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Museomix: lessons learned from an open creative hackathon in museums

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ABSTRACT

In the past decades, museums have become places that do not only conserve and store artefacts, but also provide visitors with education and entertainment. They are now challenged to become open, collaborative and creative spaces. In this paper we describe a participative event, involving both visitors and museum actors during a three-day hackathon in order to create digital artefacts for museums, among them tangible experiences. We describe the specific methodology created for the event, based on maker movement and rapid prototyping, and some of the resulting prototypes. Finally we draw the lessons of this experience and the possible implication of this methodology for the context of helping museum staff and visitors to personalize the visit, thanks to tangible user interfaces.

Author Keywords

Tangible interaction; museums; user-centered design; DIY; maker culture.

ACM Classification Keywords

H.5.2. User Interfaces: User-centered design.

INTRODUCTION

Since the 80's, the classical missions of museums, conservation and research, have been supplemented with a goal of education, study and enjoyment [5]. They are now competing with (or taking part in) the entertainment industry, mainly thanks to big temporary exhibitions involving new technologies and sumptuous scenography. But all institutions cannot afford these expenses or do not have the technological knowledge to create and maintain alone such installations. And these temporary events overshadow the permanent collections, driving museums into a spiral of ever-increasing temporary exhibitions.

Guiding the visitors within the museum based on their personal preferences is one of the answers considered by museums in order to re-emphasize the collections, provide enjoyment and make the learning more progressive. Indeed, visitors will not seek the same experience in the museum depending on whether they are accompanied and by whom, how much time they have, their mood or their previous knowledge about the subject. Some museums have started working on personalizing museum visits. For instance, in the European project CHESS [8], museums tried to match visitor profiles with suggested itineraries. Cap Sciences in Bordeaux goes further with the development of the Navinum software, which allows to retrieve information about the visitors' itinerary. The museums also need to consider the different user preferences when designing the exhibition.

Designing exhibitions generally is a collaborative work between curators, exhibition designers and conservators, who usually do not have a high technical knowledge. In this context, previous works [9] proved that tangible interactions are well fitted to help the creation process, even more if the public is included in the process.

Museums also have a cultural and societal duty as they are parts of the *commons*—the cultural and natural resources shared by all members of a society. Some museum workers and public individuals—inspired by the Peer-to-Peer, Open-Content and Do-It-Yourself movements—are trying to move the lines for a more horizontal access to the culture, for the opening of the cultural content and for a more participative management of museums' collections. One of the manifestations of this movement is the cultural hackathon Museomix, an international event created in order to modify the vertical and segmented vision of cultural institutions and to include people in the creation of museum exhibitions. During three days multidisciplinary teams create new museum experiences, based on new technologies and a methodology inspired by participatory design [2, 4], "makers" movement and rapid prototyping. As the author participated in the 2013 Museomix edition in Paris and took part in the organization of the 2016 edition in Toulouse, the event shaped and inspired the overall research project.

The work presented in this paper is part of a larger project in which we aim 1) at helping museum staff create, manage and transmit personalized adaptable itineraries for their visitors, and 2) at providing the museum visitors with a

personalized museum experience. Our project is conducted in direct collaboration with different French museums and science centers such as Cap Sciences and the Cité du Vin in Bordeaux, as well as the City of the Ocean in Bidart and Musée Saint Raymond in Toulouse.

In this paper, we are going to provide, as a first step, feedbacks and thoughts about Museomix as a concrete example of participatory museum design. We first describe the methodology used during the event, present some of the resulting tangible prototypes, and then draw some conclusions about this experience and its contribution to our global project.

MUSEOMIX

Museomix is an international annual event, created in 2011 in Paris by cultural institution workers, collaborative design experts and museum lovers. Its baseline is "people make museums". During three days, and in various museums around the world (18 museums in 2016), individuals from various expertise fields (graphic designers, communicators, software developers, makers, content specialists, and public experts) work together in order to create one prototype per self-constituted team of six people that usually have never met before the event. They are supported by various volunteers: staff from the hosting museum, content experts, technology specialists, facilitators, computer science students etc.; as well as various technical tools: a fablab (for fabrication laboratory)—a small-scale workshop offering digital fabrication—and a "techshop" the resource center for all kind of hardware (Kinect, Arduino, computers, screens, video projectors, Makey-Makey®…). On the last day, museum visitors are invited to experiment the resulting prototypes. In seven annual editions, more than 160 prototypes were created and documented on the Museomix website http://www.museomix.org/prototypes2/.

Methodology

The Museomix methodology is inspired by participative and user centered design methodologies [2,4], but complements it with a strong multidisciplinarity and a Do-It-Yourself and rapid prototyping approach. On the first day, after visiting the collections, the fablab and the "techshop", all participants start talking and brainstorming using post-its around big themes (defined in advance by the Museomix organizing community and the museum). Participants can wander freely around big boards representing each theme. After 15 minutes, small groups are already self-constituted and they can pitch their ideas in front of everybody, in order to ask the missing profiles to join their team. Each team must be constituted with one and only one of the six profiles (graphic designers, communicators, developers, industrial designers, content specialists, public experts), thus completing the team's profile "bingo" card. After about 30 minutes of "profile market", all teams are constituted around a first idea. They then go in their work area to brainstorm for the rest of the afternoon, helped by a facilitator, in order to refine their idea (the organization of teams and available resources are shown in Figure 1). They will present it in front of everyone at the evening "plenary session", for their mutual awareness and in order to get feedback.

The second day is dedicated to the refinement of the idea and the early realization of the prototypes. Each participant, depending on its profile, gathers the resources necessary to the realization of the prototype. For example, the computer scientists go to the "techshop" to collect the needed sensors or hardware (and learn how to use it if necessary). The industrial designers start making plans of the installation and go to the fablab to ask for feasibility and needed materials. At this step, the teams are doing numerous iterations, depending on available materials, the technical feasibility and time constraints (the prototype must be ready to test on the third day). At the second day evening meeting, they present the scenario of use of their prototype, from the visitor's point of view.

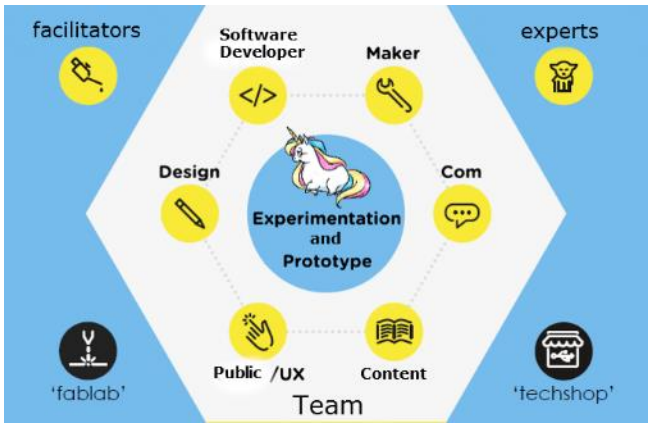

Figure 1: Museomix organization of teams and resources (source: Museomix community)

On the third day, they finalize and document their prototypes. In order to detect potential problems, a "crash test" is conducted by some volunteers. These tests help to highlight the technical and ergonomic problems soon enough, identify the missing resources and allow the team to cut off some functionalities in order to have a working prototype for the visiting hour. At four pm, the general public of the museum is welcomed to test the prototypes. Sometimes, the prototypes remain in the exhibition for a few days, in other museums they are disassembled immediately. All prototypes are documented on the Museomix website, under the Creative Common license, in order to build them again easily. After the event some of the museums choose to make some prototypes permanent.

Prototypes

Among the 168 prototypes produced during the seven Museomix editions, some of them are of special interest for the Tangible and Embedded Interaction field, falling into two main themes: immersive experiences and interactive objects.

Figure 2: Museomix prototypes a) Momix b) Prehistopiano c) Museocyclette d) Making-off Prehistopiano e) Hero des Lyres

Multi-sensory and immersive experiments

A very recurrent wish among teams is to create multi-sensory and immersive experiments for the public. The scenarios are different each time to adapt to the museum object, but the underlying technology always relies on the same principle: embedded sensors triggering lights, video projections and sounds. The visitor is going to hear a conversation between August and his wife when approaching their statues, to listen to persons living in 1913 using the exhibits on a daily basis when approaching the objects, to hear the stories of the inhabitants at different ages when approaching the corner of a cloister, and so on... In "Momix", as shown on video [7] and Figure 2a, the visitor lies down next to a mummy on a cardboard sarcophagus to feel the size and proportion of the real one. When his head is detected by a proximity sensor in the cardboard, he listens to the story of the mummy next to him through a speaker and videos are projected on a ceiling above his head. The teams often use storytelling to immerse the visitor in the context and give extra information about the subject, but they sometime also use embedded interactions to offer the visitor to play and create. For example with "prehistopiano" (see video [10] and Figure 2b and d) they can create "scratch" music while touching the different prehistorical stone tools. The contact is propagated thanks to a Makey-Makey® circuit board and triggers the sounds and a video of the stone tool usage. As shown on Figure 2b, this prototype could be used by several visitors at the same time, thus fostering the communication between them. As seen in this section, embedded interactions are widely used in the prototypes, often to provide the visitors with an immersive experiment.

Interactive tangible objects

Other prototypes are about manipulating objects, whether replicas created for the experience, thanks to the fablab laser cutter and 3D printer, or more rarely the real museum object itself. For example, in "Museocyclette" [11], the visitor is invited to pedal a real penny-farthing (the first type of bicycle, Figure 2c) augmented with sensors in order to explore virtually the collection of the museum, projected on a screen in front of the bicycle. On the path the cyclist finds virtual artefacts and browses through multimedia contents with natural bicycle manipulations: moving the handlebars left or right to explore, ring the bell to select. In "Hero des Lyres" [12], the team created a whole scenery to complement the statue of Athena and invite visitors to take part in the mythological episode to which this fragmentary work refers. Two visitors are invited to grasp each one an instrument: a lyre (for Apollo) or an aulos (a double pipe, for Marsyas) and face each other in a "mythological Guitar Hero". If Marsyas wins, Athena's head, missing on the statue and projected on a sheet behind it, inflates and explodes (Athena has cursed Marsyas because the aulos distorted her cheeks) and if Apollo wins, an animation explaining the actual end of the mythological story is projected (Marsyas is skinned alive). The team decided to build the instruments with laser cut transparent Plexiglas instead of cardboard or opaque material, because they wanted the public to see the Makey-Makey® wires inside: a glimpse on the technology underlying the magic. The lyre metallic chords and the aulos holes covered with aluminum foil were linked to these wires, for the visitor to "play" the instruments in a natural way. Tangible interactions were used in many other prototypes across the years, usually with a simpler process: when the visitor grabs an object and

positions it in a specific place, it triggers a related content projection [13–15].

Lessons learned and improvements

The organization of several editions of Museomix, and its exponential growth around the world, showed that people are eager to take part in collaborative and creative processes in museums; and that museums are more and more willing to innovate and give space to collaboration. The public affluence on the third day of Museomix events confirms this appetite for innovation in museums. The mind changing goal of Museomix is then fulfilled.

Another positive result is that the methodology allows creating real prototypes that can be tested by end users in only three days. Sometimes they are not fully functional but the most important result is the idea and its transmission to the general public, with the help of some "Wizard of Oz" technique [6] if needed. Visitors' surveys were conducted by students in some of the Museomix events, but they were not scientifically validated questionnaires on usability or learning. Most of the results are incomplete or not accessible, preventing us from drawing valid conclusions on the overall event.

In the last sections, we saw that numerous prototypes differ on the story they tell (adapting to the museum theme) but are very similar on their interaction principle (embedded interaction and tangible objects interaction for TEI related prototypes) across the years. Only few prototypes were truly innovative, which is also one of the goals of the Museomix event. Several explanations can be found: 1) the participants know some previous works and want to test them themselves, 2) the event duration is too short to dig into more original ideas, and the first ideas coming out in the brainstorming are kept: the productivity loss in brainstorming groups is also a well-known problem [3], 3) the teams are not very aware of the possibilities offered by the available technologies (like Myo Gesture Control Armband, Leap Motion, Occulus Rift etc.) and rely on already known or easy to apprehend uses of the technologies. More technological opportunities were thought to foster creativity, but finally it appears that they lead to confusion. The time-constrained format of the event cannot be changed without changing the whole concept; but the technological confusion could be fixed by providing less different technologies, sticking to "low tech" (cardboard, sensors, lights and speakers), documenting better the possible uses and providing sample code. The use of scientific result like [1] is another possible way for improving the creative process.

On a methodological point of view, there is also a drawback in the recruiting method. In order to be sure that each team can build a (quite) complete and testable prototype, the participants have to fall into one of the six categories defined by the Museomix process, but this reduces the call to museum or digital communities. Moreover, the call for participants is published on websites or social media by people working in the museum environment, and reaches most of the time people already working in or for museums. As a consequence, this excludes mechanically the "classical" visitors, the very user at the center of the participative design methodology. For the next editions of Museomix, some local communities are thinking about some adjustments to better include the general public in the event. One first step could be to add workshops besides the hackathon main event to make visitors experiment the "mix" concept themselves. Alternatively, the event format could be deeply changed to have also "classical" visitors participate in the hackathon, replacing some of the six types of specialists. The missing skills in the teams could be provided by volunteers as support functions (as currently the facilitators, the fablab volunteers or the museum experts).

CONCLUSION

In this paper we described Museomix, a three day open and participative hackathon that takes place each year since 2011 in several museums around the world. We presented its specific methodology, a mix of participative design and maker movement, we described some resulting prototypes of interest for the TEI community and we highlighted some limitations and possible improvements for the next event organization. It is now clear that tangible interactions are pertinent to use in museum context. However, it also shows that the very constrained format of the event, in time and methodology, might limit highly the possible contributions which in the end are often similar and not so innovative. Thus, we want to explore the use of tangible interactions to help museum professionals design personalized itineraries in their museum exhibitions and guide the visitors along them, in a less restrained context. Museomix was truly inspirational for our overall project, and we hope that we can adapt some of its methodology to our future work.

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