DIGITAL TRANSFORMATION, SMALL TOWN, EXPERIMENTATION: MEMBRANA SMART RESEARCH PROJECT

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Resumen

Mitchell (2004), en su libro Me++, observando los efectos que la información digital es capaz de producir en el territorio, y en relación a los aspectos que un tiempo le eran desconocidos, afirma que el código binario constituye el instrumento más potente que poseemos para expresar nuestros propósitos y para traducirlos en acciones concretas. Sin embargo, se han tenido en consideración los cambios que la transformación digital es capaz de producir en la estructura, organización y lógica del funcionamiento de una ciudad y de su territorio, principalmente en relación a la gran escala urbana o a aspectos más específicos como, por ejemplo, las comunidades con bajos ingresos. Pero, ¿qué tipo de vínculo existe entre la transformación digital y los centros más pequeños que caracterizan Italia y Europa? ¿Cómo pueden interpretarlo, de manera rentable, las disciplinas relacionadas? ¿Cuáles son, en cambio, los riesgos que derivan desde una perspectiva ética y deontológica?

A la luz de estas reflexiones, tal contribución tiene el objetivo de ilustrar algunos de los resultados relacionados con el proyecto de investigación "Membrana inteligente", compartido con una asociación de empresas que trabajan en la región de Calabria, financiado gracias a POR CALABRIA FESR-FSE 2014-2020, Eje I "Investigación e innovación", Objetivo específico 1.2 "Consolidación del sistema innovativo regional y nacional", Acción 1.2.2 "Apoyar la realización de proyectos complejos de actividades de investigación y desarrollo en algunas áreas temáticas relevantes y la aplicación de soluciones tecnológicas funcionales para la implementación de estrategias S3".

Todo lo anterior se realiza a partir de la implementación de un dispositivo tecnológico i) avanzado, con capacidad de autoidentificación, localización, diagnóstico de estado, adquisición de datos, elaboración, implementación; ii) interactivo, responde a los estímulos/acciones de las personas y a los cambios del entorno; iii) modular, para ser ensamblado para formar superficies multisensoriales y artísticas; iv) inteligente, ya que utiliza la más reciente tecnología inalámbrica, aumento de redes (banda ancha), redimensionamiento de los dispositivos móviles de transmisión/recepción, realidad aumentada, internet de las cosas (IoT); v) open source, posibilidad de elegir entre diferentes opciones, para las cuales los usuarios pueden elegir cuales actualizar y cuáles no. Los autores, después de haber examinado las diversas implicaciones de las membranas inteligentes en la vida diaria, centran la atención en los diferentes criterios estructurales con los que este medio/instrumento permite organizar la comunicación y el disfrute de la ciudad y del territorio. Destacando cómo su importancia reside en el tipo y en la calidad de las relaciones que establece con el contexto; la membrana inteligente no se presenta como un objeto en el espacio, sino más bien como un instrumento para la construcción del espacio, como un elemento para la puesta en escena de una ciudad y del territorio del cual forma parte. Evidentemente, tal campo de investigación tiene argumentos en este ámbito del debate científico que nos inspiran a imaginar y reconstruir los lugares a partir de las relaciones entre el mundo material y el virtual, y también a reconsiderar las implicaciones que estos cambios tienen en las disciplinas del proyecto. Como es sabido, este debate se desarrolla desde la segunda mitad de los años noventa debido a la concomitancia de algunas cuestiones técnicas (aplicación simultánea de la informática, de la electrónica y de la cibernética), disciplinarias (definición de la City of bits de Mitchell, informatización del espacio, etc.) e interdisciplinarias (media art, land art etc.). El proyecto de investigación tiene una finalidad concreta, proponer cuatro iniciativas para aplicar la membrana inteligente en beneficio de las comunidades ubicadas en los centros urbanos más pequeños. Estas son i) la regeneración de espacios urbanos y de complejos arquitectónicos que con el paso del tiempo han perdido su original función; ii) el reconocimiento, la expansión y la protección de algunos recursos latentes; iii) la mejora del patrimonio considerado como riqueza colectiva, accesible a

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todos; iv) explotar el potencial empresarial de las tecnologías digitales, especialmente las relacionadas con el teletrabajo y con el empleo juvenil y femenino.

En los centros menores menos evolucionados, los resultados esperados de la membrana inteligente apuntan a la construcción/activación de nuevos contextos integrados en este proyecto, a través de los cuales despertar el interés social. En términos más generales, este proyecto tiene como objetivo incorporar nuevos instrumentos además de los que ya están existen. Pero no sólo instrumentos concretos, como los que ya conocemos, sino también instrumentos compuestos por bits, conexiones y software.

Abstract

In his book Me++ (2004), Mitchell, when ascertaining the concrete effects that digital information is capable of producing in the various sectors and with regard to aspects that were once extraneous to it, states that binary code is the most powerful tool we have for expressing our projectuality and translate it into concrete actions. However, the changes that digital transformation is able to produce to the structure, organisation and logic of operation of the city and territory have been taken into consideration, primarily, with reference to the large urban scale, or to specific and circumstantial aspects such as, for example, low-income communities. And yet, what kind of link exists between digital transformation and the smaller centres that characterise Italy and Europe? How can the disciplines of the project interpret it profitably? And, conversely, what are the risks that arise from a deontological and ethical perspective?

In light of these reflections, this contribution aims to illustrate some of the results related to the "Membrana smart" research project, in collaboration with a partnership of companies operating in the Calabrian territory, funded under the POR CALABRIA FESR-ESF 2014 -2020, Axis I "Research and innovation", Specific objective 1.2 "Strengthening of the regional and national innovative system", Action 1.2.2 " Support for the realisation of complex research and development projects on a few thematic areas of relief and the application of functional technological solutions to the realisation of the S3 strategies".

This is accomplished by starting from the realisation of a technological device that is i) advanced, with the capacity of self-identification, localisation, status diagnosis, data acquisition, elaboration and implementation; ii) interactive, as it responds to people's stimuli/actions and the changes in the surrounding environment; iii) modular, to be assembled so as to form multisensory and artistic surfaces; iv) intelligent, as it makes use of the latest wireless technology, network scale-up (broadband), downsizing of mobile transmission/reception devices, augmented reality, Internet of things (IOT); v) open source, open to the proposition of different options for which users are left with the decision on which to evolve and not. The authors, after having examined the different implications of membrane smart in everyday life, draw the attention towards the different structural criteria with which this medium/instrument allows the organization of communication and the enjoyment of the city and the territory, highlighting how its value lies precisely in the type and quality of the relationships it establishes with the surrounding environment; therefore, membrane smart does not present itself as an object in space but, rather, as a tool for the construction of space, as an element for the staging of a city and a territory of which it is a part. Evidently, this field of investigation finds reasoning in that part of the scientific debate that stimulates us to reimagine and reconstruct the places by starting from the relationships between the material and the virtual world, and to reconsider the implications that such modifications have on the disciplines of the project. As is known, this debate has been maturing since the second half of the 90's due to the concomitant competition of technical issues (simultaneous application of information technology, electronics and cybernetics), disciplinary issues (definition of Mitchell's City of bits, computerisation of the space, etc.) and interdisciplinary issues (media art, land art, etc.). The research project finds concrete expression in the proposal of four initiatives for the use of membrane smart for the well-being of communities located in smaller centres. They pertain to i) the regeneration of urban spaces and architectural artefacts that have lost their original function over time; ii) the identification, expansion and protection of latent resources; iii) the valorisation of heritage valued as collective wealth, accessible to all; iv) the entrepreneurial potential of digital technologies, especially with reference to teleworking and youth and women's entrepreneurship.

In the fragile and scarcely investigated smaller centres, membrane smart's expected results aim at constructing/activating the contexts of interaction design through which to awaken a broad social participation. More generally, this project aims to add new tools to those that already form the designer's repertoire. No longer just hard tools, like the ones we are used to, but also those made up of bits, connections and software.

1. The Membrana smart research project: aspects of methodology, propositions and debate

In his book Me++ (2004), Mitchell, when ascertaining the concrete effects that digital information is capable of producing in the various sectors, and with regard to aspects that were once extraneous to it, states that binary code is the most powerful tool we have for expressing our projectuality and translate it into concrete actions. "We are becoming true inhabitants of electronically mediated environments rather than mere users of computational tools" (Mitchell, 1999), as proven by Ratti and Claudel (2016), in illustrating some recent experiences carried out within the Senseable City Lab. According to the two authors, we are witnessing, as part of the evolution of the idea of the city, a radical turning point defined by the intersection of technological forces with the built environment. In this sense, we can certainly agree with Mitchell (1997) when he states that "the network is the urban site that faces us, an invitation to design and build the city of bits, just as, long ago, a narrow peninsula next to the Meander became the foundation site of Miletus. But this new type of settlement will flip the classic categories like a glove and restructure the arguments that architects have bound themselves to since the classical era all the way to the present day. It will be a city uprooted from any point fixed to the surface of the earth, which is configured by the limitations of connectivity and bandwidth, rather than by the accessibility and the value disposition of properties, largely asynchronous in its operation, inhabited by incorporeal and fragmented subjects that exist as collections of aliases and electronic agents. Its places will be built virtually by the software and no longer physically from stones and wood; these places will be connected by logical links instead of doors, landscapes and roads".

The broad scope of these considerations seems to open new horizons to different lines of research that are specific to the urban and territorial planning and design discipline.

This was what Lévy (1996) was referring to when he stated that cyberspace architecture will be one of the main arts of the XXI, eliciting the need to not continue to think about digital transformation exclusively in terms of impact but, above all, in terms of design, working to "elaborate environments of thought (signal systems, intellectual technologies), perception (interfaces), action (telework) and communication (access rights) that will largely structure social and cultural evolutions".

However, the changes that digital transformation is able to create in the structure, organisation and logic of operation of the city and territory, have been taken into consideration, primarily, with reference to the large urban scale, or to specific and circumstantial aspects such as, for example, low-income communities. And yet, what kind of link exists between digital transformation and the smaller centres that characterise Italy and Europe? How can the disciplines of the project interpret it profitably? And, conversely, what are the risks that arise from a deontological and ethical perspective?

In light of these reflections, this contribution aims to illustrate some of the results related to the "Membrana smart" research project (scientific supervisor: Domenico Passarelli; Research collaborators: Vincenzo A. Cosimo and Giuseppe Caridi) in collaboration with a partnership of companies operating in the Calabrian territory, funded under the POR CALABRIA FESR-ESF 2014 -2020, Axis I "Research and innovation", Specific objective 1.2 "Strengthening of the regional and national innovative system", Action 1.2.2 "Support for the realisation of complex

research and development projects on a few thematic areas of relief and the application of functional technological solutions to the realisation of the S3 strategies".

In particular, in this first paragraph, we analysed the methodological, propositional aspects along with those of debate. In the second paragraph, we explore the analytical characteristics and the specifications of the device. Finally, the third paragraph discusses expected results, main limits and significant developments.

The research project is realised starting from the creation of a technological device called Membrane smart. The attention is drawn towards the different structural criteria with which this medium/instrument allows the organisation of communication and the enjoyment of the city and the territory. Hence, it is possible to highlight how its value lies precisely in the type and quality of the relationships it establishes with the surrounding environment; therefore, membrana smart does not present itself as an object in space but, rather, as a tool for the construction of space, as an element for the staging of a city and a territory of which it is a part.

The project also pursues the suggestive indication of "urbanizing technologies", as formulated by Sassen (2012).

To this end, the project is based on a vision of social innovation understood not as a product or novelty but, rather, as a process capable of improving the structural and relational conditions of local society.

This setting allows you to operate at different levels of the value creation chain; that is to say, at the level of i) cognitive capital, by spreading ideas, attitudes, behaviours, mental schemes and interpretative systems open to innovation throughout the various components of the community; ii) social capital, by favouring processes of collective learning, accumulation of information and knowledge, made possible both by the geographical and relational proximity of the players, and by the strengthening of a social interaction system; iii) territorial specialisation, in which the spatial dimension of the cultural experience allows the reinterpretation in the contemporaneity of the local identity factors, palimpsest of historically sedimented layers; iv) process innovation, as it is capable of providing the other productive sectors with content, tools, practices and models oriented towards innovation and creativity, and, therefore, generating intangible competitive capacity; v) product innovation, as it promotes the creation of new goods and services, incorporating within them its own symbolic and identity value.

The implementation of the project makes the following things possible: i) positive cross-contaminations between different fields of discipline and knowledge (humanistic, scientific and technological); ii) integration between public and private themes and the use of various types of resources (community, state, local, private); iii) transversality between productive sectors (cultural heritage, tourism, urban planning, design, art, crafts); iv) cross-fertilisation between different supply chains (culture, tourism, agri-food, ICT, design, architecture, urban planning, crafts, welfare); v) cooperation between different players (universities, research centres, companies, trade associations, institutions); vi) hybridisation between technologies and "humanities" (enhancement and promotion of cultural heritage through immersive, interactive and experiential paths, digitalisation of cultural resources, etc.); vii) widespread social and economic creativity (cultural and social asset, diffusion of lateral thinking, start-ups).

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Evidently, this field of investigation finds reasoning in that part of the scientific debate that stimulates us to reimagine and reconstruct the places by starting from the relationships between the material and the virtual world, and to reconsider the implications that such modifications have on the disciplines of the project. As is known, this debate has been maturing since the second half of the 90's due to the concomitant competition of technical issues (simultaneous application of information technology, electronics and cybernetics), disciplinary issues (definition of Mitchell's City of bits, computerisation of the space, etc.) and interdisciplinary issues (media art, land art, etc.). And it coalesces in the fortunate expression of smart city that has monopolised both the common lexicon and the urban/territorial planning and design. An expression that, in its most recent interpretation, should not be understood exclusively as a process of implementing technological infrastructures in the urban organism (innovative solutions for traffic, pollution, resource consumption, etc.) but, rather, as the breeding ground of technological transformation; namely, as a context of design interaction useful to citizens to reinvent the city from the bottom up, so as to live in a new way by facing old and new problems with the help of technology, which allows shorter times and lower costs. Technological transformation, therefore, as an integral part of community life, not as an external element that limits itself to exercising a more or less strong power over it.

Power, a theme that is at the intersection between the technological field and that of the city; because, as we will see in detail in the last paragraph of this paper, the technological transformation of the city and the territory is neither a neutral nor a limitless process.

2. Analytical characteristics of the Membrana smart device

As already mentioned in the previous paragraph, the research project takes shape from the creation of a technological device that is i) advanced, with the ability to auto-identify, localise, diagnose status, acquire data, process and update; ii) interactive, as it responds to people's stimuli/actions and to the changes of the surrounding environment; iii) modular, to be assembled to form multisensory and artistic surfaces; iv) intelligent, as it makes use of the most recent wireless technology, scaling up of networks (broadband), downsizing of mobile transmission/reception devices, augmented reality, Internet of things (IOT); v) open source, open to the proposition of various options for which users are left with the decision on which to evolve and which not.

From a constructive point of view, the membrana smart consists of: i) structural elements made with a 3D printer to be assembled for the creation of spaces and/or objects; ii) solar cells in an autonomous system produce all the energy necessary for the interactive elements that react to the user's presence. The energy generated is stored in a battery and then distributed through micro controls to the respective elements; iii) interactive elements that can be constituted by "intelligent" polymers (which contract when subjected to current and return to their initial position when the current ceases to go through them), shape memory metals (which react to the temperature taking on the pre-established shape during its configuration phase) and/or other material (kinetics); iv) electric sensors and micro circuits; v) dedicated hardware and software; vi) artistic membranes (to be assembled to the supporting structure) to which more artistic panels made with interactive elements and multimedia components can be attached.

Through the realisation of immersive and interactive works and environments - by composing the smart membrane in articulated forms and using the specific software provided by the project - it

is possible to obtain new models of dissemination of the contents (also on smartphones) related to the use of resources of historical interest -architectural, artistic, urban, environmental etc. also able to qualify in terms of the local economy endorser, to support both the territory's tourist offer capacity, and the knowability based on the widespread and "shared" experience. Compared to the systems already in use (in museums for example), the here proposed membrana smart presents elements of great innovation as it is not limited to an interaction with the user that is almost exclusively based on smartphone received multimedia content, which can vary based on the person's position but, in our case, the spaces and the interactive objects made with said membrane can react and "adapt" to the different emotions that, from time to time, follow one another in the multimedia content sent to the smartphone. In essence, by placing the smartphone in proximity of the membrana smart (or simply by walking near "sensitive" objects and spaces) an unpredictable reaction will occur that will make the interactive elements inserted in said membrane become "alive", which can: i) reflect the different emotions, proposed in the multimedia content running on smartphones, in the environment; ii) send notifications and multimedia content to the smartphone; iii) activate a series of visual, sound, luminous, "olfactory" inputs; iv) allow the movement of some of the interactive elements present in the scenario and in the path.

To make the operation of the product/system clearer in a possible scenario, let us imagine that a user is in an interactive space, delimited by the membrana smart, and in the artistic component, composed of shapes and reliefs that reproduce a forest. When the user is near a tree, the interactive product/system will send a first welcome notification to his/her smartphone and, at the same time, activate the commands that will illuminate the trunk and rotate a leaf that, from a "resting state", will achieve an "active state": the number of active leaves (that are moving that is) and the luminous intensity of the trunk will provide information on the number of users who, at that moment, are interacting with the "artistic" membrane. This will allow, for example, to regulate the intensity of the virtual forest sounds emitted by the video displayed on the smartphones - which may be more or less "engaging" - depending on the number of "active" leaves on each tree. Once the greeting "effects" are on the smartphone are over, a creative video associated with a specific piece of work will activate on the membrana smart. The user can choose to view the video without performing any action, or whether - by using his/her own smartphone and scanning the real scenario - interact with the artistic smart membrane. In this case, the artistic smart membrane will tune into the part of the multimedia content in execution and will activate its own "living" elements, which will "animate" in sync with content/meanings, emotions, sounds and colours that, from time to time, will flow through the video. So, for example, in case of a dramatic situation of visual storytelling, the membrane could react - to emphasise the state of fear and/or anxiety - by making the "leaf elements" vibrate; in the same way, as we move towards a more serene situation, the "leaf elements" of the artistic membrane could take on a position that is more suitable to the new emotional state. Obviously, the visitors present will be able to watch the scenographic animation offered by the artistic membrane, choosing to become an active part of an emotional show. Multiple users, by bringing their smartphone closer to different points of the membrane, can simultaneously activate multiple scenographic animations. The immersive environment thus conceived makes the multimedia content sent to the various mobile devices of the users more engaging, opening them, with harmony and a good dose of unpredictability, to the artistic space/path that surrounds them. The multisensory scenario reduces the isolation that is often generated between the user who is consulting content on their mobile device and the external environment, to propose a new art of sharing in which anyone is called upon to interact with others, in a kind of canvas on which to create creative culture, so as to live a new experience, without technological barriers, all together. The innovation, compared to other systems that

transmit additional content relating to an object or a work of art on the user's smartphone, consists in the possibility (in the product/system that one intends to design and experiment which also makes use of a cloud platform) to send a triple action on a mobile device: i) the first regards the sending of multimedia content to the smartphone; ii) the second, in conjunction with the first, acts on the electronic and multimedia devices hidden in the smart membranes that form spaces and/or interactive paths, creating luminous effects, videos, sounds, scents and movements of the interactive elements that characterise the same architectural and artistic structure; iii) the third, is triggered by the multimedia contents in execution that send signals to the cloud platform that, after having analysed them, activates various sensory effects in the space that are consistent with the multimedia contents in progress. In essence, with the membrane smart it will be possible to activate, simultaneously, three technological connections to create a single emotion never before reached. In conclusion, the goal is to create - by virtue of the membrane smart - places of "experience consumption" and a search for engaging, immersive and transforming "systems of sense", so as to offer unique experiences of increased cultural heritage fruition, and of the urban environment as well, so as to trigger the development process for smart cities, based on the diffusion of knowledge and innovative models for the use and development of the area in all its components.

An intelligent product/system, therefore, capable of enabling new ways of conceiving the use of territorial resources and the enhancement of places and the city, and to generate a significant impact in the ways of conceiving, producing, sharing and enjoying culture, historical-artistic and environmental heritage and urban public spaces.

In particular, the product/system, and each individual component, will be designed to meet the following fundamental characteristics: i) modularity and expandability - the membrana smart consists of a "smart" and independent modular element - to be realised with 3D printer and with the use of advanced technological components (supports, membrane, sensors, microelectronic circuits etc.) - which is assembled, added, replaced or eliminated, so as to compose different and expandable shapes and spaces by virtue of the simple combination of the module and the connection of the ducted circuits without the need of an intervention by part of specialised personnel; ii) flexibility - the product/system shows a high degree of flexibility, in order to be perfectly suited to current needs (integration and personalisation) and to be adapted, over time, to the different functional requirements (cultural heritage, rural routes, urban environment, etc.). Therefore, the hardware components have characteristics of varying configurability and excellent connectivity, and those softwares are equipped with high-tech development tools that allow the creation of new interactive modes and new sensory functions; iii) "sensorial" accessibility - the product/system to be created proposes new sensorial tools, functional to the perception and reading skills of works and places (architecture, urban design, cultural heritage, environment, etc.) by part of each user, thus breaking down any linguistic, age, and handicap barrier related to the use of the senses (sight, hearing, touch); iv) updating of contents - using the especially created cloud platform, it will be possible to provide services with dynamic contents that are updated over time; v) digital identity - the product/system requires the use of highly complex and performing identification processes; vi) cultural creativity - the project envisages a new intervention methodology aimed at promoting contemporary art, creativity and new communication languages; vii) greater connectivity - the project involves the application of new forms of intelligent connection between immersive spaces, experiential paths, interactive objects/works and storytelling of multimedia contents sent to the user's smartphone. The mode of operation of the project involves

two fundamental phases: the first is that of research, design and implementation of the prototype of the smart membrane, of the systems and the designated softwares.

3. Expected results, main limitations and significant research developments

Nei in the fragile and little investigated minor centres, the results expected from the membrana smart aim at the construction/activation of contexts of project interaction through which to awaken a wide social participation. They find concrete expression in the proposal of four initiatives for the use of membrana smart aimed at benefiting the communities in smaller centres: i) the regeneration of urban spaces and architectural artifacts that have lost their original function over time; ii) the recognition, expansion and protection of latent resources; iii) the enhancement of heritage, viewed as a collective wealth that is accessible to all; iv) the entrepreneurial potential of digital technologies, especially with reference to teleworking and youth and women's entrepreneurship.

More in general, this project aims to add new tools to those that are already in the designer's repertoire. No longer just hard/concrete tools, like the ones we are used to, but also those made up of bits, connections and software.

Evidently, the function of the university's research, although inserted in a ROP, is to increase the critical vision of the research projects, the main research developments are placed in relation to the treatment of the virtualisation and fictionalisation phenomena, introduced respectively by Lévy (1994; 1995) and Augé (1997). The work of these two scholars joins and corroborates the open reflection, dating as far back as the late 70s, on the simulacra and their precession and on Baudrillard's hyperreality (1976; 1977).

Unlike the common language, the virtual one indicates a not implemented potential, something that potentially exists without physically being present. "The possible [...] is a phantasmagoric, latent reality. [...] it is exactly like reality: it only lacks existence. [...] The difference between the possible and the real is therefore purely logical. The virtual, in turn, is not opposed to the real, but to the current. Contrary to the possible, static and already formed, the virtual is like the problematic complex, the knot of trends and forces that accompanies a situation, an event, an object or any entity, and which requires a process of transformation: the actualisation [...] The real resembles the possible; the actual, on the other hand, is not at all similar to the virtual: it responds to it" (Lévy, 1997). As its Latin etymology virtus indicates, the term virtual cannot be opposed to the real as if it were its opposite, but, rather, it completes reality, inscribes it in a performative project, which is susceptible of actualisation, of realisation.

Therefore, the relationships between material reality and the infinite medial planes that intersect it refer to the theme of identity. In fact, according to Turkle (1997), the medial planes are not simple alternative windows (it refers to the windows of operating systems with a graphic interface), but are contemporaneous with everyday life. This, in fact, multiplies the planes of existence and the spheres of reality, and ends up assigning the same degree of meaning to all.

The result is that of a dimension of existence in which material reality is constantly targeted by mediatic fiction. According to the French anthropologist Augé (1998) "it is the new fictional regime that afflicts social life today, contaminating it and penetrating it to the point of making us doubt it, its reality, its meaning and categories (identity, the otherness) that constitute and define it". These

considerations allow him to introduce, in his text The War of Dreams (1998), the notion of fictionalisation, understood as an alteration of the conditions of circulation between individual imagery (for example the dream), collective imaginary (for example the myth) and narrative fiction (literary or artistic, placed as an image or not).

For a long time, Western civilisation tended to consider itself within an epistemic and conceptual horizon where existence depends on material consistency. The cultural forms that are specific to it focus on the empirical dimension of reality as the main object of its own interests. The conscious human subject observes material objects and interprets real phenomena and problematises them through imagination and rational thought with the aim of transforming the surrounding reality so as to make it more suitable for its own survival and more coherent with its own specific cultural needs.

In the last fifty years (October 9, 1969 marks the date of the first remote connection between computers), we have entered a new and complex stage in which the population of the developed world has had the possibility of developing communication methods and image statutes different from those experienced before. Through the process that takes the name "computerisation of the space", characterised by the simultaneous application of information technology, electronics and cybernetics, the atoms are brought back as bits: something that can be touched, has weight and can be seen, takes in the form of something that cannot be touched, is weightless and cannot be seen.

By virtue of this, the conscious human subject is no longer limited to observing/interpreting material reality, through the use of imagination and rational thought, but has the possibility of externalising the contents of the imagination by transferring them into an artificial reality that new technologies render back to him/her as something absolutely independent. What takes form is a new, priorly imposible, reality, which constantly interacts with the material reality, orienting and shaping it and, in a cyclical path, allows itself to be oriented and molded by it.

This new reality is called cyberspace, according to the term, introduced in English by the novelist Gibson (1982; 1984), which derives from the juxtaposition of the confix cyber, in turn derived from the abbreviation of the English noun cybernetics, to the word space. The concept of cyberspace, which over time has been revived, reused and modified, is contrasted with meatspace (the space of the flesh that is the physical world) in Gibson's original meaning and represents "a consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts [...] A graphical representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the non-space of the mind, clusters and constellations of data. Like city lights, receding [...]" (Gibson, 1984).

Today we can consider it as the antispatial interface of the different navigation/simulation devices (hypertext, interactive multimedia, video games, virtual reality, groupware, expert systems etc.) that are progressively made available through the development of remote information transmission technologies (Lévy, 1996). However, it is good to specify that there are also attempts to circumscribe the concept by identifying it, tout court, with the network (Barlowian cyberspace). A simplification linked to the fact that cyberspace shares the profound antispatial matrix with it, "the Net is an environment that is in no particular place, but at the same time is everywhere. You don't go there, but you enter through a word (log in) from wherever you are. In doing so you do

not visit it in the traditional sense; you're just performing an act of speaking that guarantees the access, like saying: Open Sesame" (Mitchell, 1996).

According to Virilio's interpretation (1999), we have added, through the process of computerisation of space, a third dimension to matter "after mass and energy, the dimension of information makes its entry in the history of reality, doubling the real presence of things and places [...] The material and geometric volume of an object is then succeeded by the immaterial and electronic one of information [...] After the era of the energic acceleration of steam engines, internal combustion engines or electric motor engines comes the era of computer acceleration of the latest engines: the engine with logical inference of the computer and its software, the reality engine of virtual space and the search engine of the network , in which the speed of the calculation succeds that of the turbocharger of the automobile engine, or also to that of the turbines and the nozzles of the supersonic aviation". This is in line with the thesis of Castells (1996) according to which "information is the key ingredient of our social organisation: it marks the beginning of a new existence, marked by the autonomy of culture with respect to its material basis". By acquiring centrality in the context of philosophical and scientific discussion, the imagery of cyberculture is related to the theoretical basis, which preceded it, and in a certain sense informed it. In this framework, the work of Baudrillard has a privileged role (1977; 1979). The theme of the relationship between the artificial/natural and copy/original pairs is resumed and, therefore, the concept of simulacrum as a reproduction of reality (ie something that stands for something else). Then, that of the development of the two couples over time and, consequently, of the process that saw the artificial overtake the natural and the copy overtake the original, through the succession of different types of simulacrum (the eighteenth-century automata, the serial clones of mass production, reality simulations produced by electronic machines). This process takes the name of precession of the simulacra (Baudrillard, 1979) and today it is pushed to its extreme consequences, up to the creation of an artificial reality that is completely detached from any possible dependence on natural reality, while affirming itself as an original and not as a copy, hyperreality (Baudrillard, 1977).

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