

All that is solid melts into bits:

advanced ICT technologies for converting fashion into museum exhibits

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Abstract—Museums and similar institutions are historically locations where content is typically only intellectually appreciated following linear visiting patterns. No interactions, in fact, are typically implemented and no possible choice is drawn in front of a visitor regarding the exhibits that will be shown. In addition, exhibition experiences are typically confined within their buildings' walls, not projecting themselves beyond those limits. In this work we present an installation that aims at breaking such limitations for fashion exhibitions, particularly relevant for the simple fact that their exhibits cannot typically be relocated, experienced or shared with the outside world. With this installation, namely PreTApTek, visitors, along with museum curators, become active players within museums, that, in turn, can extend their reach beyond their walls. Pretaportek, in fact, implements a special mechanism that enables, at once: (a) the active participation of a visitor within (visitors are led to choose their own and personalized visiting patterns), and, (b) the publication of personalized exhibitive content on social media. The contribution of this paper is hence that of describing how both of these objectives have been reached at once.

Museums; ICT, fashion, design, museums, exhibition, interface, social media, communication

I. INTRODUCTION

Despite common perception, museums and similar institutions have only partially been affected by the digital revolution [1]. This can be easily shown with a few examples.

In fact, although museums are more and more tending to integrate within their walls all kinds of digital paraphernalia (ranging from touch screens, to audio guides, mobile apps, etc.), the general pattern where topics are unveiled still follows some type of linear organization (e.g., time, space, topic type, etc.). The general public, conversely, has become more and more accustomed to follow patterns that are far from linear, e.g., when interacting on an everyday basis with search engines. When searching online, a given person typically

inserts one or more keywords and receives different entities of information (e.g., links, documents, images, videos, etc.) in return. Among the corpus of returned information, composed of typically many different entities, that user will find and choose the answer(s) that best satisfy the needs expressed in that given moment. Moreover, modern search engines also provide suggestions while seeking for information, often resulting in the discovery of unexpected information or unforeseen points of view on given problems. Such type of pattern of search, now very well established among all those that search for information online, may make the linear organizations of exhibitions and museums even more narrowing and, consequently, frustrating for their contemporary visitors.

Museums and similar institutions, in addition, typically confine their operations within their walls. For obvious reasons, exhibits never exit their premises and the experience museums provide can only be lived with strictly imposed time and space limitations. People, on the other side, have become more and more used to challenge spatial limitations living in a world in which information seem to be available at any time of the day everywhere in the world – provided you have a smart-device and an internet connection: walls are demolished and all types of information are published.

Museums are also places where the only allowed action is contemplation: “no access beyond this point”, “no photo” or “don’t touch” represent only some of the limitation being imposed on visitors when approaching exhibits. The only action that is allowed is a strictly personal intellectual and emotional experience. On the other side, though, the general public is nowadays more and more used to interact with objects that let them perform actions, stimulating different types of exchanges (e.g., olfactory, tactile, etc.), rather than forbidding them. As the Internet of Things paradigm becomes

part of every person's life, users have become more and more able to utilize technological devices to implement such type of possibilities and, through a selection process, to personalize the exchanges with world that surround them.

The above mentioned scenarios highlight the existence of a digital divide between how people now interact and exchange information within the real world and how such type of interaction and exchanges happen within the walls of a museum. Such situation poses fundamental problems for all, ranging from technologists, to designers, philosophers and museum curators [2]. The challenge therefore seems to be to imagine a new generation of installations that allow visitors to (a) choose the exhibition pattern (i.e., search and customize), (b) experience the exhibits (i.e., interact), and, (c) to share/partake the latter with the world outside museums (i.e., communicate). PreTAporTek, a fashion installation developed together with a group of students of the E-commerce course at the Master of Arts in Fashion at the University of Bologna, precisely aims at answering these needs, representing a proposal that may help bridging the gap between how people daily act and what they are allowed to do in museums or similar institutions.

II. RELATED WORK

Although the union of museography and technology as well as fashion and technology may both deserve the creation of fields of study of their own, this has not happened to this date and computer scientists, engineers, designers, architects, sociologists, artists, philosophers, etc. approach these fields together, but in different ways and with different perspectives. However, and despite the abovementioned panorama, a new awareness seems to be growing about the importance of content communication, being the subject of the latter either fashion or any other aspect of the vast cultural spectrum.

Focusing on fashion, an interesting experiment that blends such area with technology and communication has recently occurred in Milan. Here, the Renaissance church of San Carpoforo has been equipped with high-definition screens, infrared sensors, and motion-tracking technology for the particular occasion, in order to stage an interesting exhibition between March 14 and 16, 2014 [3]. The installation consisted of a moving image that responded in real-time to the presence and actions of the audience. Interestingly, the installation designer reported "...we needed a laboratory that could be as rich and multi-faceted as the current media landscape. To me, print alone was no longer enough to convey current creative ideas. Digital allows people to get a lot closer to their content: to manipulate and adapt it, and interact with it", when describing his creation. Although this exhibition only took into consideration one of the facets of the problems described in Section 1, i.e., providing interactions between visitors and exhibits, its success nevertheless triggers a reflection on how important it is nowadays to create responsive environments able to bring visitors' experiences to new levels through an

intelligent use of all the possibilities offered by consumer technologies.

An example of how there have been attempts in recent works of extending the reach of cultural institutions beyond their walls may be found in [4] and [5]. In [4], in particular, the authors developed an App, Marsili's Spirit, that virtually connected a few of the most important museums of the city of Bologna. In order to encourage such connections, i.e., visitors moving from one institution to the other, the authors designed an incentive mechanism that stimulates a visitor to go from one museum to the other (i.e., the incentive mechanism is based on the unlocking of the additional artistic content that is preserved in the App when visiting one additional museum). The authors of [5], instead, exploited the opportunities that the sceneries of Florence provides in the Artist's View App: the peculiarity of Artists' View is that, by means of augmented reality technologies, it is today possible to see what the artists who painted Florence at the end of the 19th century saw.

Although these examples are relevant and reveal that other ongoing works exist heading in the same direction, it is possible to note that none include in one installation an answer to all of the requirements that have emerged in Section 1: interaction, customization, search and communication. However, these few examples show that there is an intense ongoing research in both cultural institutions, industry and academia, searching for the opportunities that may come from the blending of two areas that seem far, but are so close indeed, as both are strictly bound to education and knowledge: museums and technology.

III. PROJECT DESCRIPTION

PreTAporTek has been conceived as a project that could allow students at the Master of Arts in Fashion at the University of Bologna to experience the possibilities offered by Information and Communication Technologies (ICT) in the field of innovative commercial and/or exhibition practices. The project has been exhibited in front of the general public during a two days exhibition (March 14 and 15, 2014) held at the Museum of Modern Art of Bologna (MAMbo).

From a technological standpoint, PreTAporTek builds upon established vision and mixed reality techniques: a user interacts with the system while standing in front of a projection where s/he can see a virtual environment juxtaposed over his/her figure, composed of graphical elements that can be "touched" and used as an input to the system (Figures 1 and 2). In particular, from Figure 1 it is possible to appreciate the general setting of the installation that is composed by: (a) a projection area on the wall, (b) a webcam pointing at the panels that delimit the playing area,



Figure 1: The PreTAporTek installation at the Bologna Museum of Modern Art: the area devoted to the installation.



Figure 2: The PreTAporTek installation at the Bologna Museum of Modern Art: a user playing with the exhibit.

placed right next to the laptop, (c) a projector on the side of the panels, and, (d) four panels, whose role was that of providing a fixed background behind a visitor. Interactions occur thanks to an algorithm that searches within the frames streamed by the webcam for any differences with the fixed background provided by the white panels, in this way the PreTAporTek system determines which areas a visitor touches while moving and virtually touching.

From the content standpoint, the installation has been entirely developed taking into consideration the museographic issues that typically appear when the exhibits are clothes and their related accessories. Taking into account this specific typology of exhibitions allowed us to test the installation within a field in which the impossibility to experience exhibits seems to be particularly frustrating for users: we are typically

accustomed, in fact, to see clothes and accessories exhibited upon faceless manikins within glass cases, although the full comprehension of these comes only when wearing them. The installation's name, instead, has been conceived to bring attention upon the two main aspects that would be coexisting within the installation: "prêt-à-porter" for fashion, and "tek" for technology. Before starting to develop the installation, the question we've asked ourselves was whether (and to which degree) it was possible to ameliorate the experience of fashion museum visitor's by supporting virtual interactions, since any other type of interaction was, clearly, out of question? We then proceeded asking other questions that aimed at responding to a growing desire for customization and communication of the experiences that are carried out within a museum. Attempting to reach such goals, we've invented an innovative context within which clothes and accessories might be exhibited.

In fact, PreTAporTek has been designed to comprise four different phases, in each of which users had to interact with the installation in order to perform a set of predefined actions:

1) During the first phase users were asked to activate PreTAporTek letting it measure their body like a tailor would do before starting his/her craft. The aim of this phase was to induce the user to think about the ongoing experience in terms of a "customized" one (Figure 3). Thanks to the measures and the gender choice that have been taken at this stage, during the third phase the users are given the chance to try the clothes that have been adapted to their bodies, just as in a real dressing room;

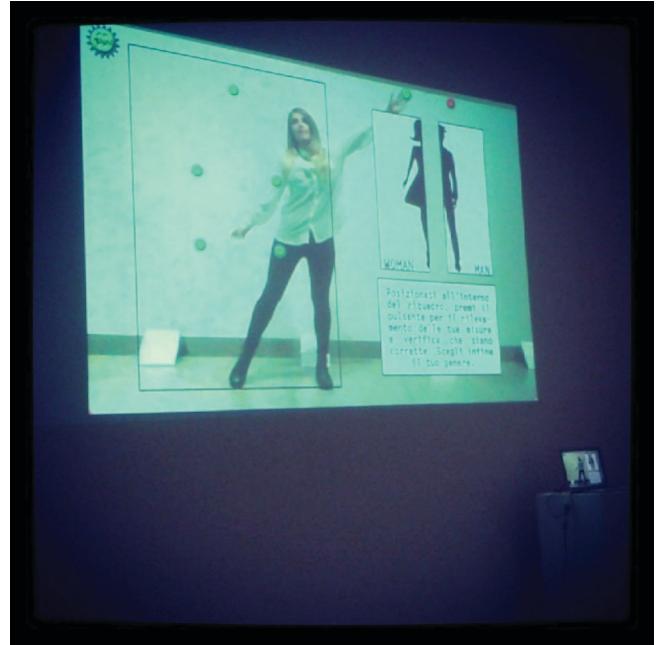


Figure 3: After measuring the body figure with PreTAporTek, a user selects her gender to enter the second phase.

2) In the second phase, a given user is asked to answer a set of multiple-choice questions. The aim here is that of defining the “character” of the user. In addition, while providing answers to questions, the user gets more and more accustomed to how the installation works.

Not only, while learning how to physically interact with the installation users also get more and more involved with the installation from a purely intellectual point of view. At the end of the process, depending on the answers that have been provided, users ended up matching one of three possible profiles prepared for this phase. Each profile unlocked a different set of clothes and accessories, clothes and accessories that have been designed by the University of Bologna students;

3) During the third phase users are given the possibility to play with clothes, combining upper and lower parts (e.g., different shirts with different pants) until the trendiest combination is found. This phase probably represents the most stimulating one in relation to the already identified museographic issues and, in particular, in relation to problems concerning the display of fashion and accessories within museums and similar institutions.



Figure 4: A visitor sharing his experience on Facebook.

4) Finally, during the fourth phase users are allowed to take a picture of themselves while wearing the chosen combination of clothes, and to share their photo image via Facebook (an

example is reported in Figure 4), thus exceeding time/space limitations and “bringing” the exhibits to the outside world, through the digital one [6].

IV. SURVEY RESULTS

The two days during which PreTAporTek was displayed within the Museum of Modern Art of Bologna provided a museographic context where we could evaluate to what degree the installation helped exceeding the limits of linear narration and interaction restrictions usually imposed by museums or similar institutions when the exhibits are clothes and accessories. In order to implement such evaluation phase, a questionnaire was prepared and submitted to those visitors who experienced the installation (a total number of 110 questionnaires was filled).

The average age of PreTAporTek visitors was 44.5 years (in general, all users' age fell between 20 and 69): from this point of view, it is absolutely plausible to assume that the users who have interacted with the installation and compiled the questionnaire fall within those groups that most visit museum and such type of institutions. In such sense, the results that have been collected during this survey might be considered general and representative for any other museum or similar institution.

The majority of those who have tried the installation and later answered the survey questions were women (62.72%). Being the unbalance in terms of percentage values between genders relatively low, it might be assumed that while on one side clothes and accessories are likely to attract female public, the male population has conversely found intriguing the technological and interactive aspects of PreTAporTek.

The 71.81% of interviewed visitors has enthusiastically reviewed the overall experience as “resolutely pleasing”; 27.27% considered it “pleasing”, while only one user – unfortunately without explaining his/hers motivations – qualified the experience as “unpleasant”. Interaction was given a strikingly positive evaluation (91.81%), thus confirming the initial hypothesis that nowadays people are looking for interaction possibilities, especially within museum contexts where these are typically missing.

On the other side, interestingly, visitors did not see PreTAporTek as an installation suitable only for museums or similar institutions (22.72%): in fact, visitors indicated such installation as suitable also for private homes (20%), schools (35.45%) and, above all, for dressmaker's shops (49.09%). For what concern this last case, it is worth noting that 79.09% of the interviewed has considered that PreTAporTek might become very useful in helping choosing a dress.

Finally, almost all users have shared their picture on Facebook (except a minor number of cases), as can be appreciated in [5], thus confirming another assumption,

namely that the sharing of personal experiences via social networks has become so important in people's everyday lives that museums and similar institutions cannot fail in taking it into consideration such aspect if willing to keep pace with the evolution of contemporary society.

V. CONCLUSIONS

In everyday life, we interact continuously with objects: we sense their texture by touching them, we use them to perform actions, we wear them combining colors in order to express a certain state of mind. We recognize ourselves in objects populating our domestic environment and people recognize us in the objects we wear outside homes. It might be said that each and every object – a certain lamp or a particular earring – contributes to build our identity and share it with the society [7-15].

The importance of fashion has been acknowledged in many ways, the most important of which are probably the establishment of schools and museums devoted to teaching, studying and communicating these disciplines and the objects around which they revolve. What too often is lacking, however, is the physical experience of objects and clothes that only through an interaction with us can be truly understood.

According to the encouraging survey results, the authors believe that PreTAporTek may be put to good to provide augmented experiences in contexts – such as universities and museums – where direct interactions with exhibits are usually forbidden. All that is solid melts into bits.

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VII. REFERENCES

- [1] Aymonino, A., Tolic, I. (eds), *La vita delle mostre*, Bruno Mondadori, Milano 2007.
- [2] Rosner, D., Roccati, M., Marfia, G., The Digitization of Cultural Practices, Communications of the ACM, ACM, to appear, June 2014.
- [3] Available, online, accessed on May 20th 2014: <http://www.businessoffashion.com/2014/03/milan-exhibition-aims-convert-fashion-faithful-new-digital-gospel.html>.

[exhibition-aims-convert-fashion-faithful-new-digital-gospel.html](http://www.businessoffashion.com/2014/03/milan-exhibition-aims-convert-fashion-faithful-new-digital-gospel.html).

- [4] M. Roccati, G. Marfia, A. Varni, M. Zanichelli, "How to Outreach the External World from a Musem: The Case of the Marsili's Spirit App", Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST Volume 116, 2013, pp. 25-32, 3rd International Conference on Arts and Technology, ArtsIT 2013, Milan, 2013.
- [5] Available, online, accessed on May 19th 2014: <https://itunes.apple.com/gb/app/artists-view/id504132267?mt=8>.
- [6] Available, online, accessed on May 19th 2014: <https://www.facebook.com/PretAPorTek>
- [7] M. Roccati, G. Marfia, M. Zanichelli, "The Art and Craft of Making the Tortellino: Playing with a Digital Gesture Recognizer for Preparing Pasta Culinary Recipes," *ACM Computers in Entertainment*, ACM, vol. 8, n. 4, December 2010.
- [8] M. Roccati, G. Marfia, C. Bertuccioli, A. Marcomini, M. Zanichelli, A. Varni, "Supporting Cultural Emotional Browsing for Museums: The VersoVerdi App," Proc. of the IEEE International Conference on Multimedia and Expo (ICME 2013), IEEE, San Jose, July 2013.
- [9] M. Roccati, G. Marfia, A. Semeraro, "Playing into the Wild: A Gesture-based Interface for Gaming in Public Spaces," *Journal of Visual Communication and Image Representation*, Elsevier, 23 (3) , pp. 426-440.
- [10] C.E. Palazzi, M. Roccati, G. Marfia, "Realizing the Unexploited Potential of Games on Serious Challenges," *Computers in Entertainment*, ACM, 8 (4), art. no. 23.
- [11] M. Roccati, G. Marfia, "Recognizing Intuitive Pre-Defined Gestures for Cultural Specific Interactions: An Image-based Approach," 2011 IEEE Consumer Communications and Networking Conference, CCNC'2011, pp. 172-176.
- [12] M. Gerla, D. Maggiorini, C. E. Palazzi, A. Bujari, "A Survey on Interactive Games over mobile Networks", Wiley Wireless Communications and Mobile Computing, vol. 13, no. 3, Feb 2013.
- [13] S. Ferretti, M. Furini, C.E. Palazzi, M. Roccati, P. Salomoni, "WWW recycling for a better world", *Communications of the ACM* 53 (4) , pp. 139-143.
- [14] C.E. Palazzi, S. Ferretti, M. Roccati, G. Pau, M. Gerla, "What's in that magic box? The home entertainment center's special protocol potion, revealed", *IEEE Transactions on Consumer Electronics* 52 (4) , pp. 1280-1288.
- [15] S. Ferretti, S. Mirri, M. Roccati, P. Salomoni, , Notes for a collaboration: On the design of a wiki-type educational video lecture annotation system", CSC 2007 International Conference on Semantic Computing , art. no. 4338406 , pp. 651-656.