Преглед НЦД 21 (2012), 47–56

Sofia Pescarin
(Consiglio Nazionale delle Ricerche (CNR), Rome, Italy)
Selma Rizvic
(Faculty of Electrical Engineering,
University of Sarajevo, Bosnia and Herzegovina)
Dino Selimovic
(Association for digitization and informatisation of cultural
heritage DIGI.BA, Sarajevo, Bosnia and Herzegovina)

V-MUST.NET - THE VIRTUAL MUSEUM TRANSNATIONAL NETWORK

Abstract: V-MusT (Virtual Museum Transnational Network) is a new EU FP7-funded network of excellence that aims to provide the heritage sector with the tools and support to develop virtual museums that are educational, enjoyable, long-lasting and easy to maintain. Virtual Museums (VMs) are personalized, immersive, interactive experiences that enhance our understanding of the world around us. The term 'VM' is a general one that covers various types of digital creations including virtual reality and 3D. The V-MusT.net partners believe that Europe has the capacity to become the worldwide leader in the domain of VM. This leadership can only be achieved if we resolve the problem of research fragmentation and share the knowledge required to integrate VMs into the broader museum domain in a sustainable way. We can achieve this by connecting different technological domains, integrating social and cognitive sciences, providing state-of-the-art digital preservation and authoring tools, proving the socio-economic impact of VM and establishing sound methods of quality assessment.

Keywords: digitisation, cultural heritage, virtual museums, network of excellence, EU, FP7

1. Introduction

Virtual **MUS**eum **T**ransnational **NET**work – **V-MusT.net** – is a network of excellence dedicated to Virtual Museums, specifically to the researches on this field and to their implementation. The project and the entire Network of Excellence are financed by the FP7 fund of the European Union. The V-MusT.net network of excellence consists of 18 Partners coming from 13 different countries. The project is planned to last 4 years, from February 2011 to February 2015.

Virtual Museums (VM) are a new model of communication that aims at creating a personalized, immersive, interactive way to enhance our understanding of the world around us. The term “VM” is a short-cut that comprehends various types of digital creations. Unfortunately, although its idea is not new, development and implementation researches have not yet brought Europe to be the leader in this field, as expected. This sector has not reached a sufficient level of maturity, such as Cinema or Game sectors, and is not as widespread as it should be. Moreover in Europe, unlike USA, we still face a disconnection between the research, that develops tools with little interest in their wide application, and the industry, that builds ten-year plans addressing the market [V-MUST].

VM domain is the perfect application area where all these problems NEED to be solved for the real benefit of community. Unfortunately there are no solutions ready to be developed through research. A NoE would be required at this point. V-MusT.net partners believe that Europe CAN be the leader in the worldwide panorama of VM. A large subset of the most im-

portant VMs is implemented by EU groups. Some of the most notable and excellent researches related to this field are developed in EU. This leadership can be achieved only by going beyond the actual research fragmentation, by soliciting a common effort in assessing limitations emerging from all VM experiences consolidated so far, finding proper solutions, assessing them through experimental activity and finally consolidating a transnational network dedicated to VMs.

V-MusT.net will bridge technological domains, archival, social and cognitive sciences to advance the state-of-the-art of digital preservation, for VMs future persistence. It will finally create a virtual research area; identify researches for further development; identify the VM of the Future; increase competitiveness of the EU-ICT industry; create a quality evaluation procedure.

2. Concept and objectives

What is a Virtual Museums (VM)? A VM is a "short-cut" commonly used to identify different digital creations (i.e. VR applications, CG animations, multimedia, web-based presentations, etc.). VMs, as formulated at the beginning of the 90s, are aimed at opening new modes of communication, creating a bridge to the remains of our past and their knowledge, building a personalized, immersive interactive way to enhance our understanding of the world around us. A fundamental requirement is therefore the focus they should have on users. VMs should be the application domain of several different researches: content-related research, cognitive sciences, Information and Communication Technologies (ICT), and more specifically interactive media management, Technology Enhanced Learning (TEL), serious and educational games, business studies.

VMs are built as aggregations of content (digital libraries of 3D models, texts, images, geospatial data, audio, videos, etc.) and they are based on the use of ICT solutions for their development and deployment. A VM uses vision, narratives and interaction to create an experience that can bring visitors, students, scientists inside history, past landscapes, art, etc. It needs also a space to be accessed: either a dedicated physical space inside a traditional museum or visitor center, or a cyberspace (visual presentations accessible via Internet, content distributed on DVDs, etc.). Since VMs may have the potential to completely alter and extend the way we approach, understand, learn about and preserve CH knowledge, they should be more and more part of our traditional museums, but also of the learning process in schools and universities. VM are not limited to the historical and archaeological heritage transmission and in the next decades, thanks to their high effectiveness and low cost, VMs will be one of the most diffused instruments for the dissemination of knowledge about culture.

Unfortunately, although the VM idea is not new, its development and implementation has not brought Europe to be the leader in this field, as expected, and this for several reasons, the major being the significantly fragmented research. Museums or education institution have not yet endorsed VM as the major communication media, general communication in museums is still based on written text or audio-guides. The proof is that most VMs developed so far have been produced as case studies of scientific projects, with little or no impact for end-users. The life-cycle of many installations is still very limited in time (in many cases, just a few weeks to complete an assessment exercise in the framework of a scientific project). Furthermore, important long-lasting projects, often founded by public money, are today completely lost and inaccessible, due also to the lack of preservation policies.

Moreover, another main problem regards HOW researches are currently carried out in Europe. From the user and marketing point of view, we witness the development of various and different small and medium-scale ICT solutions. Every ICT lab commonly develops its

own solution, with little or no interest in its large-scale application. The Virtual Museum domain rather needs a deeper focus on application. Typically a research project starts, is developed and dies in the same place. The result is that the research that is developed is at a very high level and sometimes much beyond the state of the art, but it remains at academic level, very distant from the industry sector and from the users' experience. On the other side, as we can see in the USA where there is a much more homogeneous and standardized tendency (i.e. the choice is just between Direct X or OpenGL and nothing more), industry establishes directions. In Europe there is a deep disjointedness with industry policies.

Therefore the project will consider also industry plan in order to avoid disconnection and to promote sustainability.

Main problems caused by this fragmentation are: weakness of VR solutions, focused on the development of "experimental pilot-cases" more than on effective, long-lasting digital contents; lack of widely accepted preservation methodologies and guidelines, which may take into account also meta-data such as accuracy, resolution, used sources, reliability level etc. (see www.londoncharter.org); lack of efficient long term storage and online presence (such as Europeana); VMs with no physical implementation; scarce accessibility to digital scientific contents, pipelines and sources; re-creation of the same base content for different communication projects and lack of re-usability procedures; un-sustainability in the daily management of the installations; lack of trained museum staff (trained professionals for digital curators, guides); wrong or no marketing plan to achieve projects sustainability and sharing of content, under a clear copyright reference; difficulties in evaluating impact and sustainability due to lack of statistics and cognitive studies; problems in VMs usability due to little involvement of public institutions and end-users.

The level of fragmentation does not allow at the moment to solve problems behind Virtual Museum domain. There aren't yet specific researches that can be developed (through an IP project i.e.) a priori. There is, on the contrary, a strong necessity for analysing those problems, defining requirements and needs, identifying existing researches that should be interconnected and completed. At the end of this process, typical of a NoE, it is possible to address new researches to be developed.

V-MusT.net will take into consideration and integrate results achieved by previous and on-going networks and IP projects related to the domain (EPOCH, STELLAR, EUROPEANA LOCAL, 3D-COFORM, V-City, Athena, Carare, GaLa, STACHEM, 3DTV, 3D4YOU, F-MUSEUM, INTUITION). It will look at advances in current research networks on VM related topics in order to be as updated on technological innovation and methodological approaches, at the same time sharing with them the suggestions coming from Project's results. V-MusT.net will move on a higher policy level based on the leadership of the research sector. V-MusT.net will move beyond the earliest networks, not considering the digital acquisition phase of the work, but focusing on: interaction, integration and user interface, with a strong commitment to user needs inclusion and satisfaction, to curatorship policy integration, to industry comparison and re-connection. V-MusT.net will go over the state of the art on digital preservation, bringing it to a more practical level. It will set up a foresight agenda for the Virtual Museum of the future. Despite the valuable work carried out by previous networks, European Virtual Museums are not internationally visible as they should be. At strategic level there is still a lot to do to reach and align policy-makers and to connect research domains that are currently far from each other, making EU research to progress more rapidly.

Nevertheless, there are few reference VMs, which display the potential for very significant benefit knowledge acquisition, teaching and tourism. One of the first examples is the TimeScope system developed in 1998 for the Ename archaeological park (B) that has pro-

moted the name of the small city of Ename at the highest level in Europe [Ple00]. Other successful examples are the Virtual Museum of the Scrovegni Chapel in Padova (IT), the VR explorations of ancient Greece at the Foundation of the Hellenic World or the Virtual Museum of Ancient Via Flaminia (Figure 1).

In the last 10 years, European researchers have been involved in the development of the most important and quoted Virtual Museums in the world, obtaining international awards. Most of them have been created by V-MusT.net partners.

V-MusT.net partners believe that Europe can become the leader in the worldwide panorama of Virtual Museums and Virtual Heritage, under the condition that the actual research fragmentation will be reduced and that common and easy-to-use tools will be provided to the community. EU richness, both in terms of the share of world heritage and of the large number of cultures represented in the EU states and cultural institutions, is a key-point to create standards and reference models with world-wide impact, invaluably more than what can be obtained in a single national panorama.

Figure 1 - Virtual Museum of Ancient Via Flaminia installation, Museo Nazionale Romano, Rome, Italy

This digital patrimony is in danger due to the lack of a shared methodology for preserving those contents. This danger is felt more and more, when this digital patrimony is the only testimony of heritage disappeared or in danger (see Buddhas of Bamiyan, Lascaux Caves, Santimamine's caves, Scrovegni Chapel digital projects, etc.). In these cases, the need of pairing the real artefact or the real site with VMs installations is particularly evident, as they are the only mean to access CH wherever inaccessible to visitors, i.e. for preservation reasons.

In addition, EU institutions have been involved in the development of various basic and applied researches, in different domains that may be considered very useful in the VM field. VMs in fact are generally the product of an interdisciplinary team work. Researches concern all digital contents commonly used in a VM (2D, 3D, geospatial data, computer-graphics libraries, multimedia contents, texts, images, audio, movie), and belong to the following areas: Cultural Heritage, Art and Natural Sciences; Virtual Heritage development (acquisition, processing, interpretation, reconstruction); Scientific Simulation, Artificial Life and Ecosystem studies; ICT researches (software development addressed to specific digital sources processing, authoring tools dedicated to VR applications development and also hardware researches addressed to computing, interaction); Semantic and Cognitive Studies; Business/Marketing planning.

Although the involved researches (see state-of-the-art below) have reached a high level of specialization, results have not been sufficiently compared and integrated, and have rarely been tested in real cases considering also users, their needs, characteristics, psychology (the few existing data in this sense comes mainly from V-MusT.net partner's past projects) [Rou05]. This has caused a waste of funding and a slow progress of the research. On one hand, existing studies related to Virtual Heritage and Museums are fragmentary and not tar-

geted to specific common goals, thus generating, in the implementation process, a general lack of evaluation criteria regarding what may be stated as a successful project. On the other hand, scholars have been rarely involved in pluri disciplinary environments: ICT researchers tend not to consider the importance of content creators, communication experts, cognitive scientists and final users; as content owners and virtual heritage developers tend to consider the technology only as an instrument that can be changed each time, instead of taking into account the need to train, develop and create a stable and robust result.

Moreover, although there is still not state-of-the-art or off-the-shelf ICT solutions specifically designed for Virtual Museums and Virtual Heritage, it is possible to move to CH needs the approaches and solutions, developed by the game and movie industry. The creation of an Expert Group which involves important international expertise such as that brought by Acti-Vision Corporate and Playable Fiction (further detailed in Section 2), tries to face this challenge.

3. Main issues

V-MusT.net partners believe that the creation of the network would help solving the existing problems, connecting existing and new VMs, identifying common guidelines and references in the researches aimed at creating next generation VMs and addressing new needed researches. Consequently, the main issues that should be identified are:

- **services and facilities** for VM (repositories, simulation, rendering and visualisation, computing);
- **new methodologies and digital workflows**, since they are usually developed inside each research sector separately, without a shared cross-domain methodology, taking into account: digital preservation, maintenance and usability of VM;
- **tools** for presentation and interaction as well as new transmedia authoring components;
- **stakeholders** that have to be involved in VM design and deployment (researchers expert in ICT, social-cognitive studies; museum staff and curators; end-users: visitors, tourists, students); professionals in the field of communication, marketing and art).

From the user perspective	From the research perspective:
Permanent forum	Creation of an Enabling Platform
Training	Huge effort dedicated to training (not just focusing on the consortium but open to the external world) and to grow a new generation of multidisciplinary researchers
European cybermap of currently available VMs	Comparative evaluation of previous activities on VM
Quality level of Virtual Museums	Creation of an interconnected community (joint development activities of new VMs, common development resources, uniform methodologies, ...)
Mobility	Definition of policies and tools for VM data integration and preservation
Accessibility, Usability	Network of knowledge centers
Collaborative environment	Collaborative, shared, open platform

Wide dissemination of VM knowledge	Definition of an evaluation process for granting quality level (VM quality label)
Local access to VM knowledge	Knowledge base

Table 1 – List of V-MusT.net contributions

4. V-MusT.net general strategies

The strategies that will be used in order to achieve this goal and promote the excellence are:

- **inversion of perspective and approach** (from technology-driven to communication-driven): V-MusT.net aims at inverting the perspective and approach commonly adopted (technology-driven) in the VM field. Starting from contents and from planned communication objectives to gather users' attention, the project intends to identify hardware and software technologies, but also ICT services, really innovative, useful and adequate to a (usually) low-budget domain. In this approach, V-MusT.net will start considering first the users, the cultural content and the communication goals. Then it will analyse which ICT tools should be used, modified or developed and, finally, it will identify the necessary services. The "House of Questions", built by WP2, will focus in fact on the analysis of needs and problems related to users and contents, while the work carried out by WP3 will focus on communication issues. WP4 and WP5 will get more into technological issues related to the identification of useful ICT services (WP4) and visualisation tools (WP5).
- **creation and consolidation of inter-disciplinary teams** as the only way to ensure a correct communication. This strategy is aimed at creating inter-disciplinary mixed teams, to establish the basis of a new methodology for the design and implementation of VM products, which should become the standard approach and survive the end of the project. The goal is to identify new questions for the research, impossible otherwise to be picked out. Each WP will participate by experts coming from scientific and humanities field (also in vertical WPs - such as WP2, WP3 and WP5 – at least 10% of the partners will come from a different sector).
- **use of a bottom-up approach**. Bringing people together doesn't necessarily mean creating a fruitful cooperation, able to generate new inputs in the research. To be effective and productive, an interdisciplinary team requires the stratification of a common language and a common cross-discipline culture. For this reason, V-MusT.net will bring strategy 1 and 2 into practice. Experts of each research fields involved in the project will be chosen - by WP2 - to participate together at a wide transnational interactive experiment (WP7). It will be used to tangibly test theories and criteria, identified by WP2, WP3 and WP5. The training (WP6) that will be done also within the testing activities will be a further impulse toward the mutual understanding and cooperation. The work of WP6 and 7 will serve to build a common mutual understanding and shared knowledge (virtual research area).
- **identification of good-practice examples** and of the procedure to grant a quality label. Sharing knowledge means also being able to define common rules and procedures to evaluate and assess the quality of VM products. This is a crucial factor: the international domain is ideal for setting up a procedure that allows to (cross-) evaluate the different experiences and results of the many VM projects and products. This is an effort that can be based on technical evaluation parameters, on public response on a mixture of the previous elements.

- **integration of young researchers into the training and mobility program**. Rising a new generation of researchers is also an extremely important task of the proposed project. This will be obtained at different levels: most of the budget will be dedicated to personnel (and most of this will be spent by hiring Ph.D. students and young researchers); this new research unit will be trained and skilled, giving them the possibility to work in a multidisciplinary domain and to apply new methodologies to real on-the-field activities. Moreover, internal training will be the iceberg-tip of a wider effort to train personnel; several actions will be implemented to transfer technologies and methodologies to the external world (encompassing academia, cultural institutions and industry), by means of Ph.D. courses, summer schools, training weeks, seminars, publications.

5. V-MusT.net objectives and their application

V-MusT.net aims at critically and scientifically analysing the research fragmentation issues and at proposing solutions in order to re-orient researches currently on going, to create new trends, new methodologies and a new generation of VMs, more integrated with the educational and research processes. This goal will be achieved through the creation of a transnational "virtual research area" shared with first-rank institutions and entities involved in the various research fields.

V-MusT.net objectives	Objectives application in V-MusT.net
Improve the creation, access, management, sustainability and **digital preservation** of appropriate virtual and digital contents, with the overall goal of making easier the creation, delivering, sharing and preservation of VM, identifying data and knowledge preservation strategies	Debates on digital preservation and survey of the problem (WP2.2); Design and deployment of strategies, processes and infrastructure on data and knowledge preservation (WP3, WP4); Identification of solution in term of visualisation and interaction (WP5); Assessment of the identified methodologies (WP7.1,2,3); Demonstration (WP8)
Create an interdisciplinary research network that will act as a **bridge between the technological, cognitive and humanities domains;** Create a common language and a common basic knowledge shared by all research domains involved	House of Questions (WP2.2) Virtual Museum Laboratory (WP7.2, 7.3)
Advance the state-of-the-art (overcome the epistemic limits of established approaches; bring in new ideas and conduct exploratory research around them)	Creation of a multi-disciplinary discussion and identification of gaps and needs of the actual researches (WP3.2) Call for Micro-Researches (WP1, WP2.3) New research in the field of cognitive and communication studies (WP3) Advances in the field of visualisation and interaction systems (WP5) Consolidation of the research through VM laboratories activities and Transmedia Joint Project development (WP7.2,3)
Restructure and strengthen European research landscape in digital libraries and digital preservation	Thematic Calls (Call for Micro-Researches, Call for external application integration, Call for Micro-Projects in WP2, WP4, WP5, WP7); Joint research projects (Transmedia Joint Project: WP5.3,

	WP7.3)
Improve **knowledge dissemination** based upon visual and interactive media within real museums and on line VMs	V-Move mobility program and V.MusTer.School training program (WP6) Interactive Expo, Know-How Books, web-site Forum, Network of Knowledge Center, Observatory of Virtual Museums (WP8)
Identify **needs, requirements** and **problems** that need new researches to find solutions	House of Questions (WP2), Testbeds assessment and Transmedia Joint Project development (WP7)
Define the **conceptual framework** of VM-related activities and a "theory of VM"	Theory and models of Virtual Museums (WP3)
Involve **users** at various stages	Forum (WP2), V-MusTer.School Training Program (WP6) V-Move mobility program (WP6) Assessment activities (WP7) Dissemination activities (WP8)
Identify **new forms of visualisation and interaction** with virtual worlds, developing scalable facilities for multiple media content presentation, also through natural interfaces	Implementation platform for Transmedia authoring, ubiquitous display, 3d web
Create a **quality training system** in the field of ICT applied to VM	International Virtual Heritage School (WP6) Virtual Museum Academy (Academy for trainers, Academy for manager) (WP6) Educational program (WP6) E-Learning support (WP4, WP6) Know-how Books (WP8)
Verify theories and hypothesis through exploratory activities	Virtual Museums Laboratory (WP7)
Improve employability in the field of Virtual Museums	V-Move program (database of jobs and stages in EU) (WP6) Virtual Museum European Observatory (WP8)
Improve the impact of VM at **high institutional level**	Virtual Academy for manager (WP6) Interactive Expo' (WP8) Network of knowledge centres (WP8)
Identify **evaluation criteria to state successful cases**	VM assessment criteria identification (WP2, WP3, WP5) VM Quality Awards dedicated to the future creation of an European VM Quality Label (WP7)
Exchange and re-use of VR set-ups	Identification of problems, needs and requirement in the House of Question on methodology and re-usability (WP2) Identification of solutions regarding semantic level (WP3) Identification of solutions regarding infrastructural level (WP4) Identification of solutions regarding visualisation and interaction tools. Identification of portable VM model (WP5) Testing of identified solution (WP7) Demonstration of final results (WP8)

Table 2 - list of V-MusT.net objectives and their applications

In such a perspective, V-MusT.net will create a persistent European network focused on VMs, connecting those leading institutions involved in the various research fields. It will

work to reach an implementation phase where data, knowledge, policies, meta-data, tools, and training will be tangibly shared. The network will create complementary research fields, will consolidate already integrated areas, will create synergies (resources sharing modelled using virtualization schemes, i.e. virtual labs).

The described goals will lead to the building of a shared new paradigm for the creation and deployment of Virtual Museums, much more integrated within European and national policies, and eventually to the creation of new professional activities and positions (e.g. digital curators). All the goals will be implemented by the proposed NoE also by acting as link towards the major research efforts in the domain (i.e. the NoE will be an active disseminator of the VH technologies and methodologies developed in current EC projects, such as 3DCOFORM, V-City, Europeana, Carare, Athena). We expect to create a new generation of Virtual Museums: more communicative and effective in term of European knowledge dissemination, more efficient in term of simplicity, access and cost, more sustainable, durable/portable (maintenance is a key topic), more easily shared and visible inside public spaces and on line cyberspaces, more participating. We will also experiment different metaphors of communication (VR, Multimedia, Narratives, Social Networks, Augmented Reality, etc.), different levels of interaction and complexity, different condition of fruition with the goal to verify and compare cultural impact on learners (students), specialists and tourists.

6. Work Packages (WPs)

The V-MusT.net project is structured into 8 work packages (WP):

- WP1 is aimed at the management of the entire project. It is also in charge of the management of the Development Camp where post-doctoral students and young researchers create new applications and content at international level.
- WP2 defines the knowledge base, on top of which the rest of the work will be built. It aims to define a common language related to the Virtual Museum field and identify problems, needs and requirements through the discussion groups that will meet in a 'House of Questions' session at the beginning of the project.
- WP3 uses the knowledge base to build a theoretical model of Virtual Museums, with input from the fields of communication, cognitive science and ontology.
- WP4 identifies a service platform with infrastructural components and integrated services to be used by the VM community.
- WP5 focuses on visualisation, interaction and new output devices and identifies useful tools, resulting in guidelines for the Virtual Museum of the Future.
- WP6 develops a Mobility program (V-Move), Training Program (V-MusTer.School) and Educational Programme based upon the results of the other work packages.
- WP7 is aimed at building the experimental laboratory for the entire project. It will create Virtual Museum test beds and develop a Transmedia Project containing several virtual museums that use different communicative media (e.g. video, multimedia, interactive games).
- WP8 will be dedicated to the dissemination and exploitation of the results. It will show the results of the project in 2014 through a Next Generation Virtual Museum exhibition and event, based upon the results in WP7, and disseminate project knowledge through know-how books and a distributed competence centre.

7. Partners

The project is realised with the efforts of following official partners of the V-Must.Net project and Network of excellence:

1. Consiglio Nazionale delle Ricerche, (CNR-ITABC/ISTI/ITD), Italy
2. Agenzia Per La Promozione Della Ricerca Europea, (APRE), Italy
3. King's College London, Centre for Computing in the Humanities, King's Visualisation Lab (King's), UK
4. University of Sarajevo, Dept. Computer Science, (ETF), Bosnia and Herzegovina
5. Institut National de Recherche en Informatique et Automatique (INRIA-IPARLA Joint Research Team), (INRIA), France
6. Lund University, Department of Design Sciences, (ULUND), Sweden
7. STARC, Cyprus Institute, (CREF-Cyl), Cyprus
8. CINECA, (CINECA), Italy
9. Foundation of the Hellenic World, (FHW), Greece
10. Allard Pirson Museum, University of Amsterdam, (UVA), Netherlands
11. Center for Documentation of Cultural and Natural Heritage, (CULTNAT), Egypt
12. Comune di Roma, Sovraintendenza ai Beni Culturali, Museo dei Fori Imperiali, (SOVR), Italy
13. Fraunhofer Institute für Graphische Datenverarbeitung, (FHG), Germany
14. Virtualware, (Virtualware), Spain
15. Visual Dimension, (VisDim), Belgium
16. Sociedad Española de Arqueología Virtual, (SEAV), Spain
17. Noho LTD, (NOHO), Ireland
18. University of Brighton, University of Brighton's Business School, (UoB), UK

References

[V-MUST] www.v-must.net

[Ple00] Pletinckx, D. Callebaut, D. Killebrew, A.E. Silberman, N.A. *Ename Centre for Public Archaeology & Heritage Presentation. Multimedia*, IEEE, 2000, vol 7, issue 2: 45–48

[Rou05] Roussou M., *Can interactivity in virtual environments enable conceptual learning?* In 7th Virtual Reality International Conference. Laval, France. pp.57–64

sofia.pescarin@mlib.itabc.cnr.it
srizvic@etf.unsa.ba
dino.selimovic@digi.ba