillusionment produced by Edward Snowden’s revelations, which put an end to the revolutionary, emancipatory vision of the network society, now a cramped panopticon with no escape routes; and of course the environmental collapse generated by global warming, which has turned the future into a series of points of no return we scramble to adapt to, “staying with the trouble”<sup>3</sup>, as it were. The future has failed us, and while our planet is burning up, it has

- 1 Fisher, M. (2009). *Capitalist Realism: Is There No Alternative?* Zero Books.
- 2 Rushkoff, D. (2013). *Present Shock: When Everything Happens Now*. Penguin.
- 3 Haraway, D. (2016). *Staying with the Trouble: Making Kin in the Chthulucene*. Duke University Press.

become something to “demand” and “invent”,<sup>4</sup> as the accelerationists would have it.

While this negative view of the future was developing and taking root, a new, positive vision was gradually forming around an emerging technology, born out of this digital unease: the blockchain. Conceived in 2008 by the pseudonymous Satoshi Nakamoto as a way to bypass and ultimately destroy the banking system, the blockchain is a distributed ledger protected by cryptography, a completely automated exchange platform which is tamper-proof by design. Initially designed as a platform to generate and circulate digital currencies, it has become the foundation of a new vision of the Web – the so-called Web3 – and our future society.

The blockchain relies heavily on the same “planetary scale computation” that is the cornerstone of Platform Capitalism, which is based on gathering and exploiting users’ personal data,<sup>5</sup> and it’s the outcome of the same techno-utopianism that shaped the current technologies, according to which there is a technological solution for all problems. Yet it embodies a vision that is completely different from the one that shaped our current environment, and it aspires to make changes that will affect all aspects of our lives: from economics to politics, from social relationships to the production and dissemination of culture. Crypto evangelists tout an optimistic vision

4 Berardi, F. (2011). *After the Future*. Ak Press; Thacker, E. (2011). *In the Dust of this Planet*. Zero Books; Williams, A. & Srnicek, N. (2015). *Inventing the Future. Postcapitalism and a World Without Work*. Verso.

5 Cf. Bratton, B. H. (2015). *The Stack. On Software and Sovereignty*. The MIT Press; and Srnicek, N. (2017). *Platform Capitalism*. Polity Press.

in which communications, transactions, stakes and votes are fully decentralised and automated, with no need for centralised institutions, authorities, laws, contracts or middlemen; where trust is not required, thanks to the law of code. They promise a world in which all communications and data are protected and secure, and everybody can claim ownership of their own data and be rewarded, not exploited, for their online interactions; where mega platforms and centralised communities are replaced by smaller, horizontal communities in which everybody has a voice and voting power. Grounded in technology that purports to be immutable, transparent and secure, Web3 offers an environment in which copyright is protected, everybody will be able to claim and prove their rights, and data is not stored on private clouds, but peer-to-peer networks owned by the community. And the crypto zealots' vision knows no bounds: when they promise empowerment, it's universal and open to all minorities and underprivileged majorities; when they promise duration, they are talking about eternity; when they promise access to data, they mean interplanetary access. And naturally, all of this can be achieved with a reduced environmental impact, given that many blockchains now claim to be green, and the ones which aren't are rushing to sort out carbon reversal programmes.

This wild optimism could easily be mistaken for some sort of commercial hype, until you see how it has caught on. The NFT craze of spring 2021, when “non-fungible tokens” – codes recorded on the blockchain, able to prove the authenticity and ownership of any digital file and regulate their circulation for ever more – started being adopted en masse by artists and creators, rapidly swelling the ranks of crypto

believers. Won over by the promise of digital scarcity, many of them are now happy to claim that crypto has changed their lives forever. The disrupting power of NFTs has even been endorsed by the godfather of the original Web, Sir Tim Berners-Lee (who auctioned a depiction of the original code of the World Wide Web for charity),<sup>6</sup> and by a champion of resistance against Web 2.0, Edward Snowden (who sold a self-portrait to support the Freedom of the Press Foundation).<sup>7</sup>

In short, the blockchain and Web3 have brought utopia back and given us a future once more, and it doesn't even look too dire. There's almost a whiff of the original cybernetic dream about it, "where mammals and computers / live together in mutually / programming harmony", and "all watched over by machines of loving grace".<sup>8</sup> Of course, one man's utopia is another man's dystopia. The crypto-utopian dream is the product of complete distrust in the human ability to self-govern without the aid of automated systems, and raises as many questions as it provides answers. On the blockchain, democracy means plutocracy – you are what you have in your wallet – and its much-vaunted security is more often a myth than an actual reality, as data disappear and contracts are increasingly violated. Furthermore: what will happen to remixing practices once copyright and ownership

6 The auction took place online at Sotheby's from 23 to 30 June 2021. Cf. <https://www.sothebys.com/en/digital-catalogues/this-changed-everything>.

7 *Stay Free (Edward Snowden, 2021)* was sold on the Foundation platform on 16 April 2021 for more than \$6 million, making it the second most expensive NFT at the time. Cf. <https://foundation.app/@snowden/foundation/24437>.

8 Brautigan, R. (1967). *All Watched Over by Machines of Loving Grace*. Communication Company.

are universally and seamlessly implemented? Will the promise of disintermediation destroy the world as we know it? Are these genuine pledges or just hot air? How can we have a hand in shaping this ongoing process, and making sure crypto-utopia delivers on a fairer future?

According to economist, writer and former Greek finance minister Yanis Varoufakis, technology alone can't change the world, and is not intrinsically emancipatory; but some technologies could play an important role in an emancipated world, and right now they can be designed and improved on to ensure they are better equipped to play this role when the time comes. In a recent interview, Varoufakis explains, "Within our present oligarchic, exploitative, irrational, and inhuman world system, the rise of crypto applications will only make our society more oligarchic, more exploitative, more irrational, and more inhuman."<sup>9</sup> In line with how Marx and Engels viewed technology, Varoufakis acknowledges "the genuine ingenuity of blockchain" and its emancipatory potential, but he also believes that no technology on its own can emancipate us. "Indeed, any digital service, currency, or good that is built on it within the present system will simply reproduce the present system's legitimacy." In the past, "liberation required a political movement that first overthrows the bourgeoisie and only then presses these magnificent technologies into the service of the many". As a consequence, "blockchain will be useful in societies liberated from

9 Morozov, E. (2022, January 26). *Yanis Varoufakis on Crypto & the Left, and Techno-Feudalism*. The Crypto Syllabus. Retrieved June 20, 2022, from <https://the-crypto-syllabus.com/yanis-varoufakis-on-techno-feudalism>

the patterned extractive power of the few”.<sup>10</sup>

What can we do to prepare blockchains to play this role when the time comes? We can play the traitor in the Byzantine Generals Problem. In this story, several generals are besieging Byzantium. They have surrounded the city, but together they must decide whether to attack, and when. Some generals might prefer to attack, others to retreat: whatever they decide, an agreement has to be reached, as a halfhearted attack by a few generals would be worse than either a coordinated attack or a coordinated retreat. The generals are isolated, and there isn't a secure communication channel they can rely on. Some generals might not even be on side. They can only send their votes via messengers who might not deliver them, or might forge them; some messages might get intercepted, or have been formulated by the opposing side. How can the generals agree to attack or retreat all together, at the same time?

The Byzantine Generals Problem is a game theory problem, an analogy for “the difficulty decentralised parties have in arriving at consensus without relying on a trusted central party”.<sup>11</sup> The Byzantine Generals Problem doesn't affect centralised systems: if the generals were coordinated by an emperor or king, a trusted, central authority would be responsible for sending the messages and providing correct information. Centralised systems sacrifice trustlessness for efficiency, and can only be corrupted by the central authority. Decentralised systems, on the other end, require that truth and consensus be established trustlessly.

10 Ibid.

11 Cf. *What Is the Byzantine Generals Problem?*. River Financial. Retrieved June 20, 2022, from <https://river.com/learn/what-is-the-byzantine-generals-problem>

**Proof-of-Work blockchains solve the Byzantine Generals Problem in a secure, reliable way, and make cryptocurrencies a revolution in the centuries-long history of money. What really appeals to me about the analogy, however, is the role played by the generals who disagree. If all the generals agreed on the same solution, operating like a hive mind, there wouldn't be so great a need for a secure, strong, tamper-proof communication system. The system has to be strong and reliable because in a democratic, horizontal society, consensus is arguably difficult to reach. Coming up with a solution that makes everybody happy, establishing a shared truth, requires time, energy and negotiation. In this process, the dissenters, the critical voices, are much more important than the dependable generals, because they make the group stronger, and the infrastructures it relies on more robust.**

**Applied to the current social infrastructure that is shaping the crypto environment, this analogy can help us understand what's at stake. The loyal generals are the crypto enthusiasts, promising decentralisation, disintermediation, success for everybody, a "new creative economy" and a "Golden Age for Content", as well as taking a stand against institutions and state power (including welfare), all the while accumulating wealth and actually reproducing the status quo. The dissenting generals are the critical voices questioning the system's logic and ideology, diverting it toward new goals, building zones of resistances and sabotaging consensus. This type of action can be carried out by any kind of player, including artists. According to Martin Zeilinger, "artists and creative communities have an opportunity to help shape blockchain technologies in ways that challenge conventional perspectives on private property and the**



enclosure of cultural commons, rather than feeding into them”.<sup>12</sup> If art continues to take advantage of this opportunity, and if some generals continue to disagree, the blockchain might eventually become the emancipatory technology an emancipated society can rely upon.

## II

*The Byzantine Generals Problem* is an online exhibition focused on artworks which do not avoid an engagement with blockchains and crypto culture, but do so in a critically constructive way: questioning dominant narratives, raising problems and sometimes proposing alternative solutions. Even though they are diverse and made by artists that occasionally may have conflicting positions on specific topics, the fifteen projects selected for this exhibition have at least one thing in common: they reveal, to paraphrase and acknowledge a less successful yet fertile “fork” in the original definition that that lead to Post Internet,<sup>13</sup> a high degree of “blockchain awareness”. And awareness – which manifests as forensic research, criticism, ironic scepticism, blatant provocation or subversive affirmation – is all we need to

- 12 Zeilinger, M. (2018). Digital Art as “Monetised Graphics”: Enforcing Intellectual Property on the Blockchain. *Philosophy & Technology*, 31, 15–41. <https://doi.org/10.1007/s13347-016-0243-1>
- 13 “Internet Aware Art” was a term introduced by artist Guthrie Lonergan in an often quoted interview for Rhizome in 2008 (Beard, T. (2008, March 26). *Interview with Guthrie Lonergan*. Rhizome. Retrieved June 20, 2022, from <https://rhizome.org/editorial/2008/mar/26/interview-with-guthrie-lonergan>). It didn’t survive the Darwinian fight with the more successful Post Internet Art.

navigate this slippery scenario without being tossed around back to back by the powerful waves of rhetoric of crypto-enthusiasts, and to contribute to its development. As most artworks, these fifteen projects generate meaning on multiple levels, but in order to walk the reader through them, I've decided to gather them around a few keywords, the first being the most conceptually dense, the least ideologically charged of them all:

**Time.** [\*Temporal Secessionism – Timezone #4\*](#) (2021) is a series of 32 SVG animations and non-fungible tokens (NFTs) by Nascent, generated on-chain and updated in real time by a smart contract that calculates the average blocktime from the token's time of minting and translates it into the pulse of the animation. As every single NFT has an individual minting block, every pulse is different in the beginning, but through accumulation the blocks merge together in an endless process, one that will literally take forever. As such, *Timezone #4* can be described as a “self-contained, immanent visualisation of time in a global network of computation only bound to its own temporal infrastructure”. The political implications of such a gesture – visualising the time and pulse of a blockchain – become transparent if we consider how, on a blockchain, time measurement and synchronisation are embedded in the consensus mechanism that secures transactions and generates value, as well as how time measurement itself becomes decentralised and built through consensus, instead of relying on a single globalised standard. Is this the beginning of “a novel regime of techno-mediated temporality”?

Another way of visualising time on the blockchain is provided by [\*Blockchain Aesthetics\*](#)

(2014–2015), by Rhea Myers. *Blockchain Aesthetics* is an extensive project in which transaction hashes and block hashes from three different blockchains (Bitcoin, Ethereum and Dogecoin) are visualised as the content of modernist and postmodernist aesthetics, usually borrowed from the history of computers and interfaces. Like many projects by Myers, *Blockchain Aesthetics* is an investigation of both the politics and mechanics of informational systems and the existence of aesthetics between research and commodification, avant-garde and kitsch, autonomy and exploitation. The way the project is displayed, therefore, becomes a framing and political gesture stressing one of its potential meanings and obliterating the others. The two iterations presented in the exhibition visualise Ethereum transaction hashes and block hashes as drawings of lines that connect x and y coordinates, recalling early computer art. The volume and rhythm of transactions contrast with the slower and ultimately more regular procession of the blocks they are gathered into (on Ethereum, it takes around 12 seconds for miners to verify a new block). The two windows turn abstract information into an outdated, marginalised visual language, and show information processing in real time.

While Myers confronts the fast time of blockchain mining and transactions with the long time of aesthetics and interfaces, [Death Clock](#) (2022) establishes a relation between the limited, uncertain time of human life and the indifferent, distributed, infinite time of the blockchain infrastructure. Developed by the New York-based collective DIS, *Death Clock* is a serial NFT project in which you are invited to provide a number of personal data (age, gender, screen time etc.) in order to mint a personal Death Clock

NFT, which estimates how much time you have left on Earth and stores your date and time of death on-chain. Death Clock NFTs can be bought and sold, but with each transfer the clock is reborn.

**Ownership.** *Death Clock* contrasts the speculative drive of flippers by generating a “soulbound” NFT, to use a term that Vitalik Buterin borrowed from the world of gaming: non-transferable NFTs that define who you are, and that can only belong to whoever minted them.<sup>14</sup> NFTs demonstrate and certify ownership, as we all know: what that time-stamped piece of code registered on a tamper-proof ledger can say with absolute certainty is that the file described by a specific hash belongs to the crypto wallet that holds and controls it, and to its eventual human agent. But what does ownership actually mean? Is blockchain doomed to perpetuate and cement the capitalistic meaning of the word, where everything becomes a commodity with commercial value? Provided that “property ownership is a consensual hallucination”, as Sterling Crispin declares in one of his [NFT Concepts](#) (2021), is there only one way of living within such a hallucination? What defines you – a feature, a memory, an experience – cannot be easily commodified and sold. You can sell a token, you can trade an artifact, but – as Crispin makes clear with another “concept” – the idea itself cannot be sold. Some of the works in this show make an effort to enter into another contract with their collectors and instigate a different concept of ownership, which has more to do

14 Buterin, V. (2022, January 26). *Soulbound*. Retrieved June 20, 2022, from <https://vitalik.ca/general/2022/01/26/soulbound.html>

with care, stewardship, support and common interest than with the simple right to resell what you own. Sarah Friend's [Off](#) (2021–ongoing) is an artist edition of 255 black images, each corresponding to the exact pixel dimensions of a large collection of computer monitors, smartphones and tablets, as well as a multiplayer game. Each NFT has two components: a public image and a secret image. The public image is what you see – the secret images are distributed to collectors by email. A form of steganography was used to hide two things within each secret image: an encrypted sentence and a shard of the private key that was used to encrypt it. The full edition of 255 images contains an essay and the entire private key, 2/3 of which (170 shards) are required to decrypt any of the sentences, meaning that the essay can only be read if a majority of the collectors collaborate and share their images. After 170 are sold, the rules of the game change. In *Off*, owning one or more tokens is not equal to owning the artwork; it's more like having a stake in a process that can be fully experienced and enjoyed only by collaborating with others. In a similar fashion, in [Materia](#) (2021–ongoing), holding an NFT means being responsible for the foundation, future developments and the mythology of a whole virtual world. Conceived by avatar artist LaTurbo Avedon, *Materia* currently consists of unique blockchain-integrated virtual artifacts that are capable of influencing the aesthetics, forms and future of the work's overarching system.

A different form of participation is triggered by [The Non-Existent Token](#) (2021–ongoing), by Sarah Meyohas. The project uses a custom smart contract to set a single token with strings attached in motion. The token is programmed to be always on sale and

to grow in value at every auction according to a fixed rate: each bid must be 10% higher than the preceding one. The previous bidder will immediately receive their money back + 5% (minus gas fees). The rest is the artist's royalty. The winning bid receives an NFT of a bubble in their wallet. Whenever the previous winner is outbid, the bubble animation disappears from their wallet, only to be replaced by a receipt advertising their return; and a new animation is generated for the new winner based on a function inspired by the Boltzmann Entropy equation. In other words, the animation dynamically portrays the entropy of the NFT, which is proportional to the number of sales and represented by the number and variation of bubble particles.

**Financialisation.** Bubbles are a straightforward metaphor for a speculative asset. Tulip bulbs are another. Made in 2019 in collaboration with AI researcher David Pfau, [\*Bloemenveiling\*](#) is part of a series of works by Anna Ridler inspired by Tulip Mania, an early example of a speculative bubble. A fully functional decentralised app (dApp) and a three-day online auction, *Bloemenveiling* offered 100 short looping animations of GAN-generated tulips for sale on the Ethereum blockchain. The blockchain was used to construct artificial scarcity for a potentially unlimited supply (the number of different tulips an AI can generate). The event and the smart contract controlling the behaviour of the works were subtly engineered to mimic the dynamics of the tulips market, and to update it to the age of automated trading algorithms. A number of bots participated in the auction to help drive speculative prices. The videos looked pixelated on the auction website and, like bulbs, they would properly “bloom” only for the auction winners,

granting them an exclusive yet ephemeral experience: one week after the auction – approximately the same amount of time a cut tulip lasts – the tulip became “blighted” and disappeared from the owner’s view. If bulbs were traded as paper contracts, the GAN-generated tulips were traded as data on a public ledger.

If artworks have often been instrumental to speculative drives, this has never been the case for born-digital art, which didn’t resist commodification (especially in the form of post-digital derivatives) but was rarely perceived as a speculative investment. Before the advent of blockchains and smart contracts, the only digital asset equipped with scarcity was the domain name, which sometimes acquired economic value because of its inherent qualities (short, effective, easy to remember) or its accumulated attention and incoming links rather than its content. Artists working with digital media acknowledged the challenge they were presenting to cultural markets and their intrinsic resistance to market logic, and often found in it and in the freedom it allowed the *raison d’être* of their entire practice. [Tokenize This](#) (2021) by Ben Grosser is an explicit call to the net art community to not forget that freedom. Released at the height of the NFT craze, *Tokenize This* is a net art work that generates uniqueness while resisting commodification. Upon each new visit, the site produces a “unique digital object” that includes a custom colour gradient and guaranteed exclusive identification code, all referenced by a matching URL. What makes *Tokenize This* different from the typical website whose URLs act as persistent indexes for a page and its contents is that it destroys each page right after its creation. While the original visitor can view the unique digital object

for as long as they leave their browser tab open, any subsequent attempt to copy, share or view that URL in another tab, browser or system leads to a “404 Not Found” error. In other words, *Tokenize This* generates countless digital artifacts that can only be viewed or accessed once. The work acts in opposition to the capitalist ideologies embedded in NFTs and the ways in which NFT markets have already thrust an often anti-capitalist and anti-corporate art medium into a 21<sup>st</sup>-century gold rush get-rich-quick kind of frenzy.

But if digital artworks have become financial assets, if artists-programmers can write their own smart contracts and intervene in the field that drives politics and society, why not take this chance to change the world for the better? *Flat Fiat* (2022) by The Miha Artnak is an artistic intervention in the tradition of subversive affirmation that offers an immodest proposal for destroying fiat money, resisting hyperinflation and decentralising everything. For the project, 137 coins of different national currencies (dollars, euros, pounds, yuans) have been removed from circulation, burned (flattened on a railway track), digitised and turned into NFTs. Fiat money – where “fiat” is the Latin word for “let there be”, as in “Fiat lux!” – has no intrinsic value: its value and quantity are determined by decree by the God-like authority of the national state. In economics, hyperinflation is rapid, excessive and typically accelerating inflation that quickly erodes the real value of a currency. It usually occurs when central governments mismanage the financial system and the economy, and it is endemic to the current monetary regime. It can be prevented by either reducing the supply of currency or by altering the currency basis. While the first solution can only be pursued by the



same central authority that produces fiat currency, the latter can be decentralised and used as a tactic of resistance. When perpetrated by an individual, the act of burning fiat money by destroying its fungibility and connecting the newly-created non-fungibles to decentralised crypto operates on a purely symbolic level, but could have real consequences if it were adopted on a mass level.

**Myth.** *Flat Fiat* plays with the original myth of blockchain, which was, in Satoshi Nakamoto's words, designed as "an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party".<sup>15</sup> Myths can be an extraordinary force that drives change, but we have to tread carefully. According to Roland Barthes, "myth does not deny things, on the contrary, its function is to talk about them; simply, it purifies them, it makes them innocent, it gives them a natural and eternal justification, it gives them a clarity which is not that of an explanation *but that of a statement of fact*."<sup>16</sup> Many of the works in this show set out to add a blur to this confusing clarity, to this oversimplified version of reality often translated in keywords, slogans and catchphrases, such as verifiable digital scarcity, proof of authenticity, patronage, decentralised democracy, WAGMI (We're all gonna make it), NFTs

15 Nakamoto, S. (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*. Retrieved June 20, 2022, from <https://bitcoin.org/bitcoin.pdf>

16 Barthes, R. (1972). *Mythologies*. Noonday Press, p. 143.

changed my life forever ... FaceOrFactory – from which I borrow the Barthes quote – does it via research, playful interaction and subtle irony. The work on show advertises *The Face of Corporate Building* (2022), an upcoming videogame installation and the outcome of a research-based art-curatorial project which aims to explore the prevalent strategies of constructing narratives and specific discursive structures, operating in the background of the NFT art market and its artworks, here interpreted as a contemporary mythology. The game – designed as a trivia quiz, one of the most popular forms of self-definition and self-irony on the internet – draws a parallel between NFT market mechanisms and the ways we understand the construction of human faciality and identity parameters in contemporary society and which represent a long-term site of investigation for the FaceOrFactory project.

[Dot Com Séance](#) (2022) more specifically addresses the myth of innovation and the often-claimed contiguity between Web1 and Web3 – both utopian, decentralised, democratic and grounded in anonymity – which the project exploits to draw a parallel between the the dotcom bubble crash and the potential outcome of the current crypto bubble. For *Dot Com Séance* – a collaboration between Simon Denny, Guile Twardowski (the artist behind CryptoKitties) and Cosmographia (an experimental AI image group founded in 2021) – twenty-one dotcom era companies have been summoned for revival. Each company includes an ENS domain, a new logo-NFT designed

by Twardowski and a suite of text-to-image logos by Cosmographia that Guile drew inspiration from. Minting any NFT allows you to claim a subdomain on the company's new ENS domain. Owners of a Twardowski logo-NFT earn the title of CEO on each company's profile page.

According to a prediction attributed to Netscape's co-founder Marc Andreessen, "almost every dot-com idea from 1999 that failed will succeed". *Dot Com Séance* draws on two contemporary bubbles/hypes (AI and NFTs) to investigate temporality, timeliness and timelessness through the World Wide Web history and ideology. How many of these companies are still just phantoms? How many have become real businesses under a different name? How many will have a new chance in the close or distant future? And how many crypto ideas from 2021 that succeeded will fail? To what extent can we trust the blockchain promises of security, accessibility and eternity?

**Environmental impact.** In 2022, many of these brilliant start-up ideas that might just as likely succeed or fail are crypto projects or Decentralised Autonomous Organisations (DAOs) focused on some sort of environmental program. Everybody involved in crypto and NFTs is now aware of the tremendous environmental impact of Proof-of-Work blockchain: some are abandoning Ethereum-based platforms and joining greener Proof-of-Stake projects; some are offsetting carbon; and some just feel guilty about every transaction (the subject of another *NFT Concept* by Sterling

Crispin). However, the lack of reliable information and well-researched data have made it extremely hard to have a good-faith discussion. In order to respond to this problem, Kyle McDonald recently designed [\*Ethereum Emissions\*](#) (2021), a tracker able to provide a bottom-up estimate of the energy use and emissions of the Ethereum blockchain, based on current and historical data on a number of factors, including hashrate, hardware overhead and typical worker configurations, datacentre overhead, grid loss, hashing efficiencies, power supply efficiencies, mining hardware mix, worker locations and pool distributions, and international emissions. McDonald's research – that produced the tracker and an extensive academic paper – integrates and corrects previous estimates based on a top-down approach (calculating how much energy miners use from their revenues); it shows the affordances and limitations of technical research, and translates complex data into an intelligible, real-time visualisation, joining a long tradition of artworks engaged in investigative, forensic and documentary strategies.

**Aura.** According to Walter Benjamin,<sup>17</sup> the aura of a work of art depends upon its unique manifestation in a specific place. In the age of mechanical reproduction, this aura is destroyed, as the artwork can easily travel along the communication highways, but is artificially reconstructed through the cult of authenticity and authorship and the

17 Benjamin, W. (1935). *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit*.

conversion of cultural value into economic value. More recently, aura has paradoxically been resurrected as “buzz”,<sup>18</sup> the familiarity with a specific image generated by its easy replicability and ubiquitous circulation. To quote Oliver Laric, “an image viewed often enough becomes part of collective memory”.<sup>19</sup>

In principle, NFTs seem to be able to restore the original formulation of aura, anchoring the digital work of art to a specific online location. One might be able to demonstrate the ownership of a given file because the metadata file linked by the NFT contains the hash to that specific file in that specific place. But if ownership and provenance are provable, authorship and authenticity are, in many cases, questionable. Unlimited circulation may enhance the the power and desirability of an image, but the ease to right-click-save always vilifies the magic spell of the NFT. Aura is still something to LOL. [Aura.lol](#) (2022) by Constant Dullaart is a generative manifesto, a performative process in the form of a treasure hunt, a piece of media critique and a series of unique NFTs minted by the collectors when they interact with the contract governing the project. Each minted NFT is a unique version of the manifesto, featuring various combinations of text, emojis and colours. The piece performs an evolving, contradictory and sometimes glitchy rumination on the concept of aura, referring to the unique aesthetic authority of a work of art, as

18 Joselit, D. (2013). *After Art*. Princeton University Press.

19 Laric, O. (2009). *Versions*. Retrieved June 6, 2022, from <http://oliverlaric.com/versions.htm>

defined by Benjamin; about related topics such as the commodification of art and artists, and about the many promises of the crypto enthusiasts: immutability, unicity, trustlessness.

Another take on the aura of the original can be found in [First Derivative](#) (2021), a decentralised app by Moxie Marlinspike. *First Derivative* allows anyone to mint their own NFTs by inserting the contract and token number of an existing NFT. The new NFT has the look and name of the “original”, underlying NFT, and it “tracks” it, similar to a financial derivative that tracks an underlying commodity or security. Playing with the double nature of a non-fungible token – a techno-financial asset used to demonstrate provenance and ownership of a piece of digital art – *First Derivative* features derivative artworks that behave like financial derivatives, meaning that they derive/acquire their value from the performance of an underlying entity and inherit its properties.



## THE ARTISTS

[Anna Ridler](#) is an artist and researcher who works with systems of knowledge and how technologies are created in order to better understand the world. She is particularly interested in ideas around measurement and quantification and how this relates to the natural world. Her process often involves working with collections of information or data, particularly datasets, to create new and unusual narratives.

Artist [Ben Grosser](#) focuses on the cultural, social and political effects of software. How is an interface that foregrounds our friend count changing conceptions of friendship? Who benefits when a software system can intuit how we feel? What changes in democracy and society when platforms designed for growth and engagement become our primary window to the wider world? To examine questions like these, he constructs interactive experiences, machines and systems that make the familiar unfamiliar, revealing the ways that software prescribes our behaviour and thus, how it changes who we are.

[Constant Dullaart](#)'s often conceptual work manifests itself both on- and offline. Within his practice, he reflects on the broad cultural and social effects of communication and image processing technologies while critically engaging the power structures of mega corporations that dramatically influence our world view through the internet. He

examines the boundaries of manipulating Google, Facebook and Instagram and has started his own tech company Dulltech™ with Kickstarter.

**DIS** is a New York-based collective working across mediums and platforms. Born in 2010 as the online publication DIS Magazine (2010–2017), the collaborative grew out of intersecting presences in net art, publishing and fashion. In 2018, DIS launched the radical streaming platform dis.art to produce and publish original series and docs by artists and filmmakers. DIS has curated exhibitions, including the 9<sup>th</sup> Berlin Biennale, The Present in Drag (2016) and the Biennale de l'Image en Mouvement (2021). Throughout projects and identities, DIS has expanded art's possibilities and expanded its role in education, entertainment, commerce and the public sphere – merging all into one.

**FaceOrFactory** (Aljaž Rudolf and Eva Smrekar) is an art research platform which explores the structure and function of (human) faciality in contemporary society – that is, the face as a territory of power relations and political discourse. FaceOrFactory is a corporation that was founded to bring the face as a biological mass of data closer to its financial value in corporative hypercapitalism. It formed around harvesting DNA samples, facial scans and personal data from donors that thereby become an integral part of the project as art/building material and/as well as FaceOrFactory members.



[Kyle McDonald](#) is an artist working with code. He crafts interactive installations, sneaky interventions, playful websites, workshops and toolkits for other artists working with code. Exploring possibilities of new technologies: to understand how they affect society, to misuse them and build alternative futures; aiming to share a laugh, spark curiosity, create confusion and share spaces with magical vibes. Working with machine learning, computer vision, social and surveillance tech spanning commercial and arts spaces.

[LaTurbo Avedon](#) is an avatar and artist who creates work that emphasises the practice of non-physical identity and authorship. Avedon has spent the past decade developing a body of work that illuminates the ever-growing intensity between users and the virtual, pursuing creative environments that deepen the meaning of immaterial experiences. They curate and design Panther Modern, a file-based exhibition space that encourages artists to create site-specific installations for the Internet.

[The Miha Artnak](#) is a Ljubljana-based artist, activist, and entrepreneur, active since the 2000s. His satirical paintings, environmental installations, and subversive performances make him one of the most talked-about artists of the last decade.

[Moxie Marlinspike](#) is an American entrepreneur, cryptographer and computer security researcher. Marlinspike is the creator of Signal and

co-founder of the Signal Technology Foundation, and served as the first CEO of Signal Messenger LLC. He is a former head of the security team at Twitter and a co-author of the Signal Protocol encryption used by Signal, WhatsApp, Google Messages, Facebook Messenger and Skype.

[Nascent](#) is an EXIT TECH production studio investigating alternative infrastructures. Delving into the nature of games, economics and consensus systems, they create theory-based computational experiments and tools to prototype technological secessionism and spark discussion about the base layers of current stacks.

[Rhea Myers](#) is an artist, hacker and writer originally from the UK now based in British Columbia, Canada. Her work places technology and culture in mutual interrogation to produce new ways of seeing the world as it unfolds around us.

[Sarah Friend](#) is an artist specialising in blockchain and the p2p web. She is a participant in the Berlin Program for Artists, a co-curator of Ender Gallery, an artist residency taking place inside the game Minecraft, an alumni of Recurse Centre, a retreat for programmers, and an organiser of Our Networks, a conference on all aspects of the distributed web.

[Sarah Meyohas](#) is a conceptual artist whose practice considers the nature and capabilities of emerging technologies in contemporary society.

Using the familiar emblems of biological life, Meyohas investigates the complex operations that increasingly govern our world: soaring birds, created using augmented-reality software, flock in unison with the frenetic variations of the stock market; rose petals, aggregately identical but individually unique, comprise the dataset for their AI-created equivalents; Bitchcoin, a cryptocurrency backed by physical artworks, questions the speculative value of cryptocurrency and the ineffable value of art. Meyohas creates an intelligible visual language to articulate the systems and technologies that increasingly influence our world.

[Sterling Crispin](#) is a conceptual artist that works between digital and physical objects. In his artwork he often misuses or reverse-engineers technology in order to give form to things that are otherwise formless. He's interested in the creation of new dialogues, signs and symbols that challenge societal power structures, and he believes that earnestly reaching toward objective beauty and truth in an effort to produce the real, rather than an image of the real, is in itself a political act.

[Guile Twardowski](#) is a NFT pioneer, the artist behind the beloved CryptoKitties. His work has been exhibited and discussed in galleries and institutions like the ZKM (Karlsruhe) and Schinkel Pavillon (Berlin) as well as being presented in France, Brazil, USA and Russia.

[Simon Denny](#) has had exhibitions at MoMA PS1 (NY), the Serpentine (London), the Hammer Museum (LA), the Venice Biennale and has co-curated art and crypto exhibitions Proof of Work (2018) at Schinkel Pavillon and Proof of Stake (2021) at Kunstverein Hamburg.

**Cosmographia** is a new experimental AI image group founded in 2021.

## THE CURATOR

[Domenico Quaranta](#) is an art critic, curator and educator interested in the ways art reflects the current technological shift. His texts have appeared in numerous magazines, newspapers, books and catalogues. He is the author, among other things, of *Beyond New Media Art* (2013) and *Surfing with Satoshi. Art, Blockchain and NFTs* (2022) and the editor of several books, including *GameScenes. Art in the Age of Videogames* (2006, with M. Bit-tanti). Since 2005 he has curated several exhibitions, including *Collect the WWWorld. The Artist as Archivist in the Internet Age* (Brescia 2011; Basel and New York 2012); *Cyphoria* (Quadriennale 2016, Rome) and *Hyperemployment* (MGLC, Ljubljana 2019–2020). He lectures in Interactive Systems and is a co-founder of the Link Art Center (2011–2019).

## THE PRODUCER

Founded in 2002 by Marcela Okretič and Janez Fakin Janša, [Aksioma – Institute for Contemporary Art, Ljubljana](#) is a private, non-profit cultural organisation that produces, presents and disseminates art projects as well as exhibition, discursive and educational programmes with the aim of critically understanding the structures of contemporary society and the role that new technologies play in shaping the way we perceive it.

## THE PLATFORM

[distant.gallery](#) is a social platform and a sustainable art initiative that links actors from different parts of the (art)world. International and local at the same time, it creates the opportunity to discover artists and shows that one would usually never be able to see because they happen at places that are too far from home. Visitors get the chance to see shows from all over the world without having to transgress borders.

distant.gallery is structured in blocks each consisting of 3 exhibitions with opening each Monday during local office hours. Every exhibition is curated from a 'host' city where local artists from that host city exhibit in the same (online and social) conditions and context as artists from the other side of the globe. The hosting is in collaboration with an initiative, institution, or organizational partner in that locality to broaden the network effect for all participating artists. At the start of a new exhibition block, the old block is archived.

distant.gallery runs on common.garden - an artist-run platform that offers a wide spectrum of tools to display artworks from different media, ranging from more traditional ones like the painting to new media like the video but also specifically online-only art. Therefore distant.gallery does not just replace the physical museum or extend it, but creates a unique curatorial concept. A place where both established and international young talents can easily meet equally and gain visibility in a broader cultural context.

## COLOPHON

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