

Johann Habakuk Israel /
Christian Kassung / Jürgen Sieck (Hrsg.)

Kultur und Informatik: Extended Reality

■ Multimedia

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Kultur und Informatik

Extended Reality

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Floating in the Sea/Floating in the Data

The “Immaginario Bragadin” Experience around Venezia, Italy

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Abstract

Extended realities are often oriented in enhancing the perception of space, isolating the subject from the real environment and bringing the user to “another place”. In the “Immaginario Bragadin” (imaginary BRAGADIN, IB, from “Marcantonio Bragadin”, Venice 1523 – Famagosta 1571, past marine captain) an incredible outside world and the “introvert” virtual environment meet to define a unique and original experience in the Venetian Laguna. From a collaboration between the Laboratories of the Dipartimento di Architettura, University of Florence (DIDALABS) and Lorenzo Parretti, artistic curator of the IB, a specific and itinerant exhibition was developed to offer people the experience of XR, while floating around one of the most fascinating landscape and built heritage place in the world.

1 Introduction

The technology of virtual reality, as well as the augmented reality, allows migrating the perception of the environment in front of us. Thus, the influence of the real place, where the users/devices are present, is an element longly recognized as influent on the general experience [StMK98a], but it is often neglected in the design of the experience. On the contrary, while the users have the possibility to travel freely nullifying the distances, the real context around influences and takes full part to their senses. The decision to set up a virtual museum on a real boat came from the desire to shake the immobility of the structure that contains the computer technology and create a nomadic place, hosting an instrument capable to define a sort of virtual time/space machine exploiting the values of the context. The idea to experiment a series of site-specific aspects, like the smells, the motion, the sounds and the general mood, was extremely interesting and pushed towards the selection and organization of a series of well defined subjects, capable to benefit from such a condition.

1.1 A digital start

To start this project there was the intention to have a proper set of solutions, connecting a well defined exhibition space to a series of "path" across the Venetian Lagoon, starting to develop the hypothesis to have some possible expansion to the whole Mediterranean. The first set of visitable environments has been developed to define a "first release" of the IM itinerant exhibition. In the will of balancing the nature of the water, a specific vision of Venice and the Mediterranean and a group of the above mentioned site-specific elements were prepared to enter the first set of experiences, using advanced, almost experimental, hardware solutions like the wearable HP Z G2 backpack workstation equipped with an Oculus Rift S unit. It is even planned the further use of the high resolution (8k) Pimax visors and the Oculus Quest, but at the moment of the writing this solution is still under development. Together with this set of tools a more common solutions based on personal devices was organized to allow a general, quick and direct access to the resource using "popular" solutions in the logic of an extended dissemination of the contents.

For the personal device it has been developed also a small experience in AR, with the creation of an overlay of the Venice reality, everything made

with iOS hardware and software, using an Apple iPad Pro 11" and the Arkit Software for developer. It is a first trial of the many possibilities that this technology could offer for the development of user-oriented solutions even if it is quite clear how the variables that may influence the results are many and still ongoing in being fixed.

In the end, the aim is to recreate an itinerant virtual exhibition, with a central core in the former ferry boat, that could give to the people floating in the lagoon a new and different kind of experience about Venice, proposing different themes to explore in time, from historical aspects to the built/cultural/intangible heritage tour. The general structure of the project will be: a main exhibition based on the "Captain Bragadin" ship, with a part supported by advanced visualization devices and full immersive experience and another section dedicated to the use of personal devices.

1.2 What the "Imaginario Bragadin" is

The "Capitano Bragadin" is an offshore ship, once moved by a steam engine, now ready to start a general restoration. It is 26 metres long and was built in 1916 by the ACNIL the society for the public transport in Venice, now named ACTV, the ship exit the dockyard bringing the name "Marcantonio Bragadin", who was the governor of Famagusta in Cyprus, bearing the siege of the town against the Ottoman army from July 1570 to August 1571, the long duration of the resistance, finished with the surrender of the fortress and the horrible death of Bragadin, who longly resisted to tortures, gave time to organize the floats of the Holy League led by Pope Pius V. The Holy League was then able to defeat the Ottoman fleet in Lepanto in October 1571 [Font19]. From this series of heroic and historical events the use of naming an Italian ship "Bragadin" seems a quite common behavior. While operating as a ferry, the Bragadin received the "number" 39, operating in the lines between Burano, Murano and "Fondamenta Nuova" in Venice, up to 1987. Later, it remained in full abandon until 1997 when it was bought and restructured into a private architecture studio in "Rivier del Brenta", it was used as a design place until 2017, in the past three years it started a progressive transformation into an itinerant cultural space. During the storm in November 2019, the Bragadin suffered from various damages and now it is near to enter a new restoration to complete its transformation, in the new asset it will include a large exhibition space, a

book shop, a relaxation area, a laboratory dedicated to teaching and playful activities for children and adults.

1.3 The reasons for a floating venue

The project is based on the belief that the interaction with the environment may be an essential extra value to the virtual/augmented reality experience. Various past researches have shown how the experiences in environments well compliant or even specific in front of the proposed virtual model allow a more convincing result and even a better comprehension/learning of the proposed contents [KWLH13]. In this sense the structure proposed for the exhibition is simple and at the same time well working in front of the first in-place test conducted in February 2020: in the central part of the exhibition area two immersive units take place, both have access to a series of virtual environments, the main two are: 1) The “Teatro del Mondo” by Aldo Rossi, representing the spirit of architecture and modernity in Venice. 2) The Cistern of Constantinople, representing the links between West and East, the mixture of elements due to artistry and needs. A series of secondary contents are dedicated to Lagoon/marine navigation subjects like the interactive point cloud of the “Captain Bragadin” digital survey and by the 3D model of the historical boat “Concordia”, now abandoned nearby Porto Marghera and waiting for a recovery (these two elements are under development at the moment of writing). In addition to these immersive elements a specific selection of “guest” works is foreseen to take place in the virtual exhibition, hosting works from other scholars, with the main rule to be connected to mediterranean, coastal or “connected to Venice and its Lagoon” subjects.

Exploiting the large windows of the boat in the same main exhibition room, a series of three points of view are established to host a same number of augmented realities experience: “the imaginary shipwreck”, again the “Teatro del Mondo” and the “boats around the Lagoon”. The solutions are accessible using in place tablets or the personal devices of the visitors, the connection between the windows and the users is helped by the insertion of QR codes along the frame of the window. Last but not least, at the moment of the writing still at a very preliminary stage, the idea of creating an external experience out of the IM exhibition, with the possibility to take a small boat, navigate to one of the islands nearby and then experience the meeting with some virtual actors with a specific link to the place, like

the imaginary “ghosts” from the Poveglia island [BuSf18] or the people from the leper colony and/or the past Armenian Monks in the *San Lazzaro degli Armeni* island [MaBa99]. A solution to intensify the conclusion of the visit and link together a better knowledge of the historical values of the Lagoon with the logic of slow navigation and sustainable tourism.

2 The set of experiences for the itinerant exhibition

2.1 “Teatro del Mondo” by Aldo Rossi

This iconic temporary architecture was realized between the end of the ‘70s and the early ‘80s, it has a strong link with Venice and with the maritime theme. The Theatre of the World (Teatro del Mondo), has been built in Venice in 1979 by the architect Aldo Rossi [BrPR82]. It was assembled at the occasion of the Venice *Biennale* of Architecture; it can be considered as the most representative symbol of the Biennale and of the work of Rossi himself [RoBB04]. The experience was structured through various steps, starting from the documentation. Since the structure was dismantled, it was necessary to collect information on its formal and structural characteristics, consulting the architect’s drawings and the various photographic sources. From this knowledge, it was possible to carry out digital modeling of the object, performed with Maxon Cinema 4D. Inside this software was also modelled and mapped the city of Venice; the modeling, the UVW mapping and the exporting process of the file was important for the creation of the context all around the Theatre, and it has been done with the helpful new plugin Datasmith, that can easily, even if with some imperfections, export models directly between Cinema 4D and Epic Games Unreal Engine. At the end, the model of the Theatre, exported using an FBX format, and the model of Venice, using Datasmith, were both imported in Unreal Engine for the developing of the virtual exploration [Gree19]. The experience led to the digital rebirth of this disappeared architecture. An operation that will make it accessible even to people who have never had the opportunity to see it or to retrace memories passed to those who were present at that time. The experience obtained is a complete perception of the physicality of architecture. The boat, leading the user to the place once housed by the building, the beautiful and suggestive *Punta della Dogana*,

will allow the researcher or the interested user to experience the work in its environment.

In the same spot it is possible to visualize the AR content about the Theatre. The camera of the mobile device will trace and recognize the marker which has been set during the phase of creation of the element and the AR content will show up on the device, giving the opportunity to interact with it directly on the screen. It is a less deep kind of immersion than the one offered by content displayed in VR, but still delivers an innovative experience to the people floating on the boat around Venice [FiFi18].

2.2 The “Cisterna Basilica” in Constantinople

It is safe to say that in order to know Venice better it is essential to know Constantinople. The two cities were strongly linked by commerce, art exchange and share some robust environmental aspects. There is this unbreakable bond, whose signs can still be found today in the architecture, mosaics, cuisine, language and history of this city of ours that has inherited so much from the mythical Constantinople.

The Basilica Cistern, in Turkish *Yerebatan Sarnici*, is one of the biggest ancient below the ground of Istanbul, build by the Emperors to satisfy residents’ water needs [Onlu10].

The reconstruction of the Basilica Cistern was based on existing surveys, creating a dimensional model, optimally proportioned and that responds to the real. The Unreal Engine software was used to rebuild the Cistern and to offer a format that can be reused in any museum context [RiVP19], in this case an itinerant museum. This is the exact demonstration of the quality of this kind of result, which is an active type of communication, that offers the simulation of a real environment and an unforgettable experience. During the trials carried out on the IB, the presence of the real water and the sound of it, gave to the users an enhanced feeling of the scenario virtually recreated.

2.3 The “Imaginary shipwreck” in Venice

This setup is most of all a provocative proposal. The “large ships” presence in the Lagoon is longly subject of a debate between preservation and economical/market choices [Sett14, DaMa04]. In a certain way, they represent the extreme exaggeration of the touristic approach to the art towns, bringing gigantic cruise ship nearby the fragile and unrepeatably

Built Heritage of Venice. The risk of a tragic event repeating the “Costa Concordia” disaster in 2012 [StPe16] is one of the major concerns about the unarrestable cruises access to the Lagoon. In this way the visualization of a large shipwreck nearby the IB harbour is a way to shock and propose a reflection about the possible risks of an unwise approach to the built/natural environment of Venice. The user can just visualize the large ship in abandon, tilted on one side, in a similar position of the “Costa Concordia”, in the will of producing by “fear effect” [Pott12] a sensibilization about this risky situation.

2.4 The user’s experience feedback

The test carried out on the boat brought important observations regarding the use of the device by users. This moment was very useful to observe the feeling with the device of the different users and create a division into groups between the speed of learning and tuning with the VR. This cataloging was mainly divided according to age groups and was very interesting for us. The observed group of adults, with an age between 21 and 65 years, quickly understood the explanation of the controls and movement dynamics. However, in this group is useful to distinguish the difference in the safety of free movement, in practice something like taking few steps in the dark. The users on their first experience with VR are often very insecure, and they move in a limited space and in some cases, they do not move at all. While users who already had experiences, they felt freer, at first moving limitedly and then more widely when assisted with continuous or tactile feedback. In this group, however, it should be emphasized that a good part of the 51–65 age group, in addition to performing limited movements, preferred to let themselves be led, on a tour commanded by an external operator. This macro-group is joined by a further one, including the young age group from 8 to 20 years old. More inattentive to explanations and eager to wear the device, young people have demonstrated a very rapid acquisition of safety in movement. Besides, it should be noted that security in freedom and speed in learning the dynamics was faster as young as the user was. The residence time was also wider, with requests for a second use during the test day. Last interesting fact, among the event participants the female component proved more suspicious or declined the invitation to try the experience.

This is associated with direct comments and observations, more the result of emotional inputs than technical ones. These are difficult to summarize, the most relevant to be reported are: the amazement of being in front of an architectural work, which some users had seen live and the manifestation of perceptive sensations, such as the perception of the height or the feeling of the sizing of the spaces.

Therefore, reporting some useful data, the analyzed sample is composed of 21.4% with ages from 8 to 20 years, 14.3% between 21 and 35, 35.7% between 36 and 50 and 28.6 % between 51 and 65. The entire sample is made up of 21.4% of women and the remaining 78.6% of men. Of the users involved, 35.7% had already had at least one experience with VR, while the remaining 64.3% was at the first time. The average overall rating was 7.5 out of 8; an excellent performance over a short test period. The most significant data was obtained on the question relating to the physical environment, namely the use of a boat. As already specified, the theme presented was floating and the desire to propose it on a boat wanted to implement the sensoriality of the virtual visit. All respondents answered positively, regarding the choice of location. Even those who had never had experience with VR said that they could not imagine the experience as complete if done on land. At the end, a part of the interviews randomly selected, to give completeness to the statistical sample presented. Reporting also the comments to other queries requested which are difficult to summarize in numerical terms.

Age	Gender	First time in a VR space?	Vote	„ten words impression“	What did you like more?	What did you like less?	Effect in play	After play
51-65	M	N	8/8	Extremely pleasant	The texture, the representation of the sea, the space perception	Some mistakes in modeling	Loose reference to real, hilarity	Better understanding of the place, Better understanding of the architecture

21-35	M	N	8/8	Excellent job very interesting and perfect installation on the boat.	No answer	No answer	No answer	Better understanding of the architecture
21-35	F	N	7/8	Very nice experience	The possibility to visit an icon architectural place on an iconic water vehicle	No answer	Hilarity	Better understanding of the place, Better understanding of the architecture
36-50	M	N	8/8	Indeed, how to enter another environment and perceive it	Being able to move in space	lacking control of the observer's body	Vertigo	Better understanding of the architecture, Vertigo
10-20	M	Y	8/8	Freedom of movement	Freedom to visit spaces	Nothing	Hilarity	Better understanding of the place
36-50	M	Y	7/8	Perceptually complete, dizziness, presence of objects in space, it needs graphical improvements.	More realism. Adding unreal points of view	No answer	Vertigo, Loose reference to real	Feeling the change virtual/real, Vertigo
36-50	M	Y	8/8	Particular experience	Be suspended	No answer	No answer	Feeling the virtual/real swap
51-65	M	Y	8/8	It was my first time, incredible and fascinating.	No answer	No answer	Loose reference to real	Feeling the change virtual/real

36–50	M	Y	7/8	Very curious	No answer	No answer	No answer	No answer
51–65	M	Y	7/8	Addictive	Emotional	Movement management	Loose reference to real	Better understanding of the real, Feeling the change virtual/real
51–65	M	Y	8/8	An ocean, eye opening. Occasionally it would take this experience	More populated. Ducks, fish.	No answer	No answer	Better understanding of the place, Feeling the change virtual/real
36–50	F	Y	6/8	Emotion; I find the view from the sea spot on	Color	Motion graphics	Hilarity	Vertigo

Table 1: Excerpt from the interviews.

3 Conclusions

The project about the virtual itinerant exhibition is ongoing, the tests and the interviews with the users have confirmed how good can be the choice of a ship like the “Captain Bragadin” for hosting a set of marine experience, the environment in itself influence in an extremely positive way the perception of the virtual experience, the link between reality and virtual “suggestions” is enhanced and at the end the user feel even more interested in discovering the “real” contents just showed in the experience. The potentiality in terms of learning and dissemination of concepts is extremely interesting.

The next steps will be the completion and refining of the contents for all the virtual environments (paying attention to the feedback from the users) and the setup of the exhibition on the “Captain Bragadin”, which is going

to face a complete restoration in May/June 2020. The rich and imposing context of Venice and its Laguna have shown their unbeatable strength in influencing the experiencing with technologies.

The main “lesson learned” from the first general test is that the Virtual Environment should not replace completely the real environment and that when it is possible, the connection between the virtual experience and the smells, sounds, movements from what’s around may mix well with the final impressions gathered from the users.

The “exceptional” event of being on a boat may influence just some people, but is for sure an additional value that will help in moving visitors towards the set of experience on the IB space. The will of proposing an “alternative” Venice, far from the massive touristic access, reflecting on the special poetry of the Lagoon, mixing the relationship between people, arts, environment, with the luxury option of jumping in space and time and opening the possibility to interact in a new and specific way with an incredibly beautiful context.



Fig.1. Exterior of the “Immaginario Bragadin” during the public presentation in February 2020



Fig. 2: Example of AR technology inside the Itinerant “Immaginario Bragadin”



Fig. 3: Operating with the HP Z1 workstation on the “Immaginario Bragadin”.



Fig. 4: Screenshot from Maxon Cinema 4D, representing the making of the 3d model of Venice and of the Theatre.



Fig. 5: Screenshot from Maxon Cinema 4D, representing the image rendering phase.

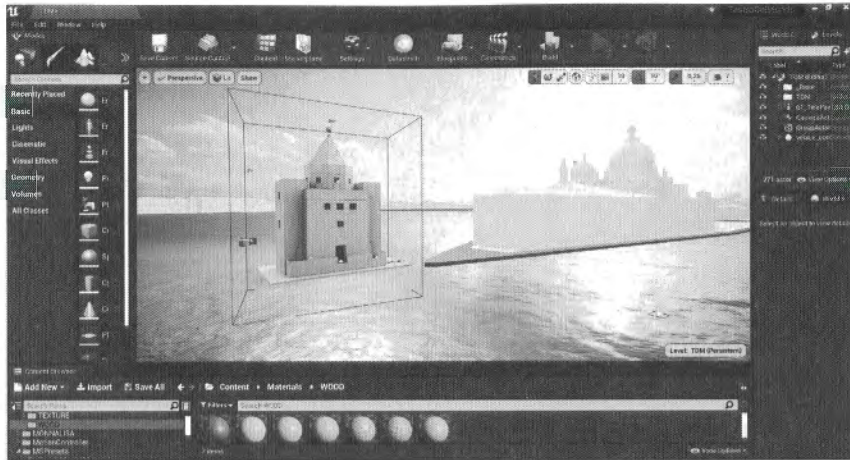


Fig. 6: Screenshot from Epic Games Unreal Engine, building the VR scene of Venice and the Theatre of the world.

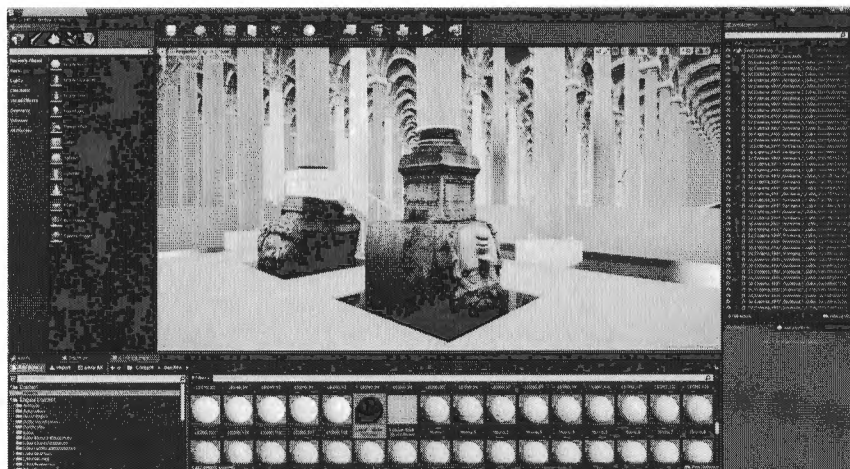


Fig. 7: Screenshot from Epic Games Unreal Engine, representing the making of the VR scene of the Basilica Cistern.

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The activities between the Dipartimento di Architettura, DiDALabs System and the "Immaginario Bragadin" Association were established in November 2019, the testing of the Virtual and Augmented Realities

contents took place in Venice in February 2020, the completion of the exhibition setup is foreseen by September 2020.

The contents for the "Teatro del Mondo" have been development with the collaboration of Eleonora Cecconi from the "Architecture Modeling Laboratory" (LMA) from the DiDALabs System. The contents for the Istanbul's Cistern, the "Imaginary Shipwreck" are a research work from Y. Ricci, A. Pasquali, G. Verdiani. The Concordia Boat is a research developed in collaboration with L. Parretti.

The present harbor where the Captain Bragadin is located in the "Spazio Junghans", Giudecca, Venezia, Italia.

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Extended Reality (XR) is omnipresent and will become even more important in the future. Therefore, XR was the main topic of the conference *Culture and Computer Science 2020*.

XR encompasses augmented, mixed and virtual reality as well as all intermediate forms. In the articles in this book, many theoretical aspects are discussed and best practice examples from art and culture are presented.

Extended Reality (XR) is characterised by a significant degree of interdisciplinarity. The entanglement between the real world and computer-generated data cuts across and expands far beyond disciplines such as human-computer interaction (HCI), computer graphics (CG), sensor systems, machine-to-machine communication, cultural science and design.

This volume addresses cultural policy makers, employees of cultural and creative industries, communication scientists, cultural and artistic actors as well as computer scientists and engineers, who conduct research and development in the field of Extended Reality.

**Matters
of Activity** Image
Space
Material

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