

# Parallel Exhibits: Combining Physical and Virtual Exhibits

*Lars Lischke, Tilman Dingler, Stefan Schneegaß, Albrecht Schmidt*

University of Stuttgart, Germany

*Merel van der Vaart*

University of Amsterdam, Netherlands

*Pawel Wozniak*

Chalmers University, Sweden

**Abstract:** *People have a special fascination for original physical objects, their texture, and visible history. However, the digitization of exhibits and the use of these data is a current challenge for museums. We believe that museums need to capitalize on the affordances of physical exhibits to help users navigate their more extensive virtual collections. Although lacking materiality, virtual objects have other advantages: They can easily be manipulated, rearranged, duplicated, and moved. This offers new opportunities for visitors to engage with museum collections and the curatorial process in a creative way. In this paper, we propose a concept designed to make use of existing digital content in combination with physical exhibits in museums, which we call Parallel Exhibits.*

*Parallel Exhibits is a system that enables museum visitors to interact with traditional museum collections and virtual objects at the same time. It is an interactive exhibition space where visitors and curators enter a design dialogue mediated by technology. Curators display a selection of physical objects and invite visitors to complete the exhibition with virtual objects from the museum's collections or elsewhere. The ever-changing display can be augmented with digital text labels and messages. We implemented Parallel Exhibits as a web application, which bears the advantage of easily running the application on different platforms. We tested the system both in a museum, using an interactive table and a projection wall, and as part of an online survey reaching a broader audience. In the field study we observed that visitors like to share their ideas and thoughts while using the table. The results of the online survey indicate that visitors like to contribute to exhibitions. In this paper, we describe the technical design of Parallel Exhibits, as well as the outcomes of the on-site study and online survey.*

**Keywords:** Digitalization; Virtual exhibition; Cross-Media installation

## Introduction

Over the last decade the traditional authoritative voice of the museum has been subject to debate. A more open and collaborative approach to exhibition making has emerged. Although the museum is still seen as guardian of objects of great (art) historic value, it is no longer thought to be the sole keeper and source of all knowledge about the objects in its care. Visitors bring their own knowledge and expertise; sometimes they are hobbyists or subject enthusiasts with very particular backgrounds and perspectives. Facilitating an active dialogue between visitors and curators can enrich both the museum's understanding of its visitors' needs and enhance visitors' experience through participation.

New technologies in the field of pervasive computing and the participatory web provide manifold opportunities to create a more personalized museum experience. Interactive exhibitions allow visitors to actively engage with cultural heritage themes or individual objects. To facilitate visitor engagement with the collections, the

Gallery One at the Cleveland Museum of Art, for example, combines museum objects with digital installations around a series of themes (Helmreich *et al.*, 2013). It provides access to a curated digital repository via a 40 feet multi-touch screen, called the 'Collection Wall'.

With the ubiquity of smartphones people carry a high-end interaction device with them at all times. Such technologies allow museum visitors to directly interact with an object, exhibit, or even an entire gallery, but might also provide access to the vast digital repositories that are available online. The Museum of Modern Art (MoMa) developed an iPhone application<sup>1</sup>, which provides object information on demand. The system allows visitors to bookmark information and to integrate their own pictures of objects. Museums strive to find new ways to facilitate a more explorative museum visit by connecting digital information and the physical. When designing an exhibition, limitations in space demand that artifacts need to be carefully selected from a vast pool of objects. During this selection process, which is traditionally undertaken by curators, countless artifacts are filtered out and never make it on display. Other times, relevant artifacts may be on display elsewhere and, hence, unavailable for the current exhibition. Virtualization of artifacts can solve these issues preliminarily. Virtual archives, such as *Europeana*<sup>2</sup> and *Google Gallery*<sup>3</sup>, have the advantage of representing countless numbers of artifacts with additional information as text, images, or videos. They can be effectively browsed, indexed, and searched to quickly find objects related to a certain topic, type, or storyline.

In this paper, we introduce a technology-mediated interactive exhibition space, where physical exhibits can be combined with virtual representations of remote or unavailable artifacts. This system, called *Parallel Exhibits*, provides visitors with means to select artifacts and augment them with digital information, just like curators would do when designing an exhibition. To profit from the curators' expertise, the system provides tools for curators to pre-select and connect certain artifacts according to common properties or topics, allowing for a semi-guided design process. Through this participatory approach visitors are invited to look more closely at the physical artifacts as well as the multi-layered stories behind them. In contrast to physical exhibits, digital objects can be exchanged and (re-)arranged without much effort. This allows the creation of more dynamic exhibition spaces, in which visitors take on an active role and contribute to the exhibition design. We have built a series of proof-of-concept prototypes where we augment physical exhibition spaces with virtual exhibits in the form of text, images, and videos. Visitors can browse a catalogue of artifacts and create customized exhibitions with or without virtual curatorial guidance. We report on a field study conducted at the Allard Pierson Museum in Amsterdam and further feedback from curators as well as an online survey that we used to refine the concept

## Engaging Visitors

A growing number of museums are currently advocating collaboration, participation, and co-curation with their audiences. The Wallace Collection in London engaged visitors in the exhibition curation process by letting a group of children co-curate an exhibition. They were given responsibility for developing the storyline, object selection, and text writing (Bryant 2011). However, this kind of involvement proved to be time consuming and the nature of the project only allowed for a small group of visitors to be involved. Furthermore, the resulting exhibition was rather traditional and static without the possibility of changes afterwards.

The Museum of National History in the Netherlands also engaged its visitors: they invited people to send in pictures representing the country of the Netherlands, which were shared with the public online in a temporary exhibition (Byvanck & Schilp 2012). This allowed for large-scale participation and the online gallery had a more dynamic nature, ever changing as more pictures were sent in. This approach allowed collecting feedback and inspirations from a broad audience. People had the chance to share their perspectives and influence the out-

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<sup>1</sup> Moma iPhone App website: <http://www.moma.org/explore/mobile/iphoneapp>

<sup>2</sup> <http://www.europeana.eu/>

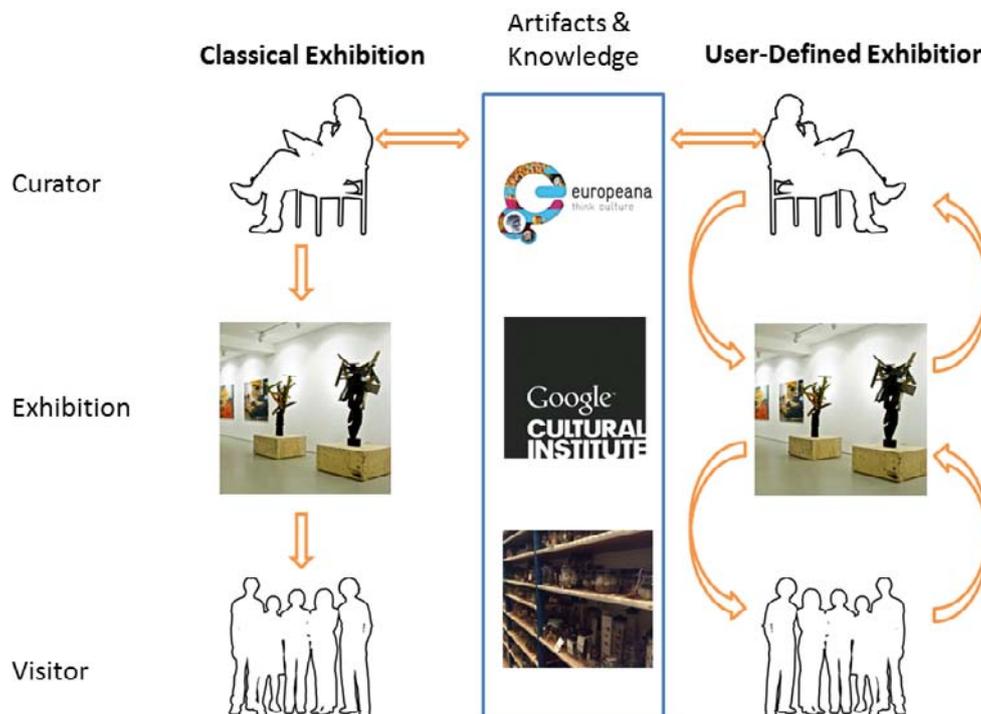
<sup>3</sup> <http://www.google.com/culturalinstitute/project/art-project>

come of the final exhibition. The resulting exhibition was, however, again static: it did not change after it was opened to the public. In contrast, we strive to create a more dynamic approach that encourages people to voice ideas concerning a current exhibition, calls for participation in the design process, and allows visitors to suggest changes on the fly.

Simon gives examples of physical exhibitions that change over time as visitors add their opinion to displays (Simon 2010): in 2009 the Smithsonian American Art Museum organized *Fill the Gap*. Visitors were asked online and on-site to suggest a replacement for a specific museum object that was to be taken off display (Simon 2010, 151). *Fill the Gap* suggested a democratic approach to the decision making process inviting visitors to state their preferences in context of the type of object that was there before and of the current exhibition. Even though this was directed at getting people involved in the exhibition design, the focus on a single interchangeable object rather limited people's creativity. Having in mind people's vast imagination and variety of perspectives we designed *Parallel Exhibits* with the goal to (virtually) open up museums' store rooms and exhibition spaces.

## Parallel Exhibits

The *Parallel Exhibits* approach aims at creating a shared online and on-site experience where visitors are provided tools that enrich their physical (or virtual) museum visit using existing digital repositories and resources (cf., Figure 1). Some museums, such as the *Tropenmuseum*<sup>4</sup> in Amsterdam, provide online access to their artifact archives, whereas other websites work across multiple museums: *Europeana* is a digital library holding the contributions of more than 2,000 European institutions giving visitors access to millions of books, paintings, films, museum objects, and archival records. With *Parallel Exhibits* we tap into these vast archives and create a system where visitors select artifacts and arrange them into a personal exhibition.



**Figure 1.** The concept of Parallel Exhibits. In contrast to classical exhibitions, there is a direct feedback loop between visitors and curators mediated through the system

<sup>4</sup> <http://papuacollectie.ab-c.nl/>

The sheer number of virtual artifacts available raises the challenge of how people sift through these to find what they like best in context of an actual exhibition. As Simon puts it: "Participation thrives on constraints" (Simon 2010, 22): people need a clear, manageable, and easy to grasp task. If visitors do not know where to start or if they feel they do not know enough about a subject to contribute, they may not participate. Hence, *Parallel Exhibits* presents a semi-guided approach where visitors are given curatorial assistance in form of information and suggestions. Its content management system and tagging tool allow curators to provide basics to help visitors develop their ideas and to make them feel confident enough to make informed decisions about artifact compilation.

*Parallel Exhibits* provides visitors with an interface to browse a pre-selected assortment of artifacts and spatially arrange them on a canvas in the context of a physical exhibition. The installation allows for multi-user interaction, acknowledging the social nature of most museum visits. To make sure the in-depth collection knowledge of curators is effectively combined with visitors' creativity, we propose two modes of use for the installation: in the first, we start off by allowing visitors to freely combine artifacts. However, not all visitors may be comfortable with this kind of freedom and might appreciate a certain level of curatorial guidance. Also, the museum or curator may want to encourage visitors to explore specific themes or subject areas.

Hence, the second mode of use involves a half-guided design tool where visitors are inspired and guided by a set of curatorial recommendations. There are three ways for curators to guide the visitor through the design experience: first, artifacts can be pre-selected from the vast pool of digital archives resulting in a filtered assortment of artifacts. Second, curators can attach keywords to each artifact, through which cross-connections between objects are created. Keywords can be anything between the material the object is made of (e.g., 'iron') to the purpose an artifact was used for (e.g., 'woodwork') or the age it was used in (e.g., 'stone age'). Users of *Parallel Exhibits* can see these cross-connections to other objects with the same keyword tag and, hence, quickly find related artifacts that might fit their exhibition. As a third way to guide the visitor's design process, curators can add physical context to the design space by placing plinths with real artifacts into the exhibition space to be augmented.

The goal of *Parallel Exhibits*' approach is to stimulate deeper engagement with the artifacts and underlying stories, as well as supporting the social interaction among visitors and between visitors and museum staff. As a result, curators can get a better understanding of the interests and ideas of visitors.

Virtual archives can hold a nearly endless amount of content and this content can be accessed, selected, and edited easily. The possibility of digital displays on-site allows visitors access to objects that are kept in museum stores, are on loan to other museums, or objects from other collections. By providing tools to surface these remote artifacts, visitors have a say in which objects are interesting and worth being on display.

*Parallel Exhibits* makes contributions in three dimensions: (1) the installation takes into account the visitor perspective, enabling personalization of the experience and valuing visitors' knowledge. (2) Curators are given means to communicate with visitors through curated exhibition challenges and might be inspired by visitor choices. (3) Museums have the opportunity to share larger sections of their collections, including objects that are on loan or too delicate to be put on display.

## System set-up

To evaluate the *Parallel Exhibits* approach, we implemented a prototype as a web-based application. By using web technologies we gain high flexibility in terms of compatible devices, sized from portables to wall sized devices. This allows creating exhibitions alone and in groups and, thus, also supports the social experience of a museum visit.

The system consists of three parts: the most important part presents the virtual collection and allows the arrangement of personal exhibitions. This so called "*stage*" is mainly designed to be part of an exhibition. To allow

groups of visitors to interact with it at the same time, we propose to run the stage on a large touch-screen, like an interactive table. Depending on the design of the exhibition it is also possible to present the stage on the web or on user owned tablets and smart phones. On this stage users can choose exhibits from a collection of objects on the right side of the interface (cf., Figure 2). It is also possible to view information about each virtual exhibit in the collection. To underline the story behind the arrangement, a title and text messages can be added. The title can also be defined by the curator, thereby guiding users into a certain direction. In the second iteration of this interface users have the possibility to share their arrangements on twitter or export them as image.



**Figure 2.** A screenshot of the visitor-facing user interface of Parallel Exhibits. The available digital exhibits are on the right and can be dragged to the stage on the left

The second part presents arrangements created in this way to a larger audience. While visitors arrange exhibits on the stage, the system presents the results in the museum using projections. It is further possible to present arrangements on the museum's website. A key concept of *Parallel Exhibits* is to combine virtual objects with real exhibits, so we connect the presentation of the virtual visitor created exhibition with a physical one by placing plinths in front of the projection area. Users can place virtual objects on the plinths to draw attention to these objects. Furthermore, placing physical exhibits on the plinths can enrich the setup, which helps guiding users' focus into a certain direction.

Additionally, we developed a "curator view", which allows museum staff to manage the digital collection. It is possible to include virtual exhibits from external sources like a museum's owned database or *Europeana*. Furthermore, detailed information about every single object can be updated. Background information and key words can be added. The key words are used to build relations between different virtual objects. Thereby the system is able to propose matching objects.

We evaluated this prototype in a field study (cf., Figure 3) by placing it in a room of an ancient Egypt exhibition at the Allard Pierson Museum. We selected 15 images from *Europeana* with objects related to this age and invited visitors of the exhibition to explore the system without any further guidance. We observed visitors and conducted semi-structured interviews with them and the museum staff. To attract attention, we decided to use

an interactive table, namely, a *Microsoft PixelSense 2.0*<sup>5</sup>. An interactive table provides a large interaction area with enough space for multiple visitors to have a look at and interact.

Additionally, we conducted a series of semi structured interviews with curators and museum staff from different museums. We discussed different uses cases of our systems and analyzed the needs of the curators.



**Figure 3.** Visitors, researchers and curators engaged in discussions around the prototype at the Allard Pierson Museum in Amsterdam

Finally we conducted an online survey in which we present our system to collect quantitative feedback. So we analyzed interaction time and how objects are used in arrangements. In the online survey we invited participants to use the stage of our system. Afterwards we asked them to answer a questionnaire.

## Findings and Discussion

During five hours of observation 35 visitors interacted with the stage of the system. Most visitors passed by in small groups or pairs. Most of the times, one visitor started arranging objects, while others stood by observing. In many cases this triggered lively discussions about the presented objects and the best way to arrange them. We also observed a strong interest in the story behind the virtual exhibits. We conclude that users are not only interested in selecting nice looking objects but also in learning more about them. An important criterion was the object's history. Visitors want to create collections of exhibits that historically fit together. This is supported by the fact that when a curator of the museum was present, visitors tended to ask many questions about the exhibits and created more sophisticated exhibitions.

<sup>5</sup> <http://www.microsoft.com/en-us/pixelsense/>

We interviewed users as well as museum staff about their motivation to participate in an interactive exhibition. Most users would like to get a printed copy of their arrangement to take home and show it to friends and family. In contrast, only very few were interested in sharing their arrangement online in social networks, like Facebook or twitter. Furthermore some visitors looked explicitly for game elements in our system: they mentioned it would be nice to get “points” for arrangements. One curator mentioned the idea to provide an exhibition context and areas on the stage to place objects. So it would be possible to give visitors points for correctly placed exhibits. Afterwards, we integrated tools for curators to assign keywords to exhibits within Parallel Exhibition. These keywords signal connections between objects and allow for a semi-guided approach to create more meaningful exhibitions and, thus, serving a similar purpose as the curator during the field study.

In our online survey, 40 people participated and interacted with the stage of our system, on which we presented 200 objects from different historical eras, for example, medieval castles or ancient Egypt handcraft. Because every participant worked on his or her own session we were able to collect quantitative feedback: participants interacted on average 226 seconds with the stage ( $SD = 220$ ). On average, every participant used 5.65 exhibits in his or her arrangement ( $SD = 4.24$ ). With longer interaction time participants arranged more objects. At the same time they removed more exhibits from the stage. Thereby, we conclude that participants tried out different arrangements before they were satisfied. Nearly three-fourths of the participants added exhibits which were recommended for their current virtual exhibition by the system. This indicates the need of support to browse large amounts of data and the interest in guidance.

Like in the Allard Pierson Museum, we placed three virtual plinths on the stage. The visualization of the positions of the arranged exhibits shows that most participants used the guidance to place objects as well. Thus, curators can explicitly influence the position by virtually assigning objects into the stage.

Afterwards we asked participants about their motivation to use such a system with regard to a museum visit. More than half of all participants would use such a system, because they miss something in an exhibition. In total, 40 % would use such a system just out of fun and only 20% were interested in sharing their thoughts with others in the museum or online. Similar to our first study, participants were more interested in a printed version of their arrangement than in sharing arrangements on social media.

Curators and museum staff indicated an interest in new ways of communication between them and visitors. Some saw a benefit of the system being a better understanding of both stakeholders, so visitors could inspire the feeling of being a curator and curators could get an impression of visitors’ interests.

As source of digital exhibits curators would use museum owned databases, because the large amounts of objects owned by the museum. In contrast, the possibility to include external databases like *Europeana* seemed to be less attractive. Additionally one curator mentioned that it would be useful to use our system for planning upcoming exhibitions. This would allow to have a first look on ideas and to discuss them with colleagues.

From a technical point of view, curators mentioned different ideas to present the arrangement in the museum. Besides the proposed concept to use plinths, curators were interested in presenting empty show cases, which could be filled with virtual objects by visitors. Furthermore, curators asked for the possibility to present the virtual objects in 3D. However, 3D visualizations of exhibits are rarely available at the moment and need to be created beforehand.

We identified three different use cases for Parallel Exhibits. The first scenario is to include the stage and the presentation of Parallel Exhibits in a museum. Here visitors are becoming curators. Exhibitions created by visitors would allow curators to get more accurate insights into visitors’ interest. Furthermore, the museum would become more interactive and enhanced interaction between visitors could take place. In this scenario we see the most potential for the museum of the future. It combines a rich fund of cultural heritage and knowledge with the creativity of visitors.

In the second scenario users would use the *Parallel Exhibits* stage online, for instance, on the museum's webpage. This can be supportive for a deeper interaction with the community of the museum. Interested and enthusiastic volunteers can contribute their knowledge. The online available version can also be used by future visitors to prepare a museum visit. This is particularly interesting for visiting groups with educational goals. For example, school kids can prepare their personal exhibition and visit the museum afterwards.

In the last scenario, museum professionals use *Parallel Exhibits* to sketch arrangements for new exhibitions. Museum professionals can visualize different arrangements without much effort, explore different drafts and discuss them. Similarly in this scenario *Parallel Exhibits* enables remote participation, so visitors or staff from other museums can be included in the exhibition design process.

## Conclusion

Cultural heritage artifacts reside in great numbers in galleries and storage facilities. For most objects a vast amount of digital content is available. Traditionally, the selection process for creating an exhibition is dominated by curators and exhibition designers. In our work, we present the *Parallel Exhibits* concept which allows visitors to be part of the exhibition creation process. In a dynamic approach visitors become co-curators under curators' guidance. We created a web-based prototype where users can select and arrange exhibits. The resulting exhibition can be viewed online or projected on-site into an exhibition space at the museum. We report on a first field study, a series of interviews with museum professionals, and an online survey in which we show the overall feasibility of our approach, identify three specialized use cases, and discuss possible application areas.

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