peer on "*blockchain is… / …for nothing*" exhibition by peers at httpdot.net (version 0.2)

this text is written for the publication of the exhibition "*blockchain is… / …for nothing"* by peers httpdot.net at aetopoulos, an artist-run space in athens, greece, organized by protocinema in february 2019.

this is version 0.2, a quickly written and just briefly edited version of the text and it will be updated for inclusion in the publication. most recent version of this text will be available at https://httpdot.net/exh/BlockchainIs-ForNothing/

and previous versions, including this version and version 0.1 are archived at https://httpdot.net/peer/texts/OLD/

this text discusses the works and some of the ideas behind the exhibition. even though there are definitions for some terms and concepts, they are not necessarily the book definitions or what they are in technical or conceptual terms, but instead how the author of this text and other peers at httpdot.net choose to approach and imagine these definitions, for various reasons. you are encouraged to imagine your own understandings of these. this text is written with the intention to be read in multiple ways and not necessarily linearly and thus some concepts, terms and emphasized phrases are marked. so, feel free to skip those you are not interested in.

overview: the exhibition; *nothing* is possible; so, nothing is impossible; so, another world is possible

this exhibition proves that *nothing* is possible, which means that nothing is impossible, which means that another world is possible. exhibition proves *nothing* as artwork, a totally dematerialized particular artwork, through the logic of blockchain and the language of contemporary art, and suggests another language for imagining the possibility of another world, through *nothing.*

in *the dematerialization of art* (1968), lucy lippard and john chandler concluded: "we still do not know how much less "nothing" can be. has an ultimate zero point been arrived at with black paintings, white paintings, light beams, transparent film, silent concerts, invisible sculpture, or any of the other projects mentioned above? it hardly seems likely."

building on the legacy of conceptual art and inspired by the logic of blockchain technology and the imagination of art, the exhibition seeks another language, not "a new" but another language to inspire the possibility of another world.

there are two sets of works in the exhibition, one of which exploring the <u>multitude of understandings and visions of blockchain</u>; "*blockchain is…*" and "*blockchain will…*", one video and one audio work of sentences containing these phrases aggregated form more than a thousand web pages; and the other set of works exhausting the notion of "<u>nothing</u>" by not only imagining but also proving it as a particular <u>totally dematerialized work of art</u> by "the artist" (pseudonym of one of the peers at httpdot.net) through the logic of blockchain, and by juxtaposing it with the language of art.

once nothing is certified as a particular work of art by the artist, once it becomes an artwork, besides also being nothing, the sentences of nothing welcomes a multitude of meanings. starting with the statement, which is made possible by the logic of blockchain technology, "<u>this is to certify that *nothing* is an original artwork by the artist</u>", which is included in the certificate of authenticity of the work *nothing,* the exhibition constructs a <u>simple yet complex, logical but also imaginative, recursive language</u>. the title of the exhibition also unfolds different meanings if nothing is understood as a particular artwork, or as nothing, as nothing.

following the same logical and linguistic attitude, the other works in exhibition also exhaust this notion of nothing as an artwork by building on each other in a <u>both logical and nonsense way</u> and create an immersive space through projections of computer calculations and texts covering all the space, as well as the people in it, as a shower of information.

<u>blockchain</u> was originally developed for <u>bitcoin</u> p2p cryptocurrency to substitute the conventional understanding of trust in economics as an hierarchical trust to central authorities, with a <u>distributed trust to the multitude of peers</u>. this proves once again the power of <u>peer-to-peer (p2p)</u> organization models as internet did, p2p being the founding principle of it. because of the lack of an effective <u>political approach to information technologies</u>, the interpretation of internet as a promise of the possibility of another world in many ways has not been articulated and communicated enough to inspire how we understand the world and in what other ways we can imagine it. blockchain is yet another sign to <u>imagine</u> another world. the exhibition imagines as such.

a digital publication will accompany the exhibition, including updated version of this text, as well as a <u>forked conversation</u> between peer and other peers at httpdot.net. in addition, <u>source codes</u> and <u>pseudocodes</u> of the works will be included. the digital publication will be available via a <u>copyleft</u> license at protocinema.org and aetopoulos.info, as well as https://httpdot.net/exh/BlockchainIs-ForNothing/

background: digital information and the internet; information technologies

<u>digital information</u> is all about representing (encoding/mapping) samples from information (anything on a medium through which we communicate, with each other and with the world around us) as binary

values (digital data) so that these values can be processed (manipulated) by computers through simple arithmetic and logical operations.

besides enabling the information to be processed by computers, information in digital form can also be multiplicated (duplicated, replicated, reproduced, copied but also lossless transcoded), exactly. this possibility is something unique to digital information which renders the concept of the original and the copy irrelevant, supplying a multitude of originals having no hierarchy among each other, and also challenging the concept of scarcity, on which the capitalist definition of economics is based on: allocating limited resources among unlimited human desires. even though the second statement in this rationale (unlimited human desires) is subject to discussion, the first statement (unlimited resources) was a fact back then, for any information in any physical form, including all artworks that require to be experienced in a fixed time+/space. the physical medium on which the unique information, the artwork is represented, is always subject to scarcity, legitimizing the need for the dominant economic order.

the availability of mechanical reproduction has been a promising development in relation to the problem of the scarcity of the artwork, which was of course not a problem for everybody, but at least for some concerned, like walter benjamin, who read that relatively recent development back then as an opportunity for "politicization of the aesthetics" instead of "aestheticization of the politics", the approach of the fascists. benjamin hoped the mechanical reproduction of work of art could enable dissemination to a wider audience, without being subject to scarcity, and thus trigger politicization of the masses against the threat of fascism. however, the art world mostly discussed benjamin's thesis based on another aspect articulated in the text, withering of the aura of the art object, which is also an important subject in this context, but limiting benjamin's text to the notion of aura could be an "aestheticization of the politics" itself.

the mechanical reproduction of work of art was also subject to scarcity because of both the scarcity of the reproduced physical medium on which the information, the artwork is dependent on; and also the scarcity of the means of production to enable such a reproduction. even though mechanical reproduction rendered the artwork to be independent from being unique or having a very limited availability, it featured another challenge: being subject to a certain mode of production, that of industrial production. the decision of what to reproduce and how much has been made according to the market dynamics in this mode of production, which lead to the emergence of the culture industry, which was coined as a negative term by theodor adorno as opposed to its positive usage in today's neoliberal context. however, such a development was unavoidable given the material dependency of the art object. the marginal cost was still an economic problem for the reproduction of work of art which required the figure of the capitalist, who owns and governs the means of production and thus the production/reproduction process, being on the top of the hierarchy, just like in other fields of physical production. even though popular cultural productions would be reproduced in higher quantities using mechanical reproduction due to the rules of the demand and supply balance, this was not the case for what the art gallery offers, the demand for which was already limited. to maximize the

profit, the cultural industry utilized the idea of creating <u>artificial scarcity</u> through <u>editioned works of art</u>, which would not only <u>create originals out of mechanical reproductions of works of art</u>, but also <u>limit the supply</u>, artificially, to satisfy dominant economic order.

the idea of the <u>dematerialization of the work of art</u>, in one way, was an attempt to escape from the materiality, the medium on which the information, the work of art manifests; the medium which was subject to scarcity because of its material condition and thus rendering work of art subject to the statement above: <u>then unavoidable capitalist definition of economics</u>, which <u>legitimizes the socio-economic order</u> dominating our lives. the institution of art has also been dominated by the same socio-economic order in the form of culture industry as explained above and the idea of the dematerialization of art has been <u>excluded from the institution of art, by inclusion</u>**.** the statements were made, they were strong and probably honest but could the artworks, at least those we know about, those <u>legitimized by the institution of art</u>, escape <u>commodification</u>? or will they be able to, in any future?

if the work of art is just the idea, how is it communicated? can it be communicated independently of a fixed time+/space so that it would reach broader "audience? what is the medium on which it manifests? what quality of this medium makes it different from other physical manifestations of work of art that make them subject to scarcity? what was the condition that rendered conceptual art independent of the material, that could dematerialize it? in such a dematerialized form, <u>if existed at all back then</u>, how could it be communicated to the people in its original medium, in its <u>original form</u>, not as a "reproduction"? could dematerialized work of art in conceptual art <u>supply abundance without creating a scarcity of the audience</u> to experience it in its original form? what was the form for conceptual art? what was the physical dependencies of this form? what was the reach of this form, the work of art, in its original form? <u>did the dematerialized work of art "materialize" its statement?</u> was it even possible back then?

following the mechanical reproduction of work of art, we are in the age of <u>mathematical reproduction of work of art</u>, we may dare say: the digital reproduction, and even beyond "reproduction", <u>digital multiplication of work of art</u>, including <u>digital reproduction</u> (digitization by sampling), <u>digital production</u> (digital-born information), <u>digital duplication</u> (no native hierarchy of the copy and the original and no natural scarcity) and <u>digital transcoding</u>, lossless and lossy, enabling the digital information to exist in various forms for various purposes. but <u>what is the politics of this?</u> what happens when work of art, in digital form, is not subject to scarcity anymore and thus can reach everyone because of having a marginal cost approaching zero and being independent of the dominant economics? <u>what are the political, ethical, economical and legal consequences of this for the institution of art and for the concerned artist?</u>

besides enabling exact duplicates, digital information can also be <u>distributed/disseminated in its original form</u> without losing any bit of digital information and without being subject to noise; to anyone having access to the internet and also to the physical equipment to experience internet.

the problem of this access to the physical dependencies of information technologies is an important aspect to acknowledge. digital divide refers to the inequality between those who has access to these technologies and those who do not. this divide gets bigger through time because access and making use of information technologies has considerable economic and social advantages. it is also a fact that physical dependencies of information technologies are subject to scarcity, like any other physical goods. even though the cost of having access to these equipment and also the cost of internet access is becoming less and less, they are still hard to access for many people. one laptop per child project was one attempt to address this issue which involved producing cheaper computers for poor children in developing countries. the targeted price was hundred dollars but the costs didn't allow that. however there was a more imaginative idea, zero dollar laptop, which involved recycling unused and "old" computers, installing free and open source gnu/linux/… (gnu, linux and other floss operating system projects) operating systems and software, giving these to the people who has no access to information technologies and also organizing workshops for how to use these hardware and software. most "old" computers do have enough processing power for everyday computing tasks when used with lighter software, the software which uses less system resources, but proprietary operating system developers design more and more resource hungry systems and "old" computers become slower when newer versions of these operating systems are installed. this is also true for many other proprietary software. zero dollar laptop features a strong politics of information technologies and is a good example of imagining ways of dealing with digital divide. four works in the exhibition are in the form of embedded system with also cheap small computers which are powered by a gnu/linux/… operating system.

however, there is also another dependency of information technologies, which is energy. this is rightfully becoming a more and more important issue in the age of anthropocene when we humans start questioning our dominance on the world. this is also where blockchain technology is criticized the most through its reference implementation in bitcoin. there are other blockchain implementations which address this issue and designed to have less footprint but energy consumption of bitcoin network is really an important issue. the main critique in terms of the energy consumption for the design of bitcoin is the proof-of-work system which is utilized in blockchain technology and also one of the most important concepts of it. more on blockchain later, but it is time to mention that the proof-of-work system in bitcoin is criticized for spending energy for achieving something arbitrary, useless, which spends energy for nothing. this is true if you look at it from another perspective than that of the logic of blockchain, which trades this cost with the cost of relying on centralized systems. however, being a distributed system is what bitcoin was designed for in the first place. so this discussion can transform into the discussion of the cost of not having to rely on centralized systems and also to the discussion of other costs introduced by those systems. four works in the exhibition continuously make calculations similar to proof-of-work system in blockchain and moreover they do these by spending energy just for nothing, as in two possible understandings of "for nothing", nothing as nothing and nothing as an artwork, which is also a part of the exhibition title. but as said, more on blockchain and nothing later… now back to the internet.

another problem regarding communication of artwork to a wider audience, the problem of distribution of the mechanically reproduced work of art was not even mentioned in benjamin's text about mechanical reproduction. the internet, which enabled broad communication of digital information, has been the most important development in information technologies, besides the computers, to solve that problem. the internet not only solved such a problem of transterritorial exact distribution of digital information but also introduced us, for the concerned, many new possibilities for imagining the possibility of another world. most of those possibilities might be invisible now for many but another internet is possible (https://another.httpdot.net/), a free/libre, anonymous, distributed, p2p internet, to inspire the possibility of another world. but how did the institution of art got inspired by these possibilities? is it interested in a politics of information technologies? are we inspired by the new concepts, new languages introduced by the internet and the information technologies in general, for imagining the impossible? beyond technological determinism and making practical and economic use of these technologies, how do we relate to the phenomenon of the last couple of decades? what does internet mean for us, besides our personal websites for "previews" of our works as a promotion showcase, besides e-mailing and using "social media" for networking, besides quick "access" to information, and besides sending our "exhibition copies" through proprietary file transfer services? is our production honest to the nature of the internet we make use of? are we inspired, for example by the power of non-hierarchical peer-to-peer organization model that constitutes the foundation of the internet, for our political discussions on other models of organization for our society? did we pay attention to that dimension of the "technology"? how about mediation of institution of art, which is supposed to be the most "progressive" and inspiring institution in our lives, for triggering such a discussion? how did we get inspired from the peer production, or from free/libre and open source software? how did we get inspired from the internet? what is internet?

nothing and the blockchain

however, the exhibition *blockchain is… / …for nothing* is not inspired by the internet, instead by another "technology" which is argued to be the most inspiring one since the invention of the internet: blockchain… the exhibition is interested in creating speculations using the language of blockchain in relation to that of the institution of art, by dealing with "nothing", literally. to put it in another way, instead of approaching the blockchain technology as a practical tool, the exhibition is interested in speculative translations of the new language and methodologies introduced by blockchain to the language of institution of art, by exhausting the notion of nothing, as a candidate for the total dematerialization of work of art.

is it possible for nothing to be unique and attributed to an artist? if possible, can it be proven, certified to satisfy the conditions of being an original artwork, according the institution of art, the institution which defines what art is, in our context. if nothing is literally nothing, and the medium of nothing is

also nothing so that it does not manifest in a physical form, or in any other form, not even in a digital form; but can be performed by anyone, and also exist as a work of art without requiring to be performed, as itself, as nothing, as nothing but an artwork; how can it be a work of art, how can it be certified by the institution of art, as a work of art, that can be proved as a unique, original work of art by an artist; and that can also be verified by anyone, as the unique, original work of art, as stated by the artist?

at the centre of the exhibition there is nothing, which is claimed to be an original unique, authentic work of art by one of the peers at httpdot.net who uses the pseudonym "the artist" and the title of the work is also true to itself, "*nothing*", without quotation marks! the certificate of authenticity of the work reads "this is to certify that *nothing* is an original artwork by the artist". the certificate also supplies information about how to verify the authenticity of the work and also to verify the author of the work as the artist. the work relies on two interrelated concepts that existed long before the invention of the blockchain technology but heavily utilized in blockchain in a very creative way: cryptographic hash functions and digital signatures.

cryptographic hash functions take any input and calculate a fixed length output from that input, like a unique fixed size arbitrary summary of the input. the input is called the "message" and the output is called the "hash" (hash value/digest/digest value, also fingerprint, checksum). but of course, it is not just that.. wikipedia is your best friend (being more sincere than that search engine, at least does not do something behind your back) but here is another take on the subject:

hash functions in general;
map the input to a fixed length output,
the same input always gives the same output for a given hash function, they are deterministic (one of the works in the exhibition exhausts this property);
but to qualify as a "cryptographic" hash function and be considered secure, a hash function should have some other properties:

-it should be infeasible to compute (know/guess/get/achieve) the input from the output. meaning that you cannot find out the input, if you just know the output. in this context infeasible refers to not being impossible but also not practical in terms of the gain vs spent resources. cryptographic hash functions should be one-way functions and this property is called "pre-image resistance". "pre-image", a mathematical term, refers to the input in this context. the output should unpredictably change even if there is a very small change in the input so that no relation should be discovered between the input and the output to predict the input and "brute-force attack" should be the only way (besides what is called "rainbow attack") to get the input for a given output. a brute-force attack requires being ready to try all possible inputs and having a lot of (the extreme opposite of no as in nothing) luck. even though the plain probability of winning a lottery is %50 from one perspective (you win or not, at the end it is binary…), the statistical probability is much less. by the way, *.piece of luck: possibly about to become*

world's most valuable work of art_, a previous work by one of the peers at httpdot.net on chance and institutional critique is documented a https://luck.httpdot.net/ . however the possibility we are talking about in the context of cryptographic hash functions is so much less. it will make you wonder about the universe to make a research to compare the probabilities of winning a lottery to that of finding an input that hashes to a given output for a cryptographic hash function; the probability of the success of a pre-image attack. as said, the exhibition is about <u>imagining the impossible</u> and this is <u>the quest of one of the works in the exhibition</u>. but more on this later…

-<u>two inputs should not produce the same output</u>. cryptographic hash functions should have "<u>collision resistance</u>" and this property is also related to the concept "<u>second pre-image resistance</u>", which refers to the <u>infeasibility of finding another input which hashes to the same value as that of a given input</u>. as "pre-image" refers to the input of a hash, "second pre-image" refers to a <u>second input which hashes to the same value as another input</u>. as in the "rainbow attack" mentioned above there are a lot of concepts in cryptography named after analogies or sample situations. "<u>birthday attack</u>" is one related to this property and also there is "pigeonhole principle" related to the possibility of achieving this property. <u>second pre-image attack is the quest of another work in the exhibition</u>. also more on this later…

cryptographic hash functions have many <u>applications</u> and <u>works in the exhibition exhaust most of these</u>, which are also heavily utilized in <u>blockchain</u> technology. they are used for <u>message integrity verification</u>: to check if there has been any intentional or unintentional change in the message through time; <u>digital signatures</u>: messages are hashed before being signed with private (secret) key and also verified by hashing them again using and public key on the hashed value to verify the signature; <u>proof-of-work</u>: targeting to achieve a partly specific hash value by adding a nonce to a message. more on proof-of-work and how all these applications connect to the works in the exhibition, later…

"cryptographic hash functions take any input and calculate a fixed length output form that input." this was the first sentence of the section about cryptographic hash functions and it is the phenomenon which is exploited to connect the language of blockchain to nothing in the exhibition in the first place. "a fixed length output is calculated for '<u>any' input</u>"… due to the design of cryptographic hash functions, <u>a cryptographic hash function also outputs a fixed length output from no input, empty string, nothing</u>, and it gives the same output every time you calculate the hash of no input for the same cryptographic hash function. <u>in this context nothing is also anything, which is something</u>. one may argue that nothing cannot be art, or, nothing is not art. however, according to what we understand from art today, <u>anything can be art, if it satisfies what institution of art defines</u>. in this context nothing can be art because <u>nothing is not nothing but anything, which can be art</u>. but how to <u>prove</u> that nothing is art? that it is a work of art by an artist, in terms of the institution of art? what is <u>the proof of art</u> and what is <u>the proof of the artist</u>? what is <u>the proof of the work of art of the artist</u>? but before that, more on cryptographic hash functions and nothing…

cryptographic hash functions can create something, a hash value, out of nothing but that something is not arbitrary: it originates from nothing and has a relation to nothing. it is born out of nothing. even beyond theology, this is not a new phenomenon and it is in fact very much related to the romantic understanding of creativity, which is/was also the most important attribute of the figure of the artist, who creates something original, which is not like anything else, and the creation originates from nothing but the artist's feelings. this romantic understanding of the figure of the artist has been challenged a lot since then and the figure of the contemporary artist, the author of an original and+/or creative work of art, is now understood as someone who interprets the world through their perspective and creates an artwork as an original expression of their creativity. the artwork does not originate from nothing anymore but is built on what came before. this approach to the concept of authorship should acknowledge asynchronous collective creativity of all the people where the figure of the artist is not someone special, not a genius on the top of the cultural hierarchy who creates art for the others who in turn should worship their creativity and be their "spectator / fan / customer", but someone who gets inspired by others, makes an artwork by building on their work and also encourages others to build on that artwork, not as "spectators / fans / customers" but as peers, the equal nodes of the culture, without having any hierarchy among them. this is a peer-to-peer (p2p) approach and it is the founding principle of the internet where computers connect to each other directly as equal nodes and share information freely instead of being mere "clients". it is also a fact that this principle of the internet has been dominated by hierarchical models by businesses on the internet, the biggest businesses of the world today. however, blockchain is important in this context because of being another "proof" of the power of peer-to-peer models over hierarchical ones. but more on blockchain later…

a peer-to-peer approach to culture should also acknowledge that "everyone is an artist". the hierarchy of the genius artist and their "clients" does not fit into this approach. also the artists as peers, as everyone should encourage others to build on their work, should give them not the "permission" but the "freedom" to build on their work. the most honest attitude to this approach is that of the free/libre culture movement, which is inspired by free/libre and open source software movements. free culture is about using free cultural licenses (https://freedomdefined.org) for cultural works which gives "everyone" the freedom to not just experience the work and share with others but also to make a new work by building on it and sharing that new work with others, too. there are many ways of releasing a work as a free cultural work; through legal licenses or personal statements without relying on the mediation of law, by dedicating to the public domain and using copyleft or non-copyleft approach, all having their own politics. a text on these options by özgür k., one of the peers at httpdot.net, is available at https://httpdot.net/OzgurK/OptionsForAnAuthor.pdf

back to cryptographic hash functions and nothing… there are various cryptographic hash functions such as md5, tiger, haval, whirlpool and sha-256. each cryptographic hash function calculates a different hash value, and maybe of different length, for a given input, due to their design. but the output for a given hash function is always same fixed length value for a given input.

sha-256 hash value for an empty string, no input, nothing is always calculated as e3b0c44298fc1c149afbf4c8996fb92427ae41e4649b934ca495991b7852b855

this is where it all begins for the exhibition. this is the proof of nothing, proof of its existence, proof of its integrity, proof for certifying it as a unique, original, authentic original work of art.

since each cryptographic hash function outputs a different value for nothing determined by their design, these might be seen as different interpretations of a single subject, like different artists interpreting a single subject differently and thus creating different artworks out of it. but art is about intention and if the intention of making something is not art, then it is not art, again according to the institution of art. so, a cryptographic hash function, say sha-256, is not art, even if it creates something out of nothing and also the author of sha-256 is not an artist, again according to the institution of art. the intention of making sha-256 is not making art but making something useful, something that will solve some problems. art is about just the opposite; asking questions instead of solving problems and it is independent of being useful. usefulness is an irrelevant concept for art, and this is what renders it as the domain of absolute freedom, freedom to deal with something that has no use for any practical matter, freedom to deal with nothing, which is what this exhibition is all about.

following the same principle that the intention of the artist is key to qualify something as a work of art, and that, what is "chosen" by the artist qualifies as art without requiring to be created by the artist; the artist, who is one of the peers at httpdot.net and who uses the pseudonym "the artist" (without quotation marks!:)) for their artworks, chooses nothing as a work of art. the work nothing is also titled *nothing*. nothing which the artist appropriates as their artwork is the one that hashes to the following value for sha-256 cryptographic hash function, the value also given above: e3b0c44298fc1c149afbf4c8996fb92427ae41e4649b934ca495991b7852b855

one can verify the authenticity of *nothing* as the artwork by the artist by using any sha-256 hash calculator and calculate the output, the hash, by supplying no input, by supplying nothing, by supplying the artwork to the hash calculator and compare the result to the value above, which is supplied in the certificate of authenticity of the work, certificate of authenticity of *nothing*.

nothing exists as itself, as nothing, as an artwork, and it can also be performed by anyone, by supplying no input to the computer, by doing nothing. neither the hash value of nothing nor the certificate of authenticity of *nothing* is the artwork; nothing is the artwork itself and the hash value is the proof of its originality, authenticity, uniqueness and the certificate of authenticity is the proof that *nothing* is an artwork by the artist, who digitally signed nothing as their artwork. the certificate of authenticity is what the artist certifies *nothing* as their artwork, what ties the artwork to the artist, and what artist certifies the work as their own original, authentic work of art.

the certificate of authenticity for artworks is what certifies an artwork typically in a reproducible form as an original artwork by a particular artist, who signs the certificate of authenticity to authenticate the work of art as original. this is what distinguishes an original and a copy, a fake. when a "sign" of the artist's "touch" is inherent in the work, when there is a sign of the unique style of the artist, such as in a conventional painting or a handmade sculpture, when the artwork is unique in the traditional sense, there is no need for a certificate of authenticity since the authenticity of the work can be determined by the experts in the field, like in a forensics process. also there is a long tradition of signing the artworks, not a certificate but the work itself. but when there is no sign to tie the work to the artist, to prove the authenticity of the work as a work of art by a particular artist, then the certificate of authenticity is the document to achieve that. the artist does not sign the work but the document, the certificate.

in mechanical reproduction, the quality of the reproduction decreases as the number of reproduction. that's why the artists' prints with lower edition numbers are more valuable than those with higher edition numbers. mechanical reproduction is also subject to generation loss: a copy made from another copy is of lower quality than a copy made from a master. the quality of the master also decreases as the copies are made from them. so the concept of the original and the copy makes sense for mechanical reproduction also in a physical sense. no two copies can be exactly the same, even if the difference is not noticeable. so the certificate of authenticity may not be mandatory for some mechanically reproduced works. a fake copy made from another copy, whether from certified first generation copy or from another later generation fake copy, will have a lower quality that can be detected more easily, again using forensics methods.

but how about digital information? how about an artwork in the form of digital information? the form of the many of the editioned contemporary works of art today…

digital information may be duplicated exactly and the original/copy distinction is irrelevant in technical context. all digital duplicates are exactly the same, they are digital multiples. so certification is the only method to distinguish a digital duplicate approved by artist as an "original", from an unapproved digital duplicate, which becomes a "fake" in this context. this is where the art market definitely needs a certification method for works in the form of digital information, which is again the certificate of authenticity of the artwork, because the artwork is not a unique particular physical object anymore, work of art is not unique by manifesting on a fixed tangible medium in its unique variant that can be certified. this argument may not make sense at first but if you think of a mechanical reproduction of an artwork, each mechanical reproduction on a physical medium is not a duplicate, even if one cannot notice any difference. this is because of the nature of analog information, which is not made up of small samples which are represented as discrete binary values, which in turn can be duplicated exactly, but exists as a continuous, analog information. think of prints… the noise introduced during the reproduction is also another limit for exact mechanical reproduction.

if we think of <u>electronic reproduction</u> in particular, instead of mechanical reproduction in a broader sense; not <u>digital electronic reproduction</u> but <u>analog electronic reproduction</u> where not the <u>discrete electric signals</u> but <u>continuous electric signals</u> are attempted to be reproduced, as the in the case of analog audio or analog video; an exact duplicate is also not possible, due to the <u>noise in analog electronics</u>.

to challenge the notions of <u>uniqueness</u> and <u>original/copy</u>, an <u>exact duplicate and transmission/dissemination is only possible through digital information and dematerialization of digital information is only possible through electronic digital information</u>.

let's have another parenthesis here by stating that <u>exact duplication possibility of digital information is not a property of electronics but that of the discrete nature of digital encoding of information</u>. even though "digital" is associated with electronics because the digital systems we use daily are mostly electronic digital systems. so what we refer to as <u>digital</u> is in fact <u>digital electronics</u> which uses <u>discrete electric signals as the medium</u> for dealing with digital information. this is important for <u>the cost of medium</u> on which electricity flows.

<u>electric signals</u> are not <u>fixed</u> on a medium but <u>flow</u> through the medium. this makes it somehow <u>independent of a fixed medium</u>. when transmitted through a cable, the <u>digital electronic information</u> flows through the cable and the same cable can be used later for transmitting other electronic digital information. this is also true for <u>analog electronic information</u> but it is subject to <u>noise</u> and analog electronic information <u>cannot be transmitted exactly</u>. when digital electronic information is stored on a memory, it changes the state of the transistor but this state can also be changed later multiple times without affecting the durability of the transistor much. if we compare this to <u>non-electronic but physical storage of digital information</u>, such as on an optical disc, a <u>dvd</u>, it is evident that the durability of a dvd for erasing the digital information written (burned, carved) on it and then writing another digital information is so much limited. this makes the <u>digital information dependent on a physical medium</u>, which is also <u>scarce</u>. the digital information does not flow but is fixed on the physical medium in this case. digital information storage method of <u>dvd media</u> is simple. binary values of digital information are represented on a dvd as "pits" and "lands". "0" or "off" state is represented by carving, making a pit on the surface of the dvd using laser, and "on" state is represented by a "land", by not carving, by not making a pit on the surface of the dvd, <u>by doing nothing</u>. this physical binary representation is read by laser again and if the laser is reflected by the surface of the dvd, it is read as "1" or "on" state, and if not reflected because of the pit, it is read as "0", "off" state. rewritable dvd media makes it possible to utilize a particular dvd media for "erasing" and rewriting binary data on it more than once, but the physical properties of the medium limits the number of rewrites. this makes dvd media <u>scarce</u> in terms of being a media suitable for <u>dematerialization of digital information</u>.

we may argue that <u>analog electronic representation of information was the first opportunity for dematerialization of art</u>. however analog electronic representation of information didn't allow exact

transmission or exact copy as explained above. this conflicts with the conventional perception of work of art being unique, original and authentic. so, an analog betacam video tape, which is copied from an analog betacam master through a component cabling connection, which allowed the minimum noise for transferring analog information through continuous analog electric signals, did not even produce an exact duplicate of the analog information stored on master analog betacam tape. this is not an original but a copy. only the master video tape, where the first generation of analog video information, the work of art is fixed on could be considered an "original" in this sense. all analog electronic reproductions differs from original, even if the difference is not noticeable.

the artist is the one who decides what is work of art. that is the artist who certifies something as a work of art. in this case of an editioned work of art as an analog betacam video tape, the medium on which the work of art is fixed as visual information, is certified as a work of art by the artist, by signing a certificate of authenticity which certifies a particular "edition" of work of art as unique, unique in itself as the current state of visual information fixed on the medium of analog betacam video tape, unique only as a combination of the visual information and the medium itself. and this edition itself is what is original and authentic as authenticated by the certificate of authenticity, which is certified by the the artist, by signing it. the signature of the artist is what certifies the artwork as authentic. now back to digital information and nothing, in relation to the notion of the signature of the artist.

most of the current certificate of authenticity schemes for works of art as digital information which does not rely on a particular physical medium do lack the mechanism of proof for connecting the identity of the artist to the work. no digital information relies on a particular physical medium because they can be duplicated exactly on another physical medium which allows exact representation of digital information. if there is no particular physical medium which constitutes the artwork together with the digital information carried on it, but the artwork can exist just as digital information independent of any physical medium then this can be argued to be the condition for an artwork to be dematerialized, be independent of the physical medium that would otherwise eventually lead to the commodification of the artwork. this was one of the promises of the idea of the dematerialization of art; to make art independent of being a commodity. however, *nothing* is a proof of how can a totally dematerialized work of art can be commodified. on the contrary it is also a proof that the commodity status of a totally dematerialized work of art can be challenged to imagine another relation between the money and art, and an abundance of both for everybody. *nothing* proposes one of these through use of digital signatures and the other through free culture approach. now more on these.

the artist digitally signed nothing as their artwork, which involves hashing nothing through a cryptographic hash function and then signing the hash of nothing with their private key. this process, digitally signing nothing, produces a binary value which is included in the certificate of authenticity of *nothing* along with the public key of the artist, both in hexadecimal representations. the binary value represented in hex is the digital duplicate of the signature of the artist on *nothing*, just like the signature of a painter on a painting, their artwork.

due to the nature of digital information this digital signature exists without being dependent on a particular physical medium. however, the certificate of authenticity of *nothing* is a physical document, a digital print on paper. and the certificate states that nothing is *unique*.

when an artist states that an artwork is unique and prepares a certificate of authenticity for that work, the certificate of authenticity also becomes unique. it should be unique because it certifies a particular work of art being an authentic artwork by that artist who signs the certificate which states that the artwork is unique.

in this case, *nothing* is unique, again becomes a statement with a double meaning: certifying *nothing* as a unique artwork, or a negative statement about the uniqueness of everything,

the certificate of authenticity of *nothing* has to be unique because otherwise it is fraud with a penalty of prison sentence. an artist may sign two paintings since each of them are unique artworks and they can also sign five certificate of authenticity for a work of five editions but each certificate should be signed for a particular edition of that work. just like an artist cannot sign two certificate of authenticity for the 3rd edition of an editioned artwork, the artist cannot supply more than one digitally signed certificate of authenticity of *nothing*. otherwise, as said, it is fraud.

the artist also cannot (shouldn't) make the digital document of the certificate of authenticity of *nothing*, which is used for printing physical certificate of authenticity, publicly available, say on the internet. because anyone can have an exact duplicate of this digital document and print it to prepare a fake certificate of authenticity of *nothing*.

but in this case there is also another problem: if both prints, the one that the artist printed and the one that is printed as a fraud by someone who downloaded the digital document are put next to each other, how to prove which print of the digital document is the "authentic" certificate of authenticity and which one is fake? since there is no sign of the "touch" of the artist, there is no proof of any connection between the artist's identity and the printed document. literal fingerprints (not the digital fingerprints but that of our fingers, literally) on the printed documents may undergo a forensics process and if there is the artist's fingerprint on one of the printed documents, this "can be" a proof of the originality of that document. however, this requires the artist's "touch", which is not a requirement for the contemporary works of art, according the institution of art.

so, digital document used for printing the certificate of authenticity shouldn't be made online and also "unique" physical certificate of authenticity shouldn't be made public too. neither itself in a public space nor a digital image of the whole physical certificate of authenticity, online. because the digital signature, which is printed on the certificate of authenticity as hexadecimal values, does not carry a sign of the artist's "touch". the physical signature of the artist, which is made by pen on paper can be

proven to be authentic, it can be proven that the artist has signed that document with great success, using forensics methods. the physical signature is like the literal fingerprint of a person. that is why physical sign is considered a proof. it is something which is hard to fake by someone else. however, digital signature of the artist is not a sign of something unique to the artist; it is a sign of what artist possesses: the private key which is used for signing the hash of *nothing* to certify nothing as an artwork by the artist, who possesses the private key.

in the scenario above where the "original" and the "fake" prints of the certificate of authenticity cannot be distinguished, the artist is the only person who can recertify any of them as the original, but as long as they have the possession of the private key which was used to digitally sign *nothing*. the artist may sign nothing again with their public key to prove that they are the artist who digitally signed it at first place since this digital signature can be verified using the public key, which is publicly available. if the artist loses the private key, then the artist may not even prove having digitally signed *nothing* at first place.

"unique" physical certificate of authenticity of *nothing* should not be made public, neither physically nor online because the hex values on the certificate which represent the digital signature of the artist on *nothing* can easily be copied and reproduced, once becomes public. it is a simple act of typing what one sees.

so, the certificate of authenticity of *nothing* is not made public on purpose. not to make or cause any *fraud for nothing*. only the artist, or the person who buys that artwork, *nothing*, who possesses *nothing,* should have access to the certificate of authenticity of *nothing*.

in this context the certificate of authenticity of *nothing* is what causes commodification of a totally dematerialized work of art, commodification of *nothing*. the certificate creates a unique object out of *nothing*, which will eventually be commodified.

certificate of authenticity of *nothing* is not exhibited in the exhibition not only to prevent being treated as the artwork itself, instead of *nothing* being the artwork, literally, so that *nothing* cannot be materialized and commodified, but also certificate of authenticity of *nothing* is not exhibited in the exhibition because of the opposite possibility that it would prevent *nothing* from being commodified. because once the digital signature on the certificate of authenticity is made public, anyone can make a certificate of authenticity of *nothing* using the printed hex representation of the signature of the artist on *nothing* by simply duplicating those printed hex values. since there will be no proof for which one is the certificate of authenticity of *nothing* printed by the artist, there will be a multitude of certificate of authenticity of *nothing*, which will harm its uniqueness and proof and thus its commodification. the institution of art has to admit the nature of the relation between an artwork's exchange value because of being a scarce commodity, or at least having limited accessibility; and its artistic value; and that both are recursive.

besides the certificate of authenticity there is another related conventional method for the proof of the possession of an artwork of a particular artist. the <u>artwork purchase agreements</u>… it is also a convention that, an artwork purchase agreement is made between and <u>signed</u> by the <u>previous owner</u> of an artwork and the <u>new owner</u> of it. artwork purchase agreement is made between and signed by <u>the artist</u> (or a legal representative of the artist, such as the art gallery) and the <u>first purchaser</u> when an artwork is <u>sold for the first time</u>. when the artwork is sold again by the first purchaser to another party, a similar artwork purchase agreement is made and signed by them. artwork purchase agreements are about the ownership status of the artworks which may seem to conflict with free culture approach but a work titled "*artwork purchase agreement [for copyleft works of art]*" by one of the peers at httpdot.net under the pseudonym " hereinafter 'the artist' " claims another possibility (https://m-est.org/2018/01/22/vasiyetimdir-hereinafter-the-artist/)

artwork purchase agreements have <u>legal validity</u>, like the certificate of authenticity. in the lack of a certificate of authenticity, artwork purchase agreement may be used "<u>as a proof</u>" the <u>authenticity</u> of the artwork, along with the current <u>ownership</u> of it, if it is made between the artist and the first purchaser. later purchase agreements between future owners of the artwork is also a <u>proof</u> for the current ownership of the artwork and it can even be a proof of the authenticity of it, if all agreements can be <u>traced back to the artist</u>. <u>blockchain technology</u> features a new possibility for both <u>proof of the authenticity</u> of the artwork and its <u>current ownership status</u>. the legal validity of this new method may be subject to discussion but it features a much more <u>secure way to verify and trace the authenticity and the ownership status of an artwork</u>, (especially those in the form of digital information) than the <u>certificate of authenticity</u> and the <u>artwork purchase agreement</u> offers.

after a discussion of *nothing* being <u>a proof of how can a totally dematerialized work of art can be commodified</u>, now it is time for the discussion of <u>how *nothing* can challenge the commodity status of a work of art</u>.

the <u>certificate of authenticity</u> of nothing also reads: "<u>*nothing* is appropriated by the artist, but also nothing is appropriated by the artist; *nothing* is dedicated to the public domain.</u>"

this is not a <u>legal method</u> of <u>dedicating an artwork to the public domain</u> and thus it can be invalid in legal terms in some jurisdictions. also dedicating a work of authorship to the public domain is <u>not even possible</u> in legal terms in some jurisdictions but since it is the statement of the artist and since it is stated in a certificate of authenticity, it makes *nothing* a <u>free cultural work</u>, whether legally forcible or not.

dedicating a work to the public domain means that <u>the author waives all copyright</u> on the work along with <u>all related and neighboring rights</u>, such as <u>moral rights</u>. so the status of the work becomes a <u>commons</u>, in a sense. anyone may use the work for any purpose, including <u>commercial use</u> (<u>all free

cultural works allow commercial use, which makes it possible to imagine another economics but it is the topic of another discussion), and even without requiring attribution to the author who dedicate it to the public domain.

dedicating a work to the public domain is different than copyleft, which is another method of releasing a work as a free cultural work. copyleft approach, introduced by gnu gpl free software license, has its own politics and it requires any work built on a free cultural work be distributed as a free cultural work as well. instead , anyone can appropriate a work dedicated to the public domain and force their copyright on the appropriated version, which becomes a conventional copyrighted work.

even though appropriation has been an important artistic strategy under that particular term in contemporary art since half a century, it has a negative connotation in general. in contemporary art it is a politically strong demand of the artist from the mass culture. the statement in the certificate of authenticity of *nothing* refers to both connotations of "appropriation". the artist appropriates nothing as their artwork but instead of demanding exclusive control of *nothing*, they dedicate *nothing* they appropriated back to the public domain. however this is not a common approach for appropriated works in contemporary art.

the statement "*nothing* is appropriated by the artist" again allows two opposite understandings. one is when nothing is nothing, and the other is when *nothing* is an artwork. and the following statement, "*nothing* is dedicated to the public domain" also allows two opposite understandings the same way. and finally all statements together contribute to exhaust the new language suggested around the notion of nothing, language of contemporary art and the logic of blockchain.

public domain dedication statement makes it possible for anyone to appropriate *nothing,* without attributing the artist. one can appropriate it under their own copyright and another can appropriate it as a free cultural work. if the latter chooses to certify *nothing* they appropriate not as a unique free cultural work but instead certify *nothing* a free cultural work in an unlimited edition, then it becomes a totally dematerialized work of art and also resists commodification.

this is the end of work in progress text by peer on "blockchain is… / …for nothing" exhibition by peers at httpdot.net
later versions of this text for "blockchain is… / …for nothing" exhibition by peers at httpdot.net be updated with the discussion of the other works in the exhibition as well as a revised version of this text.

appendix: the relation between information, digital information, hash value; and nothing

information can be encoded (represented/mapped) as digital information by sampling the information and then representing the sampled values as digital information; sequences of binary values, binary code, along with a definition of a particular digital encoding, which are the rules for how sequences of binary values are mapped to samples of information. digital encoded values can be transcoded (sequences of binary values being mapped to other sequences of binary values, in a lossless or lossy way) into various other digital encoded values. letter "a" can be digitally encoded as (mapped to) "10101001", or as 1"1001010", or as any other digital value (sequence of binary, two state values such as 1/0, true/false, on/off) and this digital value then can be decoded (reversing the mapping) to letter "a" again, a form of information through which "we", communicate. what is important here is the mapping rule which defines which sequence of bits are mapped to which values.

digital information is usually described as ones and zeros. however these ones and zeros are also not what is processed by the computer or what is stored on memory. they are also a representation: a mapping of two different states. these states are "on" and "off" for a transistor in memory, or "pits" and "lands" on an optical media such as dvd. so, a sequence of binary coding can also be represented as "+" signs and "-" signs, such as "++-+---". the same value here can also be represented as the opposite, if the mapping is reversed: "--+-+++". in first mapping, "+" is mapped/assigned to the "on" state, and in the second mapping this time "+" is assigned to the "off" state. both will represent the same thing, if mapping/encoding rule is known.

computers are designed to process binary codes, the digital values. a "1" or a "0" is one binary digit, which is called a bit, which is the smallest digital value. "00" (or "01", "10" and "11") are 2 bits. we can represent 2 different values with 1-bit, and 4 different values with 2-bits. the math for calculating how many discrete values can a sequence of binary digits represent is: 2 to the power "number of digits"; or, "multiply 2 by itself as much as the number of digits". since digital information is all about representing information as a sequence of bits by mapping each sample of the information to a sequence of bits, we need to have a bit size that is enough to map all possible values of a sample. if the information we like to represent as digital information is a three-digit decimal number such as "657", it can be sampled digit by digit and representation of each digit must be able to represent 10 discrete values (0-9). to represent 10 discrete values in binary we need 4 binary digits, 4-bits. 3-bits is not enough, which can represent only 6 different values (2x2x2=6). 4-bits can represent 16 different values (2x2x2x2=16), which is more than enough and the remaining 6 values can will wasted (or used for other purposes in this particular encoding (mapping rule). so, we can map decimal "0" to binary "0000", decimal "1" to binary "0001", decimal "2" to binary "0010" and so on. this mapping of decimal digits to a sequences of binary digits is a particular digital encoding. but this is just one of the possible digital encodings of decimal digits to represent decimal values, one of the possible mapping of decimal digits to a sequence of binary digits. using 4-bits, we may also map each sequence of 4 digit binary values to 16 shades of grey, for representation of the color of pixel in this case, which is a sample of

an image. so "0000" in binary may refer to the decimal number "0" in a decimal digit and "0000" in binary may also refer to the darkest gray, which is black, for another sample, a sample of an image, a pixel. what is stored and processed by computers is binary but what this binary representation refers (maps) to, represents, is about the digital encoding of choice.

hash values are usually represented in hexadecimal digits (in a single digit, using values 0-9 and a,b,c,d,e,f; where both lower and upper case representations of a letter refer to the same value; so "a" maps to same value as "A") that can represent 16 different values for a single digit. 4-bits, four binary digits (16 different values) can be represented by a single digit hexadecimal value using hexadecimal representation, which is also called hex. so, how long, a sequence of how many hexadecimal digits is suitable for a cryptographic hash function? what is a suitable length for a hash value? a hexadecimal hash value of "d5" represents an 8-digit binary value, 8-bits, a sequence of 8 ones and zeros. 8-bits of digital information can represent only 256 (2 to the power 8; multiply 2 by itself 8 times) different values. no matter how advanced the hash function is, there is no way two inputs will not hash to the same value: there will be a hash collision for sure, in a set of more than 256 inputs. pigeonhole principle explains this rule. so cryptographic hash functions are designed to output a much longer fixed length hash value. for example, sha-256 cryptographic hash function outputs a 256-bit hash value and you are welcome to calculate 2 to the power 256 to see how many different values, mappings, pigeon holes 256-bit allows.

so, what does it mean when one says "hash value of "hello world" (without quotation marks) is b94d27b9934d3e08a52e52d7da7dabfac484efe37a5380ee9088f7ace2efcde9"?

this 64-digit hexadecimal (base16) representation is the same as the following 256-digit binary (base2) representation:
1011100101001101001001111011100110010011010011010011110000010001010010100101110010 1001011010101111101101001111101101010101111111010110001001000010011101111111000110111 1010010100111000000011101110100100001000100011110111101011001110001011101111110011011 1101001

which is the same as the following decimal (base 10) representation we daily use for representing numbers:

83814198383102558219731078260892729932246618004265700685467928187377105751529

each of these representations refer to the same value, determined by their base number, their encoding (mapping) rule, which determines how many distinct values each digit can have. but what is the relation of these values to "hello world"? "hello world" is a text representation of something one can say in english. what is said in english is represented as the letters "hello world". but this information cannot be processed by a computer to calculate a hash value of it. so this text representation must be

encoded as digital information in order to be processed by a computer. for doing so, each letter of the alphabet is mapped to a sequence of bits according to the rule of which letter is mapped to which binary value in the chosen character encoding. there are various character encodings such as ascii and utf-8. the character set of the computer system used for calculating the above hash value for "hello world" is utf-8 and "hello world" maps to the following value in binary for utf-8 character encoding:

0110100001100101011011000110110001101111001000000111011101101111011100100110110001100100000001010

the calculation for outputting sha-256 hash value for the input "hello world" is actually done on this sequence of ones and zeros. not on the letters of "hello world", as the information we perceive. the hash is calculated on the value we supplied to the computer through a keyboard as the input and this input is encoded as binary values using the character encoding (mapping) of the operating system of the computer and the hashing operation is done on this binary value. what we see as hexadecimal values on the computer monitor as the hash value is the hexadecimal representation of the binary values processed, calculated by the computer. in fact they are not even these values, they are the visual analog information, the light, which is produced by the computer by transcoding the calculated binary hash value to hexadecimal representation first, and then transcoding these characters (hexadecimal representation) to digital pixel values, which are finally converted to visual analog information, the light which we see as hexadecimal characters on computer monitor.

so, when one calculates the hash of nothing by supplying no input to the computer, the hash calculation is done by the computer by processing which binary value?