Landscape Drawing and Comprehension: the Virtuous Passage of Scale in Digital Representation

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Abstract

The latest developments in digital representation and communication of architectural and environmental heritage offer an extremely diverse range of opportunities in which to experiment and implement new models of user involvement in cognitive paths. The study proposed here investigates –according to a methodology of critical reading– which are the aspects that can be considered most innovative, not only in terms of formal results but above all in terms of contents that can be expressed as a result of the use of new technologies. In particular, reference is made to the landscape drawing and to the possibility of overcoming the scale representation gap of a subject who, otherwise, is significantly affected by the limit dictated by the finite nature (or finite dimension) of paper supports. New figurative models –if you think of satellite navigators– new possibilities of relationship between different forms of expression –think about photography and synthetic design– also change the figure of the possible users of such visual narratives.
The aim of the study is therefore to arrive at a critical reading of what happens in the context of landscape representation in order to optimize the possibility of introducing unpublished scenarios and points of view.

Keywords: landscape, representation, method, communication.

Introduction

The representation of landscape is a theme of great complexity because of the multiplicity of factors that characterize it: in fact, it is a matter of graphically restoring a subject that, even when it is characterized by the presence of human works, is composed of elements that for their nature haven't a regular conformation in geometric terms and, moreover, are extremely changeable, sometimes in rather contained temporal spans, or, as in the case of an urban landscape, the stratifications of different interventions. alternated over time, make the recognition of a regular matrix rather difficult.
In many cases all this can be associated with the natural degradation and the degradation caused by the depletion of the resources used to maintain the artifice-nature or city-territory union, determining a further alteration of a state that is, in itself, already complex to be interpreted.
Nevertheless, many examples of correlation between the work of man and the landscape constitute a precious patrimony of the cultural traditions of a civilization that, however, in many cases is going towards serious cases of abandonment or of difficult accessibility.
The here presented study investigates some examples of enhancement of this heritage, made possible thanks to the potentiality introduced by the new technologies available for visual communication.

The representation of landscape: from a diachronic logic to a synchronic one

The complexity of the theme, referring to the representation of the landscape, has been tackled according to a wide range of expressive registers declined according to specific needs that have, in some cases, even invented visual languages ad hoc created, to better meet the needs of restitution of all the plurality of elements that converge into a part of landscape.
For example this happened for the thematic maps: articulated on the level of contents, synthetic and descriptive according to a logic of symbols and abstractions but, all in all, far from perceptual immediacy and for this reason, perhaps, rather complex to be understood by an non-attached interlocutor non-attached to these works.
In fact, although conceptually exhaustive, they are always of a product defined by signs and images mediated by a code being the more pushed the more the amount of contained data is [1]. Moreover, where a formal, historical, or perceptive deepening is necessary, the change of register, also referring to the change in the scale of representation, introduces a formal discontinuity evident in the representation, sometimes defining a sort of caesura with a more general reading.
Today, thanks to the technologies we have at our disposal, this forced articulation can be overcome precisely by virtue of the possibility of integrating different expressive languages among them, above all avoiding the necessary division between a scale of representation and another, which are proper to different purposes: therefore a sort of continuum in which, for example, even virtual approaches and departures determine expressive passages that, precisely as they are progressive, are almost not perceived as different languages, but as natural consequences of a "vision" that everyone can manage independently.
Today to all this there is added the possibility of integrating static and two-dimensional representations with actual narratives where multiple images, even if of a heterogeneous nature, can be composed in order to define a more articulated narration of a complex reality, such as the landscape is [2].
These apparent naturalness and immediacy in the landscape among forms of representation allow the development of informative and cognitive processes that we could define as highly inclusive, that is offering a possibility of access to visual narratives even for those who do not necessarily have a technical background.
Let's think about the use of satellite navigators or systems such as Google Maps, in which three-dimensional visions

Fig. 1. Collection of drawings for the study of Ligurian terraces. The graphic design of each drawing includes the choice of the scale of representation and consequently the level of detail achieved. The obvious limit is given by the physical size of the support and its reproducibility.

are placed side by side with planimetric, photographic and in some cases even symbolic visions, often coded also according to different interpretative logics, and yet these differences are not detected such as they are, but instead we are witnessing a fast, and now almost inherent, ability of the user to decipher the proposed image although characterized by variable graphic syntheses, often due to different programs and tools.
Therefore simplifications, even if apparent, and integrations of languages, introduced by digital technologies, determine a process of facilitation in the understanding of some forms of landscape representation. It is therefore legitimate the wish to reflect on what the potential of these new approaches can be to the representation and communication of the landscape that today we have at our disposal.
Especially in the context of what we could define as "cultured disclosure", the possibility of having this potentiality makes possible the reinterpretation –for example– of a whole mosaic of images (fig. 1) that once it was possible to consult only according to a progressive logic, while now –let's think of augmented reality– can be integrated in a mutual and simultaneous way.
In a certain sense, the expression of the research nowadays assumes a correspondence in the forms of methodological development: before the digital era the cognitive approach

took place in contiguous but still autonomous phases (such as bibliographical [3], historical, photographic researches, and then surveys with consequent graphic translations – in the different scales and in the different methods of representation) and then to return, in a sort of spiral design, to the reformulation of the overall narrative of what was acquired, today –in a different way– there is a prevailing tendency to a process of integrated type where the research sources can be found simultaneously, also thanks to the web.
Similarly some digital representation tools allow the simultaneous processing of images and models in which even the definition of material or lighting characteristics can vary, if only in the output phase, instantaneously (fig. 2) the simulators are the final expression of this process of conceptual and expressive simultaneity. Therefore the choice of more effective languages for the communication of a concept. becomes relevant, in the light of the availability of the expressive models at our disposal, Technology, programs, devices and network connections make possible a sort of expansion of the concept of the vector of images, but, however, the process of choice, of reading and critical proposition through a visual language, remains essential.
Among the most interesting declinations of recent technological development in the field of visual communication, the diffusion of personal portable screens can be taken into consideration, that is considering telephones as extensions of computers, if not the reverse. This consideration can, therefore, open the experimentation of new models of representation and narration of the landscape with tools that, in turn, require specific languages.
In this study we want to approach two case studies [4] that have in common the representation of the landscape for informative / tourist purposes: on the one hand an agricultural landscape with a very high historical, architectural and aesthetic value such as that of the Ligurians "5 Terre" [Ambroise, Frapa, Giorgis, 1993, pp.76-81], in which to articulate a tourist route, and on the other an urban landscape in which to develop a path between two polarities –The Galata Museum and the Lantern of Genoa– separated from a very complex city part that is difficult to approach. Two very distant realities for which to identify different methods and languages in relation to the different conditions of use (fig. 3).
In both cases the representation of the landscape has been therefore diversified in relation to the formal needs of each graphic project.
In the first, the one linked to the agricultural landscape, the binding element for the project is the systemization of a series of historical and technical-constructive knowledges that can be useful in understanding and consequently enhancing an important testimony of the work of anthropization of this part of the Ligurian territory [Ruggiero, 2018, pp.11-95].

Fig. 2. Synchronic representations; the two images show contextual views: the first at a diatopic level and the second at the level of graphic methods and languages. right: screenshot by bing images (March10th, 2019); left: image by NavNet 3d navigation system.

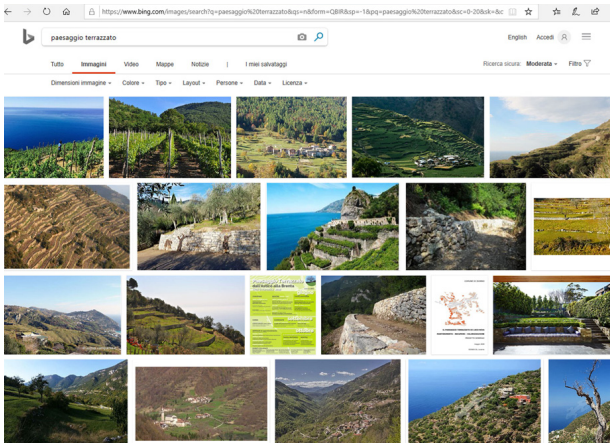


Fig. 3. Monterosso al Mare (Sp) and Genoa. Environments and characteristics of the two case studies: the differences to which the choices regarding visual communication correspond are evident.

In this case the landscape is characterized by a strong identity and a spectacularity that lends itself well to a tourist development. Furthermore, the development of the rather simple and contained urban fabric can facilitate orientation and logistics, despite some difficulties in accessing some parts of the land tissue due to the nature of the rather steep territory and with routes sometimes uneven and not safe.
Nevertheless a village, with limited vehicular traffic and mostly pedestrian, is characterized by a series of visual, auditory and more generally perceptive stimuli that favor attention towards subjects that are not very evident.
Quite different, on the other hand, is the opportunity to define a path between two polarities in an urban context characterized by a mixture of functions and visual stimuli to which a complex reality, such as the one of a commercial port, is also associated. In this case, not only the distance covered is more extensive, but it is also much more complex and difficult to manage, especially from a perceptive point of view [5].
Therefore, in both two cases, the choices have been oriented along two different lines. The first case was dealt with a communication on panels showing the route layout and some salient historical elements, with the possibility of accessing images of virtual reality, if for non-immersive, with three-dimensional model visualizations regarding non-immersive parts directly visible (such as hypogeum or dangerous structures to reach due to the pathway or access degradations); this choice was determined by the need to define selected observation positions in relation to panoramic views and safety in a context that is however steep and, in some cases, difficult to reach.

The repertoire of images to be systematized has turned above all to those that allow to enhance the historical value of some artifacts and the technical expertise necessary for their construction; in this case, in particular, the modeling of some structures has proved essential for the purpose of explaining their functioning.
In the second case, on the other hand, communication has been developed on different levels: the main objective is to identify and indicate the path to reach the historical and current symbol of the city: the Lanterna [Leoncini, Bertolucci, 2018, pp. 1-192]. The choice, therefore, fell on a paper map, where the representation of the urban net was simplified so as to facilitate the recognition of essential references, to which signage panels were placed where the language was easily identifiable in the landscape, mostly visually and acoustically compromised, where the track develops [6]. The signage, in particular, has used a graphic synthesis of the goal to be reached, represented in two colors so as to be as easily distinguishable in the context (fig. 4). It has been decided not to associate apps that indicated the route since traffic congestion and the heterogeneity of the routes makes attention to the context a priority, making up for this with fixed signs out of "scale" and therefore easily recognizable at a distance.
Nevertheless, in the vicinity of the main architectural emergencies, access to "episodes" of augmented reality has been envisaged with the aim of not distracting the interlocutor's attention, but rather to increase, if anything, the curiosity towards some intermediate points during his approach to the goal.

On this described basis we can state, therefore, that analogical and virtual models can constitute an opportunity for the development of visual languages and communications in which words, drawings and signs [Falcidieno, Giulini, 2006, pp. 11-95] are declined with articulated and integrated methods, in order also to find a renewed possibility of using image directories, only until recently destined for mere paper support.
The simultaneous nature of communications of a general nature with others of a punctual nature, in a continuous change of scale, in these two presented studies has allowed the structuring of tourist-cultural routes that otherwise would have had considerable difficulties to be an integral part of such a heterogeneous repertoire of information.

The representation of the landscape between virtual, augmented and mixed reality

The knowledge and enhancement of cultural heritage in recent years are subject to substantial changes due mainly to the now consolidated technological evolution at the service of the development of visual representation and communication techniques for architecture and environment.
The divulgation of innovative forms of use allows, in fact, to broaden the access to content through in-depth analysis and exploration of the context, capable of generating a different approach to architectural and environmental cultural assets by increasingly demanding, interested, informed users and dynamics [7]. In fact, digital is an integral part of our lives, and so the boundaries between real and virtual are narrowed in the field of visual perception.
The understanding and critical analysis of the scientific values and potential of the most recent technological and digital developments linked to virtual reality (VR), augmented (AR) and mixed (MR) [8] serving the enhancement of the architectural and landscape heritage, are the objectives to be pursued. These information technologies, in fact, not only favor the spreading of information to a wider public, but also cover the role of fundamental tools for the acquisition of a greater knowledge of the immense cultural heritage, above all thanks to the interaction and relationship methods that take place among users and context.

Fig. 4. The Lanterna of Genoa and its representations: from the 15th century to the graphic synthesis of the coordinated museum image, up to the useful interpretation of the project signage. Historical image by Hartmann Schedel's Weltchronik (Nürnberg 1493).

Fig. 5. For the valley of Buranco (Monterosso al Mare) an informational sign is proposed to which images of virtual reality are associated.

Fig. 6. For the Genoa Lantern a uniquely directional signage is proposed to which images of augmented reality are associated.

It is therefore necessary to understand the different approaches to fruition related to the use of virtual reality or the emerging augmented reality, to critically read its potential and limits with reference to the specific purpose in view. As is known, both digital realities are based on the visualization of the data in the visual field, but while in an augmented reality the information –visible only through the use of devices– overlaps reality without obscuring it if not marginally, in virtual reality an environment is recreated digitally characterized by an incredible photorealism, capable of enveloping the user within it and completely obscuring the surrounding reality [9]. Emphasizing the differences means being able to choose one or the other to optimize the pre-set result: thanks to virtual reality and augmented reality, therefore, we are able to communicate landscapes, places, paths, architectural emergencies, works of art in an alternative way and anything else that deserves to be valued.
It is of course understood that the so-called "new media", of a highly popular nature, do not replace the traditional methods of data representation and communication, but make use of them, implementing them.
Even a communication with a popular value can be an occasion for investigations and studies in which to experiment and implement new models of users' involvement in cognitive paths able to create various possibilities of relationship among different expressive forms and to introduce new scenarios and points of view; it is in this context that we want to propose the experience of two different case studies linked by the same objective, namely the visual communication of two cultural paths: the former rural, the latter a urban one.
The proposal to enhance visual communication, the subject of study for the first rural tourist itinerary, ¬ presents numerous coinciding points with the urban itinerary, despite the different contextual reality, but at the same time also significant differences: the place is the "Valle del Buranco" in Monterosso al Mare and one of the differences with the urban route is the uneven, and not always entirely possible, access to the paths.
Although they are inserted in a less dispersed and congested context –from the point of view of the project communication choices– the analysis and identification of suitable and incisive graphical-visual tools, necessarily functional and coherent with the representation of a tourist rout, included within an agricultural reality such as that examined, are substantial [10].
The adoption, therefore, of a synthetic graphic language, immediate and easy to be understood by the possible users, is manifested with the adoption of traditional communication tools alongside the contemporary multimedia and interactive instruments related to augmented and mixed reality, which are able to transmit information in places of complete safety, without lowering the attention that the users must have as for the followed path.
In this complex agricultural system, communication and disclosure of information are therefore provided through the use of information panels located along the tourist route

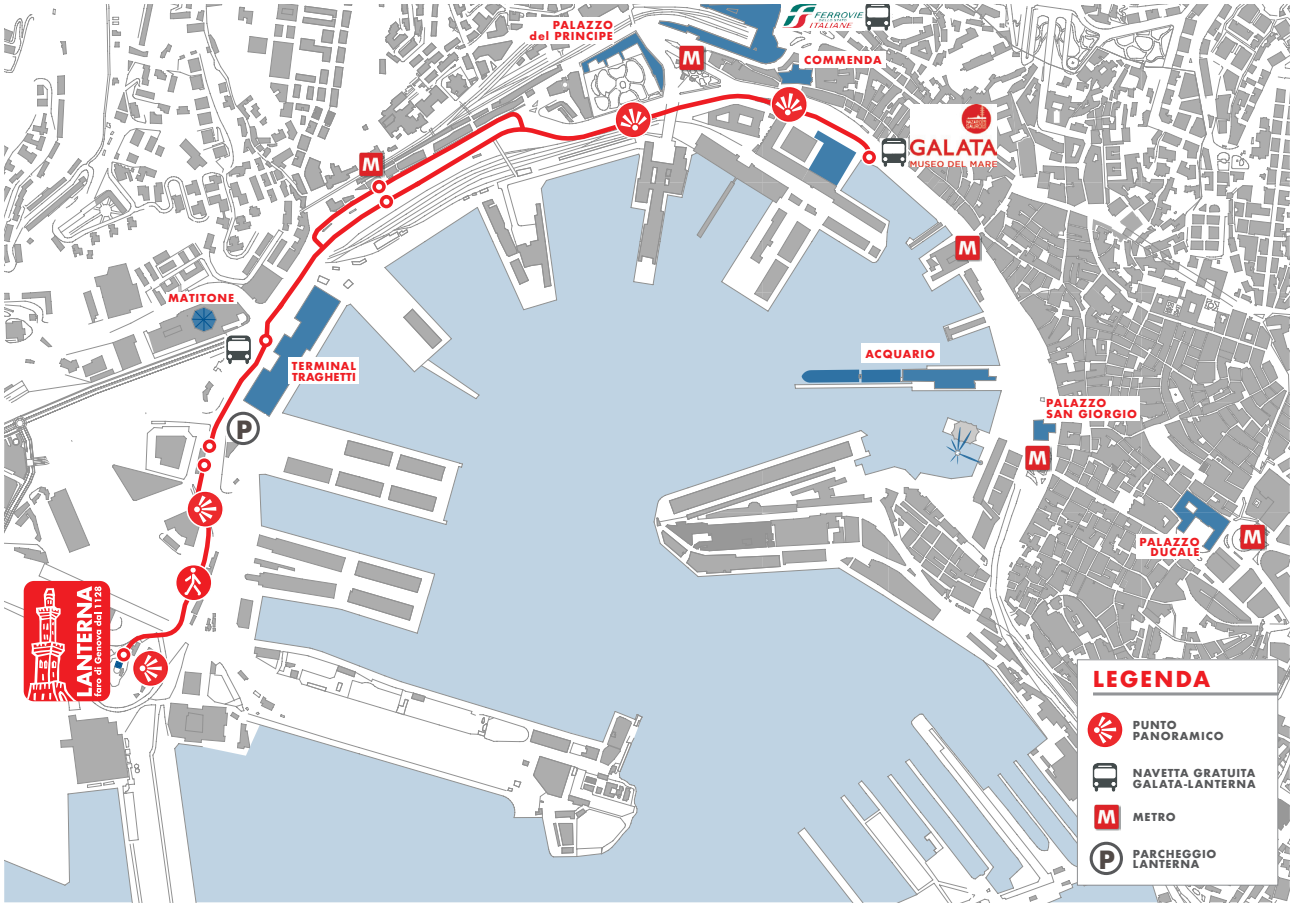
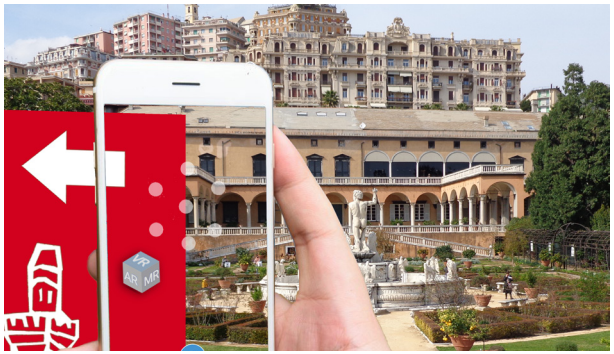


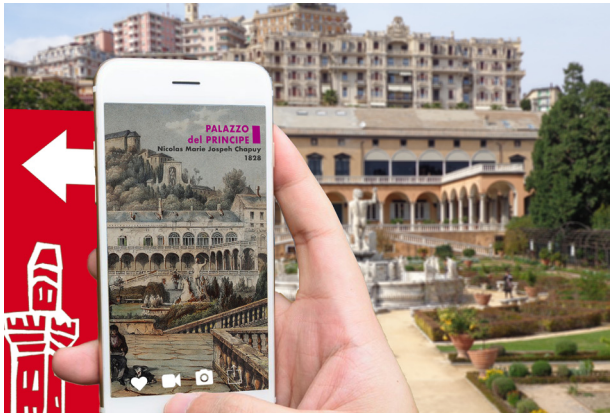
Fig. 7. Plan with the layout of the path that joins the Galata Museum with the Lantern. The main visual, logistic and narrative references, present along its development, are here highlighted, and moreover the graphic synthesis that appears in the signal panels is inserted.

and near the no longer accessible underground irrigation facilities at the service of lemon groves; the static nature of the information provided on the information panels is then accompanied by dynamic images, videos and animations in virtual and augmented reality, accessible thanks to the ever more performing devices capable of disseminating information and, by means of 3D reconstructions in virtual reality, allowing the knowledge and understanding of elements or structures that no longer exist or are inaccessible (fig. 5).

Once framed on the information panel, the trigger images such as a graphic sign, a photograph or a non-georeferenced marker [11], the device software recognizes them and, on the display, shows the overlay, that is an increased reality consisting of other images, videos, music or three-dimensional models.
The second itinerary stems from the need to connect the Galata Museo del Mare to the Lanterna of Genoa along a context marked by an advanced state of functional, architectural and semantic stratifications, therefore not purely

Fig. 8. Sequence of augmented reality images, correlated to signage panels, for the Prince's Palace in Genoa located along the access path. The communication is oriented to the description of the building in its original appearance and the fountain of Neptune.





for tourist purposes, even though it is undergoing a redevelopment phase.
The identified communication strategy has allowed the study and identification of an optimal itinerary for distance and urban quality along which a connotative graphic sign is repeated at different scales of representation: the stylization of the Lantern (fig. 6). The idea is to lead the visitor to the destination through an alternation of traditional visual communication means, such as a floor plan included in a leaflet (fig. 7), totems and signal panels alongside the AR, VR and MR technologies, commonly visible through smartphones and tablets.
Along the tourist route, in fact, it is not difficult to see architectural emergencies such as the sixteenth-century Palazzo Doria Pamphilj, known as the "Villa del Principe", a sumptuous noble residence now used as a museum near which the positioning of the signposted panels linked to the path of the Lantern is foreseen, implemented by the presence of an AR-VR symbol which, once framed with the camera of your smartphone, allows the user to be involved and interact with the artwork itself through a virtual reality tour or in augmented reality: texts, images, 3d models and sounds overlap the context and so the user is enveloped by the presence of virtual and interactive information that coexist with physical reality, thanks to an accurate localization and calibration between the real environment and virtual environment, such as to allow a perfect fusion between the two worlds and a greater diffusion of the awareness of the place and of the works of art it contains (fig. 8).

Conclusions

In conclusion, the contemporary media, thanks also to their divulging nature, cover the undisputed role of protagonists of the renewed models of representation, making use also of the consolidated previous experiences; alongside the traditional typographic tools of information representation and dissemination, there are therefore increasingly high-performance and advanced digital tools capable of spreading capillary and real-time multi-knowledge and returning lost or inaccessible realities to an ever wider and more demanding basin.
In a certain sense the right combination of a certain spectacularity given by the latest technologies, the consequent easy interpretation of languages and the integrated management with more traditional expressive registers can be occasions for the realization of inclusive processes in the cultural sphere. Finally it is considered necessary to propose a reflection on the potential and the limits in the use of some new technologies. If it is true that the fascination of communication by means of digital tools, with characters of dynamism and also of a certain spectacularity, is unquestionably easier to be approached and attractive, it is equally true that it is always necessary to evaluate the context and purpose of the use of these new technologies: that is, they are to be understood preferably as integrative – only in specific cases replacing the actual reality itself.
Not always, in fact, the distraction given by the prevalence of an access facilitation to the perception of a piece of landscape or of an architectural organism is effectively compatible with the keen observation and real understanding of a site [12].

Notes

[1] For a thorough and comprehensive critical reading of the semantic components in the representation of the landscape, refer to the text *Modelli Grafici dell'architettura e del territorio* [Cardone 2015, pp.300-311].

[2] In this regard, we highlight the reflection on the tendency, introduced by recent technologies, to have an increasingly strong correspondence between the real model and representation [Di Luggo, Zerlenga, Pascariello 2016, p. 29].

[3] The progression and consequentiality of the research phases are described in an exemplary manner by Umberto Eco in the text *Come si fa una tesi di laurea* [Eco 1977, pp. 57-75] where he emphasizes the value of a progressive cognitive and gradual pathway. Although the text predates the digital age, the considerations regarding the importance of critical analysis of sources, texts and images are perfectly up to date.

[4] The case study on the terraced agricultural landscape was the subject of research developed, first of all, by M.E. Ruggiero during the PhD thesis in Survey and Representation of Architecture and the Environment, and subsequently, by the two authors, as part of a series of seminars held on the PhD course in Architecture and Design of the Polytechnic School of the University of Genoa in 2018. A further development of these studies is currently underway in a joint research with the Leibniz Universität of Hannover entitled *Exploring responsive territories* and in the framework of a research supported with University-Unige Research Funds (2018) entitled *Visual languages and landscape identity: hypothesis of communicative models*. The study on the urban path for the Lanterna of Genoa is carried out within the framework of the research convention, of 2019, with MUMA – Institute of Museums of the Sea and Migration (Genoa), entitled *Images, communication and artistic paths for a valorization of naval culture in Genoa*, scientific director M.E. Ruggiero, operational manager R. Torti.

[5] The complexity of the factors that converge in the characterization of an urban space and the relative figurative stratifications –historical as well as potential– are the subject of the presentation by Francesca Fatta [Fatta 2014, pp.1-8].

[6] The importance of the semantic part in an urban landscape is specifically addressed in the text *City Signs*, [Falcidieno, Castellano, 2015, pp.19-44] in which the complex case study of the signage of the city of Parma is exposed.

[7] To better understand the scope and meanings of this diffusion, see the preface of *Digital Innovations in Architectural Heritage Conservation: Emerging Research and Opportunities* [Brusaporci 2017, pp. VIII-XII].

[8] Paul Milgram, of the Department of Industrial Engineering, University of Toronto, Ontario, Canada, and Fumio Kishino, creator of ATR Communication Systems Research Laboratories, in Kyoto, Japan, –pioneers of Augmented Reality Systems– in the contribution *A Taxonomy of Mixed Reality Visual Displays* [Milgram, Kishino 1994, pp. 1321-1329] describe the "virtuality continuum", a graphic synthesis concerning the close link between Augmented Reality and Virtual Reality, that is, an enlarged universe that develops into a continuum between reality and virtuality, in a sort of continuity in a well-defined space called Mixed Reality (MR).

[9] Today, two different types of virtual reality can be identified: immersive (IVR, Immersive Virtual Reality) and non-immersive (VR, Virtual Reality). In non-immersive virtual reality the desired results, although of great visual impact and incredibly photorealistic, remain less enveloping than those obtained with immersive reality. The user, in fact, perceives the virtual setting as a three-dimensional model simply reproduced on the two-dimensional surfaces of the displays of his device, without perceiving the sensation of complete obfuscation from the surrounding environment. In an immersive virtuality, instead, the user, once wearing the visor, is completely isolated from the real world and immersed into a digital world entirely rebuilt on the computer.

[10] The rural landscape referred to for the case study is *La valle del Buranco in Monterosso al Mare*, where impressive terracing and covering of the river were built at the end of the 18th century in order to create large lemon groves protected from the wind. The production of lemons was precious, at the time, to prevent scurvy during long voyages. Today these monumental structures are visible, although strongly compromised by degradation phenomena [Ruggiero 2018, pp. 53-64].

[11] Georeferencing can, in some cases, give rise to the activation of signals that, in some contexts, are grounds for inappropriate distraction: this is the case in particularly uneven environments or with excessive traffic and thickening conditions. The choice not to use this technology may introduce the right to choose exactly where a person can access certain information or views.

[12] The authors, while fully sharing the structure of the work, specify that they have respectively written: *Introduction* and *The representation of the landscape: from a diachronic logic to a synchronic one* (M.E. Ruggiero), and *The representation of the landscape between virtual reality, augmented and mixed* and *Conclusion* (R. Torti).

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