

# Hello, World. The Artist's Palette Using New Media among Atoms, Bits, and Connectivity

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## Abstract

The present work looks into the specificity of the artist's palette with new media, focusing the analysis on the association between bits and atoms within the artistic field. The concepts of materiality, immateriality and neomateriality are examined to describe the particular features assumed by the dichotomy tangible/intangible in Art with New Media. Through the analysis of a corpus of works, we present a set of possibilities, issues and questions from our times, examined in context under the light of artistic movements from the 20th century like Conceptual Art and Pop Art. Finally, we explore the role of computer code—and the datum—in the expansion of the expressive palette.

## Keywords

Bit, Atom, New Media, Expressive Palette, Artist, Materiality, Immateriality, Neomateriality, Data, Poetry

## Introduction

The word 'Multimedia' emerged to designate a new practice mediated by digital and electronic devices. Formed by the prefix 'multi' and the noun 'media', this term focuses its meaning on the idea of a multiple set of media somehow articulated in a convergent way. It is proposed as a descriptive concept, emphasizing the quantitative dimension.

In relation to the name of the discipline, it is important to mention the concept proposed by Dick Higgins from the Fluxus movement in 1965, who coined the term 'Intermedia' to designate the production of those times, which seemed to fall in between media, without being encompassed by any of the rigid categories marking off boundaries between artistic disciplines. As Higgins (1966) explains:

For the last ten years or so, artists have changed their media to suit this situation, to the point where the media have broken down in their traditional forms, and have become merely puristic points of reference. The idea has arisen, as if by spontaneous combustion

throughout the entire world, that these points are arbitrary and only useful as critical tools, in saying that such-and-such a work is basically musical, but also poetry. This is the intermedial approach, to emphasize the dialectic between the media. A composer is a dead man unless he composes for all the media and for his world. (Higgins, 1966)

In 1995, Higgins created a chart to represent these zones of disciplinary intersection. We should also note the out-line he drew in 1981 in relation to the Fluxus proposal from the 60's.

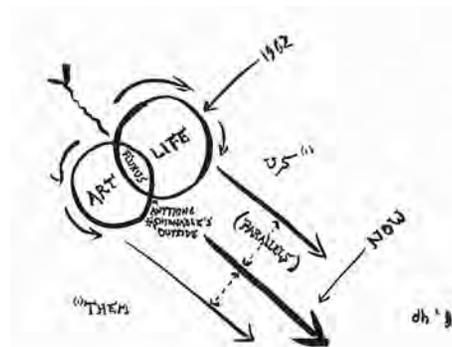


Figure 1. Fluxus Chart. 1981. Author: Dick Higgins. Source: George Maciunas Foundation Inc.

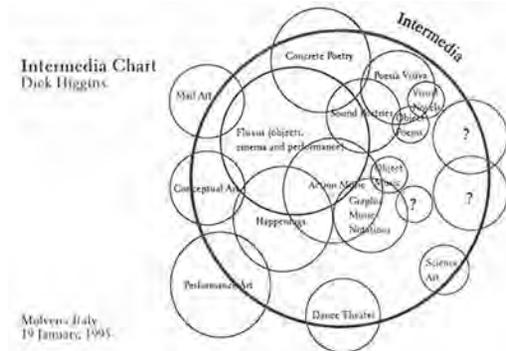


Figure 2. Intermedia Chart 1995. Author: Dick Higgins. Source: George Maciunas Foundation Inc.

Both terms—'Multimedia' and 'Intermedia'—underscore the material constitution of the works, i.e. the media they form part of as they are created, as a consequence of belonging to a certain type of disciplinary practice. Nevertheless, the 'Intermedia' concept may be extended beyond a quantitative description to establish, through the prefix 'inter', a certain focus in the association between media, an aspect that is materialized in the chart and the overlapping zones indicated.

### Multimedia in the Era of Personal Computing

Multimedia from the 90's appeared with the emergence of the personal computing paradigm and the desktop metaphor. Thus, the first multimedia productions were made in CDs or DVDs, constructed by the combination of images (both fixed and moving) + sound + interactivity. In this scenario, experience was always circumscribed to the monitor limits and to conventional interfaces (keyboard and mouse). Atoms (the physical) and bits (the virtual) were presented as clearly separated. An example of this model may be found in the work «Eve», by Peter Gabriel, developed in 1996: a 360° environment which offered a tour through different spaces presenting playful challenges.

Emphasis on the visual character of multimedia, in the first place, and on sounds, in the second place, was a constant feature. The next prevalent feature was interactivity and the possibility of swapping images and sounds, creating a particular journey in each interaction, which exalted nonlinearity and choice as distinct features in these multimedia experiences. Even though these experiences and configurations are associated with

the beginnings, the current Internet browsing model follows the same principles: we get in contact with contents—primarily images, sounds, and text—through a screen where we focus our attention.

In this sense, the first phase of multimedia would focus on its construction through the combination of preexisting media, prioritizing two-dimensional images—now built out of pixels—and acoustic stimuli. This first phase, on the other side, was characterized by a break from other artistic practices. Analogical disciplines would see in image production based on pixels and audio files an irreconcilable difference between the world of analogical technique and the enigmatic world of hardware and software. This is the reason why digital artists and artists working with analogical materials believed they spoke different languages and were even in different dimensions—two-dimensional and three-dimensional, material and immaterial.

### Multimedia in the Era of Ubiquitous and Physical Computing

At the beginning of the 21st century, in addition to this monitor-based practice, a new expansion of the Computing field towards the three-dimensional space was incorporated. The Interactive Installation was one of the genres that were strongly impacted by this change, where the monitor screen was not the exclusive space for multimedia experience.

Almost at the same time as Gabriel's project, other artists experimented with different formats. A work like «Genesis», by Eduardo Kac, already envisioned in 1998 different paths for the discipline, in the intersection between Art, Science, and Technology.

The work takes an extract from the Bible, which is translated into Morse code, and this in turn is translated into DNA pairs. Bacteria are placed in a Petri dish and exposed to ultraviolet light (operated by the public), which accelerates the mutation process of the "artistic gen" applied to the bacteria. Once the experience is over, the DNA pairs are back-translated into Morse code to finally get back to the Bible extract mutation.

A more recent work, "Data Falls" by Domestic Data Streamers from 2014, proposes to take data from public behavior in an exhibition into the material plane. Measuring the time people stand before the works of art, collected data are turned into sand grains that fall within large hour-glasses with the intent of materializing something as imperceptible and subjective as spectatorial delight.

Both this work and the preceding one—and some

examples we will mention later in this work—introduce different modes of articulation regarding Multimedia through the monitor.

These differences may be understood in the wider landscape of changes in the field of computing development and interfaces. Specifically, this line of work may be interpreted under the light of technological eras proposed by Mark in the 90's:

The important waves of technological change are those that fundamentally alter the place of technology in our lives. What matters is not technology itself, but its relationship to us. In the past fifty years of computation there have been two great trends in this relationship: the mainframe relationship, and the PC relationship. Today the Internet is carrying us through an era of widespread distributed computing towards the relationship of ubiquitous computing, characterized by deeply embedding computation in the world. (Weiser, 1996)

We are immersed in the era of miniaturized devices, which get more and more powerful, capable of surpassing the boundaries of the monitor. "Ubiquity" is a hallmark of our times regarding computing devices. These changes require reflections on materiality and the dematerialization processes.

### **Materiality, Immateriality, Neomateriality**

Art, from a classical perspective, from Plato to the present day, resonates with the idea of materiality—sensible matter as a substance to mold. This implies combining and recombining atoms in multiple ways. In 20th-century Art, many of these considerations are reformulated, though running in parallel and under different forms.

In his 'Six Memos for the Next Millennium', when analyzing the principle of 'lightness', Calvino (2008) states:

Today every branch of science seems intent on demonstrating that the world is supported by the most minute entities, such as the messages of DNA, the impulses of neurons, and quarks, and neutrinos wandering through space since the beginning of time. (p. 24)

In the reference to the idea of scientific paradigms there is matter dialoguing with a more subtle, invisible dimension. If matter may be perceived through the

senses, thinking about the imperceptible leads to revising the role of materiality in the world and in Art.

The advent of computing devices introduced the notion of 'Bit', a neologism that condenses the words Binary Digit.

It is defined as a digit which is capable of assuming either of two states: 0 and 1; on or off. It is the base principle for computer calculation. Its disruptive emergence introduced conscience about an immaterial dimension, with a marked focus on abstraction.

Philippe Dubois (2001) states that, in terms of image production machines, we are witnessing a growing dematerialization process, which with the synthetic (digital) image has reached its peak. When defining this state of affairs, he affirms:

We are far away from the matter-image of painting, the fetish object of photography, and even the dream-image of cinema which comes from a tangible still image. It is more of an abstraction than an image. Not even a spiritual vision, but the product of a calculation. (...) From there undoubtedly arises, as a compensatory reflex, the particular impulse in that sphere towards everything that comes from the reconstitution of materiality effects. The lack of materiality in computing is such that every aspect related to touch is of uttermost interest. (p. 28)

The image still constitutes the point of reference; the visual element is the main basis for analyzing the changes that take place in terms of media. Acknowledging Dubois lucid argumentation, we could wonder if this immateriality aspect has any precedents in the artistic field, in order to find threads in history that may allow us to understand continuities and disruptions in contemporary art.

In this sense, we believe it is important to recover some of the ideas developed in the 60's, particularly the idea of 'dematerialization of art' introduced by Conceptual Art. Lucy Lippard (1968) states:

During the 1960's, the anti-intellectual, emotional/intuitive processes of art-making characteristic of the last two decades have begun to give way to an ultra-conceptual art that emphasizes the thinking process almost exclusively. As more and more work is designed in the studio but executed elsewhere by professional craftsmen, as the object becomes merely the end product, a number of artists are losing interest in the physical evolution of the

work of art. The studio is again becoming a study. Such a trend appears to be provoking a profound dematerialization of art, especially of art as object, and if it continues to prevail, it may result in the object's becoming wholly obsolete. (p. 31)

Lippard's statements are in agreement with Dubois (2001) who describes the process of progressive image dematerialization as becoming "less and less 'object,' and more and more 'virtual'" (p.28)

Arthur Danto (2000) points out: "(...) conceptual art demonstrated that there need not even be a palpable visual object for something to be a work of visual art" (p.35).

The gradual loss of interest in" the physical constitution of a work of art and the emphasis on the conceptualization process allowed the emergence of an Art trend which enabled immateriality to become an instance of artistic modeling; art would not only be performed on the sensorial plane, but also on the intelligible plane. Participation aesthetics and digital media constitution may be interpreted as the continuation of some of these principles.

North American group Swamp created the work "Spore 1.1" and put to the test the promise of a company—Home Depot—to provide an unconditional 1-year warranty for the plants they sell. The work creates an ecosystem composed of a plant bought in Home Depot, and a system with Wi-Fi connection that monitors the company stock values in the market. If values increase, the plant is watered and, therefore, it can grow at the same rhythm as the company's economics. On the other hand, if values go down, the plant dies and is returned to Home Depot for replacement.

Another interesting work that is worth noting in this sense is «Drawing with Global Technologies» by Andrea Di Castro. Movement through air or sea is registered by tracking coordinates via GPS and then converting them into visual strokes. As expressed by the author (Di Castro, 2015), "movement is turned into a stroke, with nature as its medium". Thus drawings can become as large as hundreds of kilometers.

In the examples referred to above we can observe a material form sculpted by an immaterial principle that is a consubstantial part of the work: stock exchange values representing a volatile and immaterial financial system; movement by earth or air across long distances; the degree of interest in a certain work.

If 'bits' are associated with dematerialization and 'atoms' with materialization, it may be interesting to think about what happens when both dimensions, far from presenting fixed or clear-cut boundaries, connect with each other, in new forms or formations.

In a recent article, theorist Christiane Paul (2015) reflects about materialities in the context of digital technologies and art, and proposes the term 'neomateriality' as a current condition of matter and objectuality:

Neomateriality describes the embeddedness of the digital in the objects, images, and structures we encounter on a daily basis and the way we understand ourselves in relation to them. It finds different kinds of expression within contemporary culture and artistic practice in the form of objects or artworks that 1) use embedded networked technologies, reflecting back their surrounding human and non-human environment; 2) reveal their own coded materiality as part of their form, thereby becoming them-selves a residue of digital processes; 3) reflect the way in which digital machines and processes (seemingly autonomously) perceive us and our world. (p. 1)

We could mention the work «City Rythms» as a manifestation that responds to this condition of the present times. Artists Mar Canet and Varvara Guljajeva take geolocalized data from Twitter, Flickr, and YouTube activity as raw material and translate it into various metronomes moving to the beat of content flow uploaded from different cities around the globe. As the authors themselves explain:

Our concerns are about the malleability of the digital world to the physical one, and the interpretation of social data for artistic purposes. (...) The installation is a sonic and at the same time visual interface for perceiving the urban life and culture of different locations. Moreover, it gives an alternative meaning and purpose to the location-specific invisible online data. (Canet, Guljajeva, 2011)

This is an explicit manifestation of the particular malleability that the digital world may impose on the physical world, and the possibility of using—as raw material to be molded—social data, which are invisible as statistical results about collective behavior in cyberspace but which are operated from specific physical coordinates.

In this sense, the object—the materiality—is transformed and, in the pendulous regularity that characterizes it, a wedge is introduced: it responds to the bits flowing in from an invisible torrent, a force that informs the form.

This neomateriality, according to Paul, responds to a post-digital and post-Internet stage in art. In these terms she refers to “a condition of artworks and “objects” that are conceptually and practically shaped by the Internet and digital processes yet often manifest in material form” (Paul, 2015, p.1).

This is where, within the field of Art, we may recognize the presence of the Ubiquitous Computing paradigm as the era following the Personal Computing era. In order to understand the depth of the changes that have taken place and the potential changes in the aesthetics sphere, we need to dive into the scope of this neomateriality, the constitution of the digital medium as such, and its relationship with atoms.

### **Digitalization as a Metamedium**

In his celebrated book “Expanded Cinema”, Gene Youngblood suggests that all the phenomena of life on earth will constitute the artist’s palette. While all the phenomena of life on earth have always been incorporated into the work of art in terms of topics and partially in material terms, the current state of art offers a new landscape regarding materials, in which literally all phenomena may be part of the artist’s expressive palette.

We should also mention a second interesting idea introduced by Youngblood when relating this possibility to technological advance. Of course, computing tools in the 70’s were completely under development but, if this is what he could observe at the time, we might imagine how this perception would have been expanded almost half a century later, with a growing and more fluent association between bits and atoms.

The radical novelty lies in the medium allowing the connections: potentially all analogical differences can vanish in the sphere of mathematical modeling and binary representation. It is this common layer that makes the poetical approach to everything that exists in this world a real possibility, the potential of having the world as content: thus we are able to associate stock exchange values to the regulation of a watering mechanism in the installation “Spore 1.1” by SWAMP; to convert movement in space into a stroke, as in the work of Andrea Di Castro’s “Drawing with Global

Technologie’s”; to have social media posts from some unknown location mark the rhythm of a metronome in some other location; to turn the time one stays in a certain space into sand grains being proportionally released and falling, under the force of gravity, into a container as in “Datafalls” by Domestic Data Streamers.

In his book «Software Takes Command», Lev Manovich (2013) makes use of the metamedium notion to express the profound cultural changes of our times:

[The computer] is a medium that can dynamically simulate the details of any other medium, including media that cannot exist physically. It is not a tool, though it can act like many tools. It is the first metamedium, and as such it has degrees of freedom for representation and expression never before encountered and as yet barely investigated. (Lev Manovich quoting Alan Kay, p.91)

It is precisely the scope of this metamedium that generates a growing connectivity.

It is time we started thinking in terms of not only the substance of matter, but also the patterns that govern matter.

Gregory Bateson coined the term ‘the pattern which connects’ as a primary value when studying life—beyond the study of external differences among species—which becomes absolutely relevant and operational in connection with the field of relational aesthetics. Bateson (2002) states:

In truth, the right way to begin to think about the pattern which connects is to think of it as primarily (whatever that means) a dance of interacting parts and only secondarily pegged down by various sorts of physical limits and by those limits which organisms characteristically impose.

The Bit constitutes a link that connects and creates the neomateriality postulated by Paul. One of the steps in this direction was taken by Hiroshii Ishii from Tangible Media Group, whose main purpose is to provide physical form to digital information. One of the last concepts they have been working with is that of ‘radical atoms.’ Hiroshii Ishii (2012) affirms:

Radical Atoms takes a leap beyond tangible interfaces by assuming a hypothetical generation of materials that can change form and appearance dynamically, so they are as reconfigurable as pixels on a screen. Radical Atoms is a vision for the future

of human-material interactions, in which all digital information has physical manifestation so that we can interact directly with it. (p. 38)

### **Code as a Material Esperanto and the World's Brush**

It belongs to the very character of the creative mind to reach out and seize any material that stirs it so that the value of that material may be pressed out and become the matter of a new experience.

John Dewey

So far in this paper we have examined the uniqueness in the combination of materialities and immaterialities; we have established that the digital code acts as a metamedium and is responsible for the creation of new relational, intersubjective, rhizomatic experiences.

In computing practice, there is a program which is used as a first approach to a new programming language or environment. It is called 'hello, world'. This greeting to the world is the crystallization of the first contact with everything that is beyond code. From a certain perspective, it could be interpreted as a group of words with high symbolic content. The code becomes an abracadabra, an open sesame for the connection of phenomena in the world, in the sense that it is configured as a common layer that encompasses both the substance and the pattern.

Youngblood's aspiration is literally reflected on this initial programming statement. Dewey (2008) also provides an interesting look in relation to materials, society, and their implications for the work of art, as follows:

The materials of nature and human association are multifarious to the point of infinity. Whenever any material finds a medium that expresses its value in experience—that is, its imaginative and emotional value—it becomes the substance of a work of art. The abiding struggle of art is thus to convert materials that are stammering or dumb in ordinary experience into eloquent media. Remembering that art itself denotes a quality of action and of things done, every authentic new work of art is in some degree itself the birth of a new art (p. 258).

This notion of dumb materials in ordinary experience resonates with Pierre Levy's idea about the role of the new artist who sculpts the virtual:

It is less a question of the artist interpreting the world than of allowing existing or hypothetical biological processes, mathematical structures, social or collective dynamics to speak directly. In this sense art no longer involves the composition of a 'message' but the creation of a mechanism that would enable the still silent component of cosmic creativity to give voice to its song. (Levy, 1999, p. 117)

The voice which may leave dumbness behind is, in this context, a product of a connection between bits and atoms. Code would act—in a metaphorical sense—as an Esperanto on the material plane, as a codification which may universalize languages and be proposed as a point of contact among the vast differences in language, media, form, formation, and genre.

The work "Keep Alive" by German artist Aram Bartholl takes a rock and fire as actions to give life to the virtual world of a local network that allows the download of survival guides in PDF, as well as the upload of files to be kept in the network (not the Internet, but a local network).

It is interesting to see how the artist connects two situations that are so distant in time: the ancestral rock and fire regulating the existence of a technological network by turning heat into electrical energy. Here we see a world that is reconciled in space and time—the ancestral is a portal to the contemporary tool, and to survival guides, in a world where technology, apart from its obvious benefits, reveals some sharp edges.

The title makes reference to a code—Keep Alive—which is used to send empty messages among network terminals as a way to maintain connection. What is expressed here—once again, in symbolic terms—is the close link between technology and life.

In this sense, we may reinterpret the chart created by Higgins in relation to the Fluxus proposition from the 60's, a movement that occupied a place of intersection between Art and Life. Considering that Fluxus highlighted the process, we may observe a continuity in relational aesthetics, under different forms, of the principles which pulsed in the imaginary of 20th-century artists.

We may also note how code enables us to work flexibly with the micro and the macro, amplifying or attenuating phenomena, connecting materialities and immaterialities at different scales.

The world is revealed in all its dimensions, and it

is even possible to create a story based no longer on the pixel but on the atom in its constitution as such, positioned in space. This development entitled “A boy and his atom” was carried out by IBM in what they described as the world’s smallest movie. There each atom is part of the constructed image.

This code as Esperanto is what also enables multiple translations. When analyzing various works connecting bits and atoms, we will find this dynamic of passages among different materialities, and fundamentally the association between the intangible and the tangible, in two-way trajectories.

### **The ‘Datum’ and the Work of Art as ‘Being Made’**

When speaking about the end of art, I do not dismiss the possible emergence of unimaginable technologies which could be at the artists’ disposal and have the same spectrum of creative possibilities as easel painting and computers. Seriously, how could I?

Arthur Danto

Bearing in mind the tensions that have arisen throughout history in relation to the place occupied by the *idea* and the *form* in artistic creation, it is time we consider that—in relational aesthetics—a new entity has emerged between *idea* and *form*: the datum, information. Neomateriality implies a set of differential resources in the field of art. Regarding relational aesthetics, Nicolas Bourriaud (1998) states:

The form that each artist gives to this relational production is not unalterable. These artists perceive their work from a threefold viewpoint, at once aesthetic (how is it to be “translated” in material terms?), historical (how is to be incorporated in a set of artistic references?) and social (how is to find a coherent position with regard to the current state of production and social relations?). These activities evidently acquire their formal and theoretical marks in Conceptual Art, in Fluxus and in Minimal Art, but they simply use these like a vocabulary, a lexical basis. (p. 46)

In 2011, Kevin Slavin—in a conference from the series TED Talks—gave a presentation entitled: “How algorithms shape our world”. During his exposition, he analyzed the different ways in which algorithms and data analysis impact various scientific and cultural fields,

warning about how little is known about the effects of lines code. By means of a metaphor, he endowed mathematics with a seismic power:

And the landscape was always made by this sort of weird, uneasy collaboration between nature and man. But now there’s this third co-evolutionary force: algorithms (...). And we will have to understand those as nature, and in a way, they are. (Kevin Slavin, 2011)

At this point, it becomes evident that the datum is acting as a binder connecting the different phenomena in the world. These potentialities open up situations where image and sound, together with all the possibilities of space-time articulation, are no longer univocal resources in artistic creation. On the contrary, the artist’s palette is extended to include a wider set of phenomena encompassing previous resources and incorporating the voice of those phenomena which remained materially dumb, as human behavior, for example. Lucy Lippard (1968) postulates “Dematerialized art is post-aesthetic only in its increasingly non-visual emphases. The aesthetic of principle is still an aesthetic, as implied by frequent statements by mathematicians and scientists about the beauty of an equation, formula or solution” (p.31).

The datum may be born mathematical, that is, begin its existence through its own abstraction or intervene in the process as a derivation of an analogical process turned digital.

The flexibility or fluidity acquired by the atom or bit may be framed within a wider context where liquidity seems to be a hallmark of our times, as Zygmunt Bauman (2004) postulates:

The extraordinary mobility of fluids is what associates them with the idea of ‘lightness’ (...) These are reasons to consider ‘fluidity’ or ‘liquidity’ as fitting metaphors when we wish to grasp the nature of the present, in many ways novel, phase in the history of modernity. (p.8)

The idea of a flow process, modeling the interaction between the solid and the evanescent (the Fluxus movement was a clear example in this sense), acquires a renewed relevance. In addition, if Pop Art recognized that every material could be part of the artistic work, a continuity may be established between Duchamp’s concept of ‘*ready made*’ and the idea of ‘*being made*,’ a

work of art as a process in Present Continuous, flowing between the intangible and tangible dimensions and manifesting itself in the most varied forms, with no frames, no clearly defined boundaries.

### Conclusions

The Personal Computer as an initial support for multimedia practices favored the appearance of a rift in traditional procedures and materials when it entered the world of Art, and divided practices in terms of analogical and digital procedures. The idea that bits and atoms can merge more and more and become integrated into various physical media, beyond the image and the sound, would provide a new layer for the creation of interactive media but also fundamentally a layer connected with previous—nondigital—disciplines like sculpture, plastic arts, industrial design, music, theater, etc.

A wide variety of contemporary genres evidence a trend that seems to lead algorithms toward the physical realm and open up a fruitful field of application for finding in bit-augmented atoms new resources to expand the expressive palette of contemporary artists and designers.

In this sense, the concept of neomateriality offers a new point of view, no longer opposing the physical and the virtual, but proposing a scenario of mixture and fluidity between both states.

If Conceptual Art and the notion of dematerialization of art as an object prioritized the thinking process, these days another abstraction process—like the digital medium itself essentially is—can transform matter, endow it with properties that are unimaginable in the purely analogical field.

The concept or the materiality of the work are no longer the two unique and exclusive realms where poetic gestures can be sculpted: the pattern of interconnection between abstract/concrete, analogical/digital phenomena is incorporated as a third factor and, together, they all offer artists working with new media ever-wider resources for the creation of symbolic universes.

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