UMAC
University Museums and Collections

ICOM
INTERNATIONAL COUNCIL OF MUSEUMS
CONSEIL INTERNATIONAL DES MUSEES

VOLUME 7 2014

UNIVERSITY MUSEUMS AND COLLECTIONS **JOURNAL**

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The University Museums and Collections Journal (UMACJ) is a peer-reviewed, on-line journal for the proceedings of the International Committee for University Museums and Collections (UMAC), a Committee of the International Council of Museums (ICOM).

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ISSN 2071-7229

Basket porcelain with truss imitating natural fibers, belonged to a family in São Paulo, c. 1960 - Photograph José Rosael – Collection of the Museu Paulista da Universidade de São Paulo/Brazil

Napkin holder in the shape of typical women from Bahia, painted wood, 1950 – Photograph José Rosael Collection of the Museu Paulista da Universidade de São Paulo/Brazil

Since 1990, the Paulista Museum of the University of São Paulo has strived to form collections from the research lines derived from the history of material culture of the Brazilian society. This focus seeks to understand the material dimension of social life to define the particularities of objects in the viability of social and symbolic practices.

The objective of one of the fronts in the research line "Quotidian and Society" is to develop historical issues related to domestic space. One of the guiding questions in the collections formation concerns the constitution of feminine identity associated with the simultaneous production in the domestic space. For the past five years, hundreds of objects have been collected in the light of these questions, among them are the two items on the cover of UMAC Journal volume 7.

The painted wood napkin holder used in 20th century has the shape of a woman peddler, a constant character in many Brazilian regions, but one that across time has been typified as a baiana – a feminine character from the northeastern state of Bahia, Brazil. The baiana is associated with the traditional chore of selling fresh and prepared foods by Afro-descendants, both slaves and free citizens, throughout 18th and 19th centuries. In 1998, this practice became a registered profession and, in 2012, intangible heritage. The baiana's typical dress is completed when the white paper napkins are placed in the holder.

The porcelain bowl that imitates the weaving of organic fibers is a constant decoration piece in 19th century interior design until the end of the 20th century. The technique was developed to foster the nostalgia for a pre-industrial era, which the bourgeois home constantly references in trying to place itself as a refuge against the anonymous crowds, mechanical work and buzz of urban societies.

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Interior design objects collection at the Paulista Museum of the University of São Paulo, Brazil

Evaluating change

The University Museum Proceedings of the 13th Conference of the International Committee of ICOM for University Museums and Collections (UMAC) Rio de Janeiro, 10–17th August 2013

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1.

Evaluating change - The University Museum Proceedings of the 13th Conference of the International Committee of ICOM for University Museums and Collections (UMAC) – Rio de Janeiro, 10–17th August 2013

Interior objects collection in a history museum: Shifting from donations to research-based acquisitions

Vânia Carneiro de Carvalho

Abstract

Ever since it was established in 1890, the Museu Paulista *has been building up a collection of household objects through donations from affluent families whose names echo through the political and economic history of São Paulo, Brazil. The outcome of this spontaneous donation process was the formation of a collection that accurately portrays local urban elites. However, from 1989 onwards, the absorption of methodologies and themes derived from studies of material culture in order to interpret historiographic issues has allowed this Museum to reshape the social profiles of its collections. This paper explains how an exhibition project grounded on these new parameters altered the profile of its interior objects collection. The purpose of this exhibition project is to revitalize one of the three permanent exhibition galleries at this Museum, which will re-open on completion of the restoration of its XIX century building. The changes in this collection were possible because this exhibition features historical objects that are the raw materials of the research project in question. Historical exhibitions need not be only a means of presenting research projects conducted previously, as this specific characteristic allows research activities and displays to provide mutual feedback, thus prompting a return to other field surveys and issues addressed through research. This two-way relationship between research and display allowed the interior objects collection built up by the* Museu Paulista *to be extended and diversified significantly in terms of its social representativity, effectively implementing an acquisitions policy associated with research for this segment of the collections housed by this Museum.*

Back to basics

The existence of an acquisitions policy associated with research in a university museum seems to be a basic pre-requisite. For the *Museu Paulista* – today specializing in the history of Brazilian society, and part of the University of São Paulo – the implementation of an acquisitions policy was a complex and difficult process, with many stumbling blocks. Initially, because this Museum has kept alive its role as a Memorial to Brazil's Independence from Portuguese colonial rule. As such, part of its museographic configuration (which was originally established during the first two decades of the XX century) offers its visitors messages with powerful ideological content. Second, because three-dimensional documentation is still today relegated to the background in Brazilian historiography. Finally, because squabbles among vested interests within the vast teaching body of the university delayed the effective transformation of this Museum into a showcase for the History of Brazil.

Such broad-ranging issues will be merely outlined here, in order to ensure an adequate understanding of the changes introduced by research projects to a single segment of the Museum's permanent collections: its interior objects collection. The transformations presented here arose from the lengthy implementation process of an acquisitions policy grounded on lines of research introduced at this Museum from 1989 onwards.

Incorporated into the University of São Paulo in 1963, the origins of the *Museu Paulista* are rooted in two different areas. Conceptualized in 1823 as a monument paying tribute to Brazilian Independence from colonial rule, its Neo-Classic building was designed under the Brazilian Empire. However, it was completed and opened to the public only in 1895, six years after the Brazilian Republic was established. Under this new regime, this monumental building received the collections of the State Museum.

As a Museum and a Memorial to Brazil's Independence from Portugal, its scientific vitality was linked for decades to its vast Natural History collections. But ever since it was founded, it has also housed a collection of objects rated as historical (Elias 1996; Moraes 2008), drawing it closer to the ideological treatment given by Republicans to History Museums in São Paulo State (Misan 2008). Consequently, this Museum has evolved with two very distinct missions.

The first was connected to knowledge production. During the late XIX century, museums were key factors driving the development of research in the field then known as Natural History. Reflecting the blurred boundaries of the sciences at that time, this umbrella category encompassed zoology, botany and mineralogy, as well as archeological, anthropological and ethnographic studies (Lopes & Figueiroa 2003). Its collections underpinned discoveries of new species, as well as theories on the origins of civilization in its many different forms, developed to a lesser or greater extent and expressed synchronically and diachronically (Pitt-Rivers 2004; Tylor 2004). Through this approach, it steered Brazil along the path of modernization, a value cherished by new social groups moving into power.

Its second mission was related to the project constructing the political hegemony of long-established families in São Paulo State (Novais 1990). Forming its economic and political elite, these families viewed allegorical narratives portraying the birth of the Brazilian nation on display at this Museum as a way of educating the common people. This is why the Museum became involved in gathering together - even if still somewhat immanently - historical items related to a massive genre painting commissioned by the State for the main hall of this Museum, portraying the symbolic moment when Brazil threw off the colonial yoke through its 'Shout of Independence' in 1822 (Oliveira 1995; 2003).

From 1917 onwards, under the enthusiastic leadership of its director Affonso Taunay, who prepared the Museum for the celebrations honoring the Centenary of Brazilian Independence in 1922, this Museum began to shift towards becoming a history museum, although still in the Positivistic manner that characterized historiography at that time. For more than eighty years of garnering and accepting donations, textual archives and collections were built up associated with leading political names and the history of the development of São Paulo and its institutions. At the same time, a permanent collection of items and images was built up, used to didactically construct a mythical history of the birth of the Brazilian nation, followed by its independence and development during the 19th century. These exhibitions portrayed its colonial origins and entrepreneurial activities of its early settlers, explaining the changes that swept through São Paulo in teleological terms, reflecting the wealth accumulated by its political and economic elites through trade and vast coffee plantations (Taunay 1937; Carvalho & Lima 1993; Brefe 2003, 2005).

During the early decades of the 20th century, State research institutes were established that speeded up specialized studies in specific scientific fields. In order to unify areas coexisting in the State Government, the Botany Section of the Museu Paulista was transferred to the Biological Institute for Agricultural and Livestock Protection in 1927. The Zoology Section was transferred to the Zoology Department of the Agriculture Secretariat in 1939, subsequently evolving into the Zoology Museum, which is today also a part of the University of São Paulo (Meneses 1990). During the late 1960s, the function of State research institutes was questioned. According to Costa and Brandão, the Government was attempting to foster the development of new technologies to the detriment of pure research. In response, many of these scientists banded together in order to regulate scientific research as a career, with the possibility of accrediting these institutes as supplementary centers of the University (Costa & Brandão 2007). These initiatives resulted in some of the State institutes and museums being absorbed into the University.

This process began with the *Museu Paulista*, which became part of the University of São Paulo in 1963. Linked previously to the Education Secretariat, this Museum was transferred to the University with the status as institute, with full autonomy for the Human Sciences Departments. The researchers and technical staff working at this Museum were also transferred. Most of these researchers were archeologists and ethnologists rather than historians. As these researchers were not pursuing careers in teaching, they became misfits, employees without the prestige of faculty members and also not represented in the decision-taking spheres of the University.

Absorption by the University did not ensure the immediate development of the History Sector of this Museum, nor any connection with research projects being implemented by its Human Sciences Departments. There were also many administrative, functional and scientific issues to be resolved in this Museum and the University, in order for it to be restructured as a History Museum.

Through to the late 1980s, there were overlapping institutional functions in the University that had to be straightened out, as well as aspects related to the safekeeping of permanent collections in the Human Sciences fields. It was only in 1989 that the Pre-History Institute, the Art and Archaeology Museum, the Plínio Ayrosa Collection – until then under the safekeeping of the Anthropology Department at the Philosophy, Literature and Human Sciences School – and the Archaeology and Ethnology collections of the *Museu Paulista* were gathered together under the same roof, at the Archaeology and Ethnology Museum at the University of São Paulo (Costa & Brandão 2007).

Between 1963 and 1989, poor communications between the *Museu Paulista* and the Human Sciences Departments were undermined even further by a specific trend in these academic fields. With the exception of Archaeology, which can never function without assemblies of objects, these collections were no longer a matter for conceptual and methodological concern among researchers. From the XX century onwards, the evolutionist and taxonomic logic that prevailed in analyses of material 'traces' was abandoned. Equivalence among items classified in a decontextualized manner and the societies from which they derived was rated as a prejudiced and inadequate approach, unable to express the complexity of social structures (Buchli 2004; Miller 2005). Focused on the figure of the informant, participative ethnography drew researchers away from museums, interested more in fieldwork where social relationships could be observed 'live'. The redefinition of themes and methodologies was pushed as far as possible through structuralistic and communicational approaches that characterized the intellectual production of sociologists, anthropologists and historians, resulting in the abandonment of museums by the Human Sciences (Layton 2008; Boivin 2008).

In historiographic studies, indifference to artifacts has always been even more marked. With a strong logocentric tradition, historical production has long consisted mainly of written works. The acquisition of iconography as a documentary source is a recent development, with the status of objects still today cloudy, often used merely as illustrations (Rede 2012). This stance is also due to the structuralistic and Marxist approaches of material culture. For the former, items were no more than supports for communications systems, while for the latter, material culture was viewed as an epiphenomenon of economic and political structures that were seen as the driving forces behind social changes.

These political and scientific contexts resulted in the *Museu Paulista* firming up its position as Memorial to Brazil's Independence from colonial rule. Still today, its flows of visitors increase on dates close to civic commemorations, with its pictures, sculptures and items on display featured in all textbooks until very recently.

Fig. 1
Living room of the late XIXth century, donated by the family Souza Queiroz - Photograph José Rosael – Collection of the Museu Paulista da Universidade de São Paulo/Brazil

The absence of a scientific policy for this Museum allowed its historical collections and exhibitions to meander along their original paths in an acritical manner, continuing the traditional role of history museums: presenting ideological narratives to the public that pay tribute to people, events and ideals built up through political, ethnic and cultural struggles pursuing identity-based hegemonies.

It was consequently quite understandable that the representatives of these wealthy families in São Paulo viewed the Museum as a perfect showcase for their personal legacies, donating domestic items such as furniture, tableware, decorative pieces, items of personal use, portraits and other family treasures. When transformed into public collections and displayed to the public at large, they soon developed into idealized benchmarks for the São Paulo lifestyle (Fig. 1).

This type of exhibition merely strengthened beliefs among the population at large that items worthy of display in a history museum were those of exceptional value in terms of either esthetics or sophistication, or even because of their links to leading names in the political and economic history of Brazil. In keeping with the items displayed in the halls of this Museum, its technical reserves were the outcomes of private practices seeking social validation through the deployment of cultural equipment. But this was not all. Belk mentions the works of Lipsitz, Radley, Lavine and Clark, produced between the 1970s and the 1990s, in order to explain the extent to which museum curators were committed to using social filters that turned elite assets into mirrors of the past (Belk 2004). This representation was so strongly established that when families outside this circuit contacted the museum to offer donations, they did so with the same intentions. However, when they had no 'special' objects to donate, they were replaced by personal documents, such as identify cards, diplomas, certificates etc.

Research and Curatorship

This museological configuration came under fire when the material dimensions of social life returned to the center of the academic stage in the Human Sciences field. Despite the scope of this appreciation, which encompassed several aspects of the Human Sciences, a decisive role was played by the acknowledgement of society of consumption as a matter of scientific interest. Understanding its origins, dynamics, functioning, purposes, circuits and dissemination capacities prompted an upsurge of interest in objects, now viewed as social agents (Miller 2005) and consequently as important documents for research.

This shift in the course of historiographic studies focused on material culture reached this Museum in 1989, under its Director Ulpiano T. Bezerra de Meneses. An archeologist by training and a member of the History Department Faculty at the University of São Paulo, he created and implemented a specialty project at the *Museu Paulista* in the field of material culture and history of Brazilian society. Heading up this institution between 1989 and 1993, he defined a master plan for this Museum. Through Meneses, the conceptual and methodological assumptions were introduced as museological practice guidelines, adopted by historians moving away from the history of major events and great men. These concepts revitalized the field of history by highlighting aspects associated

with the daily lives of large segments of the population, stressing ethnic and cultural multiplicity as well as countless regional and social identities, gender, consumption phenomena and other issues. With these changes, the objects and items in the Museum were no longer viewed as mere supports underpinning hegemonic ideologies, but rather as historical documents offering insights into relevant aspects of society. The curatorial actions of this Museum became coherent and supportive, with acquisitions added to its permanent collections, building up its library, cataloging and restoration activities and exhibition designs necessarily conducted under the aegis of institutional research projects.

These shifts in course had sweeping impacts on its institutional acquisitions policy for its permanent collections, no longer expanding at the whim of elite donors, with items being acquired in fields responding to the lines of research conducted at that Museum. A personalized and fetishistic approach made way for broad-ranging documentary analyses. Although still focusing on collections of items and pictures, this Museum is now also striving to acquire archives related to its fields of action.

Concerns over building up massive three-dimensional iconographic documentary series are directly related to shifts in historiographic interest. The phenomenon of a consumption society is now being observed through items that were once viewed as little more than bric-a-brac (Tilley 2008; Boivin 2008; Buchli 2004; Miller 2005). As a result, sets of portrait photographs can provide information on the construction of social personages, particularly in terms of poses, accessories and backgrounds. Issues such as shaping bourgeois tastes and their dissemination require countless sets of items used for decorative purposes, in rituals related to sociability or housework. Issues such as the construction of gender categories are underpinned by collections of items in personal, public and domestic use (Gordon 1988; Gordon & McArthur 1988; George 2008; Carvalho 2008; Kinchin 2008-2009; Malta 2011). The *Museu Paulista* and the Human Sciences Departments began to draw closer. By including the themes and methodologies developed in this field in its curatorial practices, the Museum is once again a protagonist in research, influencing historiographic output and contributing new approaches and themes (Meneses 1992; 2005).

But these changes did not immediately encompass all segments of the Museum collections. After these museums and the Human Sciences institutes at the University were restructured from 1963 onwards, the new status of this Museum still required a lengthy maturation period. The history research staff at the *Museu Paulista* was pruned severely when its archeologists and ethnologists were transferred to the Museum of Archaeology and Ethnology at the University. Lacking Master's Degrees or Doctorates, they worked more as documentalists. By 1990, only five researchers had joined those already in place. As there were no teaching careers at the Museum nor any professional staff with specialty courses in history and material culture, new employees spent years of their institutional lifetimes acquiring these qualifications. Although teaching careers were implemented at the Museum in 1995, it was only in 2004 that all researchers at this institution enter the teaching careers. At the moment, the teaching staff at the Museum has only five members, with two contributing lecturers. As is clear, the University is still reluctant to establish a structure compatible with the dimensions of this institution. In terms of University policy and decisions, the museums remain on an unequal footing compared to the teaching units departments, with fewer representatives on the main decision-taking body (University Council). Until 2010, they were linked to the Office of the Dean for Culture and Extension Studies, consequently lacking autonomy and tied to an entity whose priorities do not include research activities. These differences in the administrative structure were also responsible for delays in implementing the process of turning the Museum into a specialized research institution.

Although the technical reserves of the Museum began to change more than twenty years ago, making space for sticker albums, tin toys, family portraits, postcards, mass-produced crockery and industrialized product packs including beverages, candies and perfumes, as well as albums, textbooks and tools used by tailors, carpenters etc., these shifts in the profiles of documentation collected by the Museum were rarely reflected in its displays.

Its exhibitions were still dominated by topics and themes related to Brazilian history, wealthy bourgeois lifestyles or traditional types of objects such as weapons and vehicles. It must also be borne in mind that this Museum featured a permanent display of the 1917 exhibition in its lobby, main hall and massive staircase. Despite the alterations undertaken by its curators, the nature of these exhibitions left little room for collections and topics related to the middle and lower classes.
Research projects exploring São Paulo households conducted by three faculty members of this Museum underpinned the possibility of planning the revitalization of one of the three exhibition

wings of the *Museu Paulista*. Still under way, this project has already resulted in the acquisition of more than 2,800 household items, which included decoration items, chinaware, kitchenware, recipe books, and books on etiquette, decoration and children education, as well as household-related personal objects. This was the largest campaign ever undertaken by this institution. This exhibition will be inaugurated when the building re-opens, currently under restoration. The implementation of this project demonstrates how historical exhibitions and research projects are associated.

Acquisition Criteria

With few alterations, the definitions of the items to be placed on display derive from research into gender and the home (Carvalho 2008, 2011, 2012), as well as interior décor (Lima 2002, 2008, 2011) and domestic architecture (Marins, 2001, 2005). During research activities conducted by Carvalho, it was possible to include large scale textual documentation in the permanent collections of this Museum obtained from the Mappin department store (one of the oldest in São Paulo), whose archives include more than 60,000 advertisements on clothing and household items. Through the research conducted by Lima, it was also possible to acquire the private archives of painter-decorator Oreste Sercelli, who worked in São Paulo between 1898 and 1927.

For this exhibition, the timeframe has been extended, beginning with the last two decades of the 19th century and extending through to the second half of the 20th century in some cases. This extension was possible through confirming the long social lifespan of some types of objects studied during these research projects. Most of these items were acquired at the antiques market. For historians, the antique stores circuit is part of their fieldwork. In contrast to anthropologists who work with participant observation, historians work with realities that no longer exist, meaning that the real-life context of items must be inferred through reconstructions underpinned by documentary sources. Consequently, the social life that once surrounded these objects is researched through all types of documentary sources: texts, iconography and three-dimensional items. For this exhibition, priority was assigned to the acquisition of three-dimensional documentation, meaning objects.

In a history museum that is devoted to reflecting on the importance of the material dimension of life in society, exhibitions are strategic activities that are nevertheless difficult to design. Typological or scenographic exhibitions are not sufficient. These displays may not be confused with galleries of studies or the reconstitution of settings in period rooms. The issues addressed by the research project must be recreated through the items on display, which are at one and the same time documents and museographic means of communication (Meneses 2005). A research project exploring material culture, regardless of the documentation used, is presented in a text, a monograph. A historical exhibition must necessarily feature large numbers of interconnected items whose placement ensures that the issues addressed by the research project can be understood by visitors. It was this specific requirement of historical exhibitions that prompted the curators to seek out the new acquisitions that have revitalized the interior objects collection of the *Museu Paulista*. Consequently, it was the demands raised by this exhibition that forced its curators to expand the classes of domestic objects in order to comply with the new criteria introduced by these research activities.

Several hypotheses were investigated, related to decoration, work and gender divisions in the home, leading to three conclusions that are presented here:

a) The first is a co-variation between gender differences (male and female) and the types, materials and ornaments seen on household objects.
b) The second conclusion is that changes in raw materials and manufacturing techniques for interior objects drive the dissemination of domestic values associated with the spread of ornamentation standards.
c) The third conclusion is that objects used by women as personal accessories and decorative objects are related through similarities of color, material, manufacturing techniques, shapes and finally types of ornamentation.

A good example is the use of crockery. Families update bourgeois domestic values associated with the ritual of entertaining at meals through the use of tableware. Displays of status, coherence, refinement, culture and mastery of menus are tested when entertaining at home. The best dishes come out of cupboards. Tableware used by different social segments, made from a wide variety of raw materials but with references to similar patterns of ornamentation, even if simplified, underscores the flexibility of object use during social rituals, thus ensuring efficacious reproduction of the ways in which society functions.

What does the Museum offer when addressing this issue? Tableware featuring the crests of wealthy

Fig. 2
Dinner service, Melcrome Goyana, melanin, composed of 36 pieces, 1960-70 – Photograph José Rosael – Collection of the Museu Paulista da Universidade de São Paulo/Brazil

families in Brazilian society, especially in São Paulo State. A good example is the expensive porcelain set donated by the wealthy Souza Queiroz family, with an aristocratic title and political status. Dating back to the XIX century, this Limoges dinner service features the family coat of arms and is highly specialized, with special dishes for creams, soups, vegetables, olives, cheeses, fruit and appetizers, as well as tea and coffee pots, soup, meat and dessert plates and so on.

For this exhibition, efforts were made to contrast high quality imported tableware with plates of different qualities manufactured in São Paulo. Some of them were already included in the Museum collection, acquired through a recent research project into local tableware production (Pereira 2009), while new items were also included, some of them extremely cheap, made from glass and melamine plastic (Fig. 2). This juxtaposition is intended to underscore the esthetic concerns apparent in all these items, although at different levels of complexity. Highly specialized tableware such as the set donated by the Souza Queiroz family will be compared with simpler options. There is also the intention of underscoring variations in the use of raw materials and technology - faïence, porcelain, glass, plastic, hand-painting, transfers and relief.

Many plates are decorated with themes inspired by Nature, such as flowers, leaves, fruit and small animals such as birds and insects. The idea of the home as a place remote from the mechanized world, close to the countryside and thus also close to Nature and women, is apparent in many different household items, and not only through the presence of ornaments.

This phenomenon may be noted in objects that are disguised as something else, including several types of bread and fruit baskets. The Museum acquired a flexible basket woven from silver threads

Fig. 3
Basket porcelain with truss imitating natural fibers, belonged to a family in São Paulo, c. 1960 - Photograph José Rosael – Collection of the Museu Paulista da Universidade de São Paulo/Brazil

by Christofle, a famous French silverware manufacturer founded in 1830. The Museum also found two faïence baskets used by the middle class, imitating woven cane (Fig. 3).

The bucolic idealization of the home also appears in nostalgic objects inspired by 18th century French paintings known as *fêtes gallants*. Turned into sculptures and prints on many items for personal and household use, these figures were very popular through to the 20th century. Bringing the values of an aristocratic society into the modern day, these objects are characterized by the absence of representations of work. At a time when women are moving out of their homes in order to enter the job market, these items serve as curbs on these changes. This is an example of the type of objects that did not appear in earlier research projects focused mainly on textual and visual documents. More than a hundred objects featuring *fêtes gallants* were acquired by the Museum from antique stores and fairs.

The distance between the exterior world of work and the interior world of the home is clearly reflected in the cover-ups stitched by housewives to conceal the functionality of mechanical objects, cloaked by a layer of ornaments enhanced by female handicrafts. This is what happened with telephones. The earliest devices – such as the candelabra telephone – attempted to represent the human figure, but alterations to the design of this highly technological object inspired housewives to sew cloth dolls whose flowing skirts hid these gadgets (Haltman 2000). In São Paulo, these dolls were sold at the Mappin department store, whose advertising documentation is in safekeeping at the Museum, as mentioned above.

Another very common type of object designed to conceal female work are sewing tables, machines and baskets. In home economics handbooks, housewives were advised to put all their work materials away before their husbands come home, as though they receiving unexpected callers. These items were rapidly turned into decorative elements, camouflaging their associations with housework. Used during the 19th century, references may be found to these items in magazines published during the 1920s, in addition to acquiring examples dating back to the 1950s and 1960s.

Even today, tablecloths are a common resource for setting the scene in homes. Tablecloths dress up plain wooden tables that may be adequate for routine tasks, but are unacceptable for more significant gatherings such as meals. We were able to acquire a large number of embroidered, lace-edged and crocheted tablecloths, extending this collection to include plastic tablecloths imitating lace. This juxtaposition of delicately embroidered tablecloths used for banquets with their industrialized counterparts is one of the ways found by the curators for demonstrating the way in which the standards of taste introduced during the 19th century have spread. These lacy plastic tablecloths mean that women no longer need to devote time and effort to these types of handicrafts, although still allowing them to beautify their homes. This is a good example of how items can update values that are flexibilized in order to survive, underpinning types of behavior that are still socially desirable, in this case the connection between women and their homes, ensuring their reproduction.

Many items used for home decoration are found to have the same decorative functions on women's

Fig. 4
Napkin holder in the shape of typical women from Bahia, painted wood, 1950 – Photograph José Rosael – Collection of the Museu Paulista da Universidade de São Paulo/Brazil

bodies. For this exhibition, several acquisitions of this type were made –flowered dresses, flowery fascinators, porcelain flower centerpieces, skirts with bird prints, ceramic birds to hang on the wall, photographs of women posing alongside flowers, children sitting on swans, and embroidered or lacy dresses and tablecloths, with many occurrences demonstrating how material similarities strive to indicate the social status pursued by women.

A final product category strengthens the gender with which it is associated: the pincushion, presented as a miniature silver shoe or silk settee, a bunch of paper flowers etc. This trend continues through to unusual objects, including countless trinkets representing the female body. Here, the constitution of gender identity is based on the association of the female body with the home, reaching its maximum intensity through the transfiguration of women into decorative objects for their homes. For this exhibition, miniatures were gathered together, dating back to the 19th century through until today, made from a broad range of materials, such as silver, silk, porcelain, wood and plastic resins. In addition to representing a female figure, a napkin-holder represents a female slave sent out to peddle snacks in the streets, or her more recent heir, the figure of a black woman typical of Bahia State (which has one of the largest black populations in Brazil) that may also be associated with the figure of a black housemaid in São Paulo during the 20th century (Fig. 4).

Steered by the research project criteria, the collections that we were able to build up demonstrate the vitality of certain representations. This vitality arises from the success of their penetration into different social groups, thanks to the variety of objects, materials, ornamentation and manufacturing techniques.

We believe that this simultaneous display of different objects from different periods, used by different social groups, but functioning in the same ways, will encourage visitors to reflect on the production of values in the consumption society in which they live. These reflections will begin with familiar items that are in daily use in the home. However, once transferred to the context of the Museum, they will trigger the feeling of incongruity that is needed to understand the social mechanisms that simultaneously construct the hegemony of values while underpinning social and gender-based distinctions.

Finally, all history exhibitions are prepared with the raw materials used in the research project, which is why their creative processes differ from exhibitions in other fields of knowledge that focus not on the displayed objects, but rather on the natural phenomena that they are attempting to explain. Thus, if on the one hand the historical exhibition must embody the findings of research projects, on the other, the process of preparing the exhibition may lead back to field mapping activities with new reflections, enriching earlier surveys (Meneses 2005), which has been the case for the experience reported here. For the project in question this was vital, as the Museum collections were not compatible with the issues pinpointed by the research project, in addition to being very limited in terms of interior object collections. This was how the design of this exhibition project spurred the expansion of the repertoire of objects initially mapped by monograph research activities. This historical exhibition thus becomes not only a way of disseminating knowledge, but also forms a real history laboratory.

Literature cited

Belk, R. W. 2004. Collecting in a consumer society. In: *Material culture: Critical concepts in the social sciences*, ed. V. Buchli (London: Routledge), 3, 1: 1-26.

Boivin, N. 2008. *Material cultures, Material minds. The impact of things on human thought, society, and evolution*. Cambridge: Cambridge University Press.

Brandão, C.R.F. & C. Costa 2007. Uma crônica da integração dos museus estatutários à USP. *Anais do Museu Paulista: história e cultura material* 15,1. http://dx.doi.org/10.1590/S0101-47142007000100005 (accessed February 8, 2014).

Brefe, A.C.F. 2003. História nacional em São Paulo: o Museu Paulista em 1922. *Anais do Museu Paulista: história e cultura material.* São Paulo, 10-11,1: 79-103.

Brefe, A.C.F. 2005. *O Museu Paulista: Affonso de Taunay e a memória nacional, 1917-1945.* São Paulo, UNESP/Museu Paulista.

Buchli, V. 2004. General introduction. In: *Material culture: Critical concepts in the social sciences*, ed. V. Buchli (London: Routledge), 1, 1: 26-39.

Carvalho, V.C. & S.F. Lima 1993. São Paulo Antigo, uma encomenda da modernidade: as fotografias de Militão nas pinturas do Museu Paulista. *Anais do Museu Paulista: história e cultura material*, São Paulo, 1, 1: 147-174.

Carvalho, V.C. 2008. *Gênero e artefato*: o sistema doméstico na perspectiva da cultura material. São Paulo, 1870-1920. São Paulo: Editora da Universidade de São Paulo e Fundação de Amparo à Pesquisa.

Carvalho, V.C. 2011. Cultura material, espaço doméstico e musealização. *Varia História*. Universidade Federal de Minas Gerais, 27, 443-469.

Carvalho, V.C. 2012. On ornament and hygiene. Modernity in the domestic space of a Brazilian Capital. São Paulo, 1870-1920. In: *Narrating objects, collecting stories*, eds. S. Dudley *et al.* (London: Routledge), 71-84.

Elias, M.J. 1996. Museu Paulista: memória e história. São Paulo, Tese (Doutorado) - Faculdade de Filosofia, Letras e Ciências Humanas, Universidade de São Paulo.

George, R.S. 2008. Home furnishing and domestic interiors. In: *Handbook of material culture*, eds. C. Tilley *et al.* (London: Sage), 221-229.

Gordon, B. 1988a. Victorian fancywork in the American home: Fantasy and accommodation. In: *Making the American home. Middle-class women & domestic material culture 1840-1940*, eds. M. F. Motz & P. Browne (Bowling Green/Ohio: Bowling Green State University Popular Press), 48-68.

Gordon, J. & J. McArthur 1988b. American women and domestic consumption, 1800-1920. Four interpretative themes. In: *Making the American home. Middle-class women & domestic material culture 1840-1940*, eds. M.F. Motz & P. Browne (Bowling Green/Ohio: Bowling Green State University Popular Press), 27-47.

Haltman, K. 2000. Reaching out to touch someone? Reflections on a 1923 candlestick telephone. *American artifacts: Essays in material culture*, eds. J. D. Prown & K. Haltman (East Lansing, Michigan: Michigan State University Press), 71-93.

Kinchin, J. 2008-2009. Performance and the reflected self: Modern stagings of domestic space, 1860-1914. *Studies in the Decorative Arts*, New York, Bard College, 16(1), 64-91.

Layton, r. 2008. Structuralism and semiotics. In: *Handbook of material culture*, eds. C. Tilley et al. (London: Sage), 29-42.

Lima, S.F. 2002. *Ornamento e cidade: ferro, estuque e pintura mural.* São Paulo, 1870-1930. São Paulo: tese de doutorado (História Social), Depto de História da FFLCH-USP.

Lima, S.F. 2008. O trânsito dos ornatos: modelos ornamentais da Europa para o Brasil, seus usos (e abusos?). *Anais do Museu Paulista* 16 151-199.

Lima, S.F. 2011. Profissão: pintor-decorador. Oreste Sercelli na cultura de ornamentação arquitetônica de São Paulo. In: *São Paulo, os estrangeiros e a construção das cidades,* eds. F. Peixoto, J. Lira, M.R.A. Sampaio & A.L.D. Lanna (São Paulo: Alameda), 1, 287-315.
Lopes, M.M. 1997. *O Brasil descobre a pesquisa científica: os museus e as ciências naturais no século XIX.* São Paulo: Hucitec.
Lopes, M.M. & S.F.M. Figueiroa 2003. A criação do Museu Paulista na correspondência de Hermann von Ihering (1850- 1930). *Anais do Museu Paulista: história e cultura material.* 10-11(1), 23-35.
Malta, M. 2011. *O olhar decorativo: ambientes domésticos em fins do século XIX no Rio de Janeiro.* Rio de Janeiro: Mauad X / FAPERJ.
Marins, P.C.G. 2005. *Moradias dos paulistas - das fazendas às vilas operárias.* São Paulo: Centro de Estudos e Pesquisas em Educação, Cultura e Ação Comunitária - CENPEC, 1.
Marins, P.C.G. 2001. *Através da rótula - sociedade e arquitetura no Brasil, séculos XVII a XX.* São Paulo: Humanitas / FFLCH / USP, 1.
Meneses, U.T.B. (ed.) 1990. Às *margens do Ipiranga, 1890/1990.* São Paulo: Museu Paulista/ Universidade de São Paulo.
Meneses, U.T.B. 2005. A exposição museológica e o conhecimento histórico. In: *Museus. Dos gabinetes de curiosidades à museologia moderna,* eds. B.G. Figueiredo & D.G. Vidal (Belo Horizonte, Argumentum / CNPq), p. 15-84.
Meneses, U.T.B. et al. 1992. *Como explorar um museu histórico.* São Paulo: Museu Paulista/Universidade de São Paulo.
Miller, D. (ed.) 2005. *Materiality.* London: Duke University Press.
Misan, S. 2008. Os museus históricos e pedagógicos do estado de São Paulo. *Anais do Museu Paulista: história e cultura material*. São Paulo, 16(2), 175-204.
Moraes, F.R. 2008. Uma coleção de história em um museu de ciências naturais: o Museu Paulista de Hermann von Ihering. *Anais do Museu Paulista*: *história e cultura material. São Paulo*, 16(1), 203-233.
Novais, F. 1990. O Monumento da Independência: da Monarquia à República. In: *Às Margens do Ipiranga,1890/1990,* ed. U.T.B. Meneses (São Paulo: Museu Paulista), 13.
Oliveira, C.H.S. 1995. O espetáculo do Ipiranga: reflexões preliminares sobre o imaginário da Independência. *Anais do Museu Paulista: história e cultura material*. 3(1), 195-208.
Oliveira, C.H.S. 2003. Museu Paulista: espaço de evocação do passado e reflexão sobre a história. *Anais do Museu Paulista: história e cultura material.* 10-11(1), 105-126.
Pereira, J.H.M. 2009. *Louça Paulista - as primeiras fábricas de faiança e porcelana de São Paulo.* São Paulo: Edusp/Imprensa Oficial do Estado de São Paulo/Museu Paulista-USP.
Pitt-Rivers, A.L.-F. [1875] 2004. On the evolution of culture. In: *Material culture: Critical concepts in the social sciences*, ed. V. Buchli (London: Routledge), 1(2), 182-206.
Rede, M. 2012. História e cultura material. In: *Novos Domínios da História,* C.F.S. Cardoso & R. Vainfas (Rio de Janeiro: Elsevier-Campus), 133-150.
Taunay, A.E. 1937. *Guia da secção histórica do Museu Paulista.* São Paulo: Imprensa Official do Estado.
Tilley, C. 2008. Objectification. In: *Handbook of Material Culture,* eds. C. Thiley et al. (London: Sage), 60-73.
Tylor, E.B. [1896] 2004. Introduction to history of mankind. In: *Material culture: Critical concepts in the social sciences*, ed. V. Buchli (London: Routledge), 1(2), 207-214.

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Keywords

History Museums - Collection Policies - Material Culture

A national project for the Italian University Museums network

Elena Corradini & Luigi Campanella

Abstract

Twelve historical Italian Universities, with their museum centers and systems, museums and collections, through the creation of a first network of Italian University Museums, take part to a national project aiming for contributing to the creation of a national museum system to enhance cultural, historical-scientific and naturalistic heritage. The first goal of the project is monitoring the heritage of University museum network, in order to create a national database, using the national catalogue standards, of the most significant collections.

The tool of the network is a bilingual web portal to rationalize the presence of the Italian University Museums on the web, for strengthening and standardizing the presentation of their quality contents on the web with common thematic and multidisciplinary itineraries through their most relevant collections.

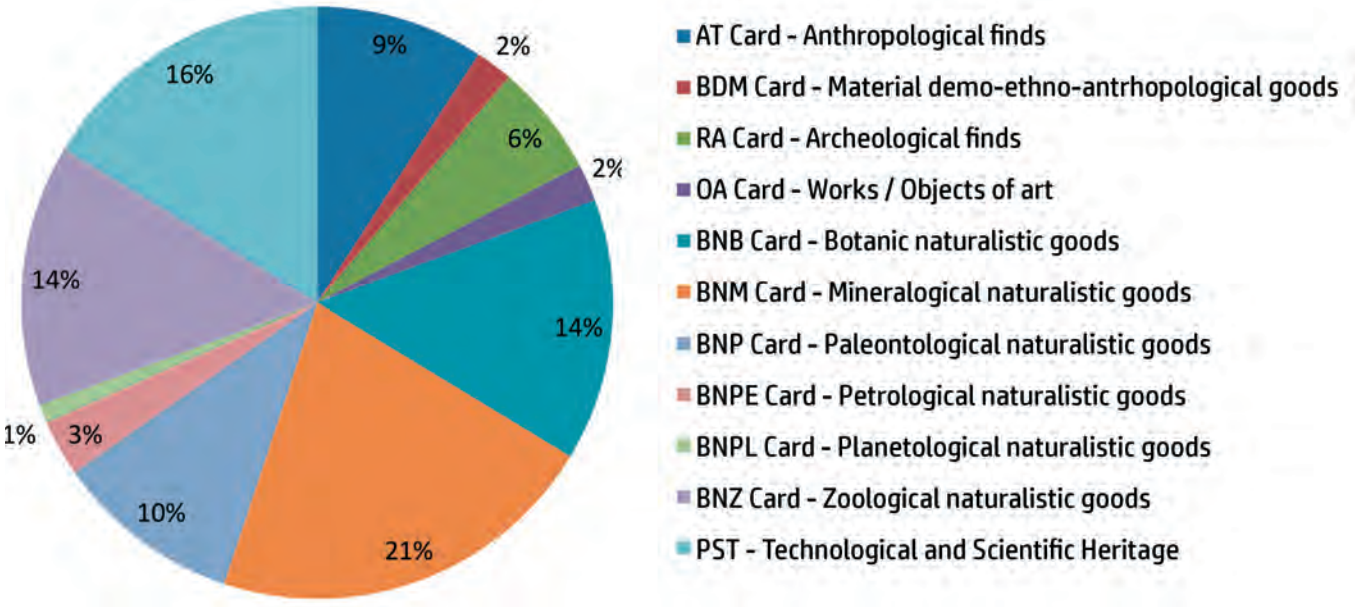


Fig. 1
The activity of cataloguing of the Network of the Italian University Museums

Introduction

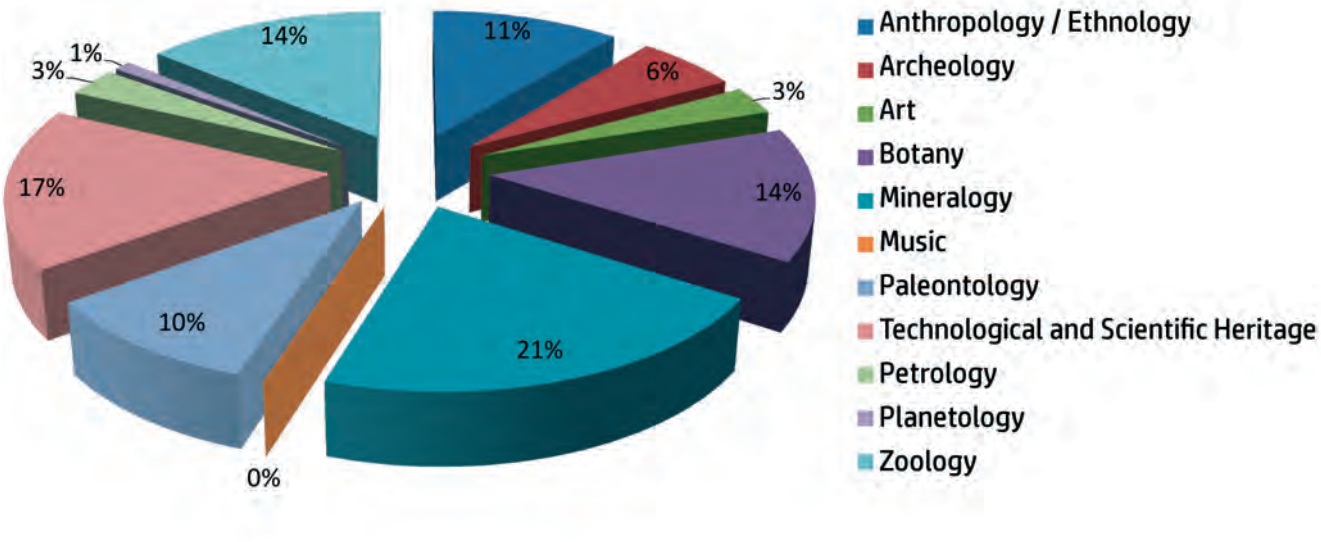
The museums, museum centers and systems of the twelve historical Italian Universities (Bari , Cagliari, Chieti-Pescara, Ferrara, Florence, Modena and Reggio Emilia, Parma, Perugia, Rome "La Sapienza", Salento, Siena, Tuscia), through a specific program agreement approved and financed by the Ministry of the University and Research, take part in a national project aiming at contributing in the creation of a national system of 64 University Museums, 38 collections, 9 Botanical Gardens and for enhancing cultural historical-scientific and naturalistic heritage of their Universities.
The agreement represents for the Universities a fundamental opportunity to contribute to the creation of a first real and virtual network of Italian University Museums. The project, approved and financed in the year 2013 by the Ministry of the University and Research within the law 6/2000 for the diffusion of the scientific culture, is coordinated by the University of Modena and Reggio Emilia (www.pomui.unimore.it).

The creation of this first national network of museums, museum centers and systems of twelve Italian Universities is a fundamental tool to create multiscale management models and integrated plannings both at a national and international level. These concern not only scientific research but also multidisciplinary museum education and integrated museum communication, so that the public value of cultural historical scientific and naturalistic heritage preserved in museums can be perceived.

The mission of the Italian University Museum network (that we aim to activate within the project), consists in offering the necessary tools to increase the interest for science through the knowledge of its collections as well as to create amusing, exciting and multiform contents in order to stimulate curiosity, interest and a more and more active participation. To respond to this need, scientific museology is in constant evolution, being aware that if audience lose interest in science it will not understand its importance.

The project aims at offering a relevant contribution to the scientific education on different levels using innovative tools that do not need huge structural investments, and that directly involves University Museums located throughout national territory by connecting them. Science related issues must become an integrating part of education for young researchers and part of the heritage for scientists because scientific museums places are relevant to promote a correct and innovative scientific information concerning science and its ongoing progresses. It means an evolution of the educational and informative role of museums in which the historical aspects are functional to a social and educational vision, through a close relationship between school and local area. Such evolution will allow to create new contents for the communication of museum objects as educational tools, providing an interesting method to transfer scientific culture since the first stages of school education.

Fig. 2
The variety of disciplines of the Italian Network



The tool of the Italian University Museums network will be a bilingual web portal realized on purpose for the project, in order to rationalize their presence on the web, for strengthening and standardizing the presentation of their quality contents on the web, as suggested by the guidelines of European project Minerva (www.minervaeurope.org), in an innovative perspective that takes into consideration the peculiar features of the collections and the experiences of each single University Museum, their interdisciplinarity and the possible uses in a contemporary historical, social and cultural context (Fig.2). That will allow to design a new image of the museums and their ability to activate national and international synergies to plan lifelong learning activities addressed to different audiences, from research structures to schools of any kind and level, to a wide audience.

The catalog of the collections

The first objective of the project is monitoring the scientific cultural heritage of the University Museums network, in order to create databases of more than 25.000 objects of their most significant collections. This first phase of the work can proceed through different steps: choice from each participating University of a defined number of objects of his heritage able at the same time to well representing cultural vocation and to give a meaningful contribution to the national project; inventory and classification of the chosen objects, cataloguing of the chosen objects using the national standards of the catalogue cards within the General Informative System for Cataloguing on the web, SIGECweb**,** released in collaboration with the Central Institute for Cataloguing and Documentation of the Ministry of the Culture and Tourism (Fig. 1).

The selection of the objects / specimens for the activity of cataloguing has been fulfilled, in order to choose the most significant and to insert them in a coherent relation, for their the symbolic value, with four thematic paths: environments, landscapes, stories, history of scientific instruments.

The standard are constituted by a set of rules, guidelines of method and specific terminology tools to follow for the acquisition of knowledge on the goods and for the production of their documentation. The rules for cataloguing cultural heritage include also rules for digital acquisition of the photographic images, for data transfer and also authority files cards which relate to entities (as the authors, the bibliography) in relation with the cultural heritage.

The catalogue cards are descriptive models that collect in an organized manner information on heritage, according to a cognitive path that guides the person who catalogs and at the same time controls and encodes the data acquisition according to specific criteria. The Central Institute for Cataloguing and Documentation of the Ministry of the Culture and Tourism has issued different cataloguing models in relation to different types of cultural goods, organized on the basis of the various disciplines.
Every rule is made up from of the layout (the structure of the data) and the related rules of compilation, in which is indicated in detail how the individual entries must be drawn up.
The observance of common rules allows, by the application of specific procedures, the interchange of information among the different players in the field of cultural heritage.

The Italian University Museums network web portal

The catalogued objects for the specific relevance of the represented disciplines, like Physics, Anatomy, Archeology, Botany, Chemistry, Mineralogy, Paleontology. Physics and Zoology (Fig. 2), can contribute to the creation of four thematic paths, stories, history of scientific instruments, landscapes, environments, by which the project want to activate the interest and the participation of a even more large and different audiences. The web-portal realized by the Network (online by July 2016) is the virtual place where the ICCD catalogue cards, realized for each object/specimen with an highly qualified scientific information, are accessible to the visitors to illustrate the various itineraries realized by the museums.
The designing project for the web portal of the Italian University Museums is based on the fact that the web does not have to be a mirror of what already exists within a museum: the web is an appropriate tool to create a digital space that through the interaction with users and the production of new contents aims at spreading the knowledge and improving the services that University Museums as public bodies are supposed to provide.

The itineraries realized by each University Museum can create multiples contexts, by working with both historical and territorial frameworks. The museums, developing a narrative approach to the information, can describe the way an object deals with other objects, with places, persons, scientific theories. This activity of story-telling implies consequently to amplify and diversify the cultural communication, involving both emotional and sensorial sphere.

The bilingual web portal is characterized by an architecture of contents developed according to a strategic marketing and usability vision, with a functional graphic interface, easy-access to contents and customizable contents, symbolically representing a strong inclination towards innovation (Fig. 3).

The information management system of the bilingual web portal will represent the engine of a network of available resources; it will aim at managing the information richness and the needs of the different subjects, giving back an integrated vision in a suitable way to spread the knowledge of cultural historical scientific and naturalistic heritage to a wide audience, as well as stimulating interest and curiosity (Fig. 3).

The creation of the web portal to spread culture and collections fruition, connecting schools and University cultural heritage, will enhance open institutions to get in contact with surrounding social, economic and cultural realities, in order to improve the quality of education as well as future social and cultural life.

Fig. 3
The bilingual web portal of the Italian Network

The bilingual web portal will promote a connection between schools and cultural historical scientific naturalistic heritage preserved within University Museums, offering the teachers an educational tool to young students the big topics of science, becoming therefore a means of knowledge, communication and scientific divulgation. An updating of contents according to the topics that daily animate the scientific debate at national and international level will allow to start educational project on cultural historical scientific naturalistic heritage for students of different school kind and level in collaboration with regional and provincial School Offices, with headmasters, teachers and associations of teachers in order to design different e-learning educational paths for students and teachers of any school kind and level. In particular, educational offers addressed to students of the two last year of higher school represent an excellent offer for University career guidance.

In particular, the creation within the portal of an informative service for young post-graduates in the sector of museology and cultural historical scientific and naturalistic heritage will allow to:
- improve the visibility and the image of Universities through innovative communication plans;
- create an useful support to educational activities and to cultural exchanges with other realities, without any territorial border;
- have an effective and efficient tool for a qualified occupational system through personalized paths for young post-graduates;
- promote the on-line diffusion and fruition of available resources for labour market;
- create a real-time dialogue between suppliers and demanders of professional resources;
- support the participation of young people to project design activities of University Museums and to integrate them within the financial circuits that support fellowships and grants for young post-graduates;
- introduce guidance models for post-graduates.

Digital technologies for the Italian University Museums web portal

The network and the creation of a dedicated bilingual web portal allow to activate synergies, to share the mission and multidisciplinary contents, in order to stop the disjointedness and the variety of their current presence on the web in various forms: dedicated portals, complex websites, websites and pages within the web site of the University and to promote more services for the knowledge, the learning, for the users and for sharing of resources with other sites.
It is therefore fundamental to create an interactive environment, specialized in conveying information, knowledge and culture, with a clear communication of the institution identity that can promote it, its mission and vowed to quality.

New digital technologies, characterized by a good usability and accessibility level, will be applied (with reference to D. lgs. 4/2004- Code of cultural heritage and landscape and to the Recommendations of the WCAG 2.0). They can be used, both within exhibition paths on-site and online through mobile devices and for editorial initiatives. These technologies will allow to create cultural communication programs that involve the emotional and sensorial spheres, by adopting different educational strategies, for general audience as well as for the students of different school kinds and levels.

The structured digital information used by means of software with rendering devices, to offer to the visitors experiences on site using the augmented reality through the field of computer graphics and the studies of the possibilities to superimpose the digital processing to the perceived reality (Buxton 1997; Wang 2009; Butchart 2011; Huang & Alem 2011; Damala, Marchal & Houllier 2007).

Such devices will be oriented to different information plans, from the local interest of the exact museum site and its surrounding area, to a regional, national, continental and worldwide interest that can strengthen the tight links of each individual earthly dimension to the rest of the planet and of the biosphere, as well as to the universe.
At present, the most part of web portals and websites of the Italian University Museums has a reduced level of interaction with users, despite the considerable amount of contents in front of which visitors tend to have a passive attitude.

The functionality of the World Wide Web continues to expand alongside the computing infrastructure: web pages can now host many forms of interactive multimedia components. There is an emerging expectation that the Web will further expand to incorporate immersive 3D environments.

The 3D immersive multi-user virtual worlds become increasingly accessible while it offers an improved and engaging quality of experience. 3D digitization models of the objects are a relevant step of the overall process of the complete reading of the objects, in accordance with specific application requirements due to complexity of the digitization needs. The main factors that influence the suitability and applicability of a method are the complexity in size and shape, the morphological complexity, the variety of materials (Pavlidis, Koutsoudis, Arnaotoglou, Tsioukas & Christodoulos 2007).

3D digitization models that may be linked to various kinds of multimedia information also with interactive models, contribute to provide more comprehensive descriptions concerning finds that can usefully be included in databases also to set catalog cards. The interactive visualization granted by 3D models is the representation tool closest to direct inspection. The following steps of storing, managing, searching and displaying 3D objects are still uneasy processes. Digital 3D models make objects accessible on a much wider scale than in real life, since everybody could have virtual access to objects located far away, without the limitations of museum operating hours or access rights.

A digital archive of high quality three-dimensional models would constitute a great improvement because it remains durable and unalterable: high resolution models could be realized for the study of the detailed formal properties; digital models of lower resolution can document a great number of pieces. The technologies that enable presentation of interactive 3D content on the web are fundamental for building virtual exhibitions, as they permit to build both internal exhibitions accessible within the museums and remote on-line exhibitions accessible over the web. Remote access to 3D content allows users to experience distant virtual exhibitions in the same way as they can experience local 3D applications (Flotynski, Dalkowski & Walczak 2012; Pieraccini, Guidi & Atzeni 2001).

The visual impact has a big relevance: virtual reality opens various opportunities for research, representation, teaching, valorization, dissemination, protection, fruition of the cultural heritage of the University Museums. Virtual exhibitions enable the presentation of countless artifacts that cannot be directly exhibited to the public due to their fragility, limited space, or the prohibitive cost of creating and managing appropriate displays.

Visual data analysis blends highly advanced computational methods with sophisticated graphics engines to tap the extraordinary ability of humans to see patterns and structure in even the most complex visual presentations (Goilekas 2001).

The use of new advanced and sophisticated techniques (currently applied to massive, heterogeneous, and dynamic datasets, such as those generated in studies of astrophysical, biological, and other complex processes) made possible the interactive manipulation of large visual data sets using visual presentations. Advanced computational methods with sophisticated graphics engines can take advantage of the extraordinary ability of humans to see patterns and structure in even the most complex visual presentations and ultra high-resolution displays allow to zoom in to examine specific aspects of the renderings, or to navigate along interesting visual pathways (Goilekas 2001).

A virtual environment tries to evoke a strong sense of reality in the user. This is achieved by the generation of artificial inputs to the users' visual, acoustic and haptic senses. By interfacing some of the user's articulations in the real world back into the virtual environment, the user can consciously interact with the environment. Typically, interfaces to direct-manipulation devices are used, but nowadays more advanced interaction techniques like speech and gesture recognition have become a major research interest (Loscos, Tecchia, Frisoli, Carrozzino, Ritter Widenfeld, Swapp & Bergamasco 2004).

The generation of high-quality visual feedback from the virtual environment is often considered the most important aspect in generating a high degree of immersion. The desire to increase the degree of immersion led to the development of sophisticated image generators and display devices (Carrozzino & Bergamoso 2010; Lorenzo, Sicilia & Sanchez 2012).

The possibility to immerse a single user into a virtual environment also creates the desire to simultaneously share the environment with multiple users, and allows them to interact not only with the environment but also each other (Moustakas & Tzovaras 2010).

The use of multimodal systems that respond to inputs in more ways or more communication channels and support a user who communicates with an application using different modes as the voice (in a human language), gestures, handwriting, typing, audiovisual speeches can be very interesting.

The educational potential

Digital technologies facilitate many kinds of collaboration – between museum and learner, between different institutions and among learners themselves- and also facilitate personalisation: the learning potential of a versatile and mobile information source that is under the control of the learner is very big. The four thematic itineraries of the University Museums network web portal (stories, history of scientific instruments, landscapes, environments) with their underlying philosophies and their different approaches to learning, can reflect the views of the University Museums and can include for example different types of activity with learned-created outcomes: creative play, guided tour, interactive reference, puzzle/mystery, role-play/stories, simulation.

Making attention to the intergeneration of learning experiences, that is to say to wonder how educational ways are conceived and designed for different age classes, the web portal of the Italian University Museums network can became a place where users of all ages and backgrounds can engage themselves in a more in-depth analysis. Through different learning styles and levels of

knowledge the web portal can develop interest and motivation to learn more that can be transferred to formal learning environments building capacity and providing continuity. And while the portal has a role to play in capacity and continuity, it perhaps can have greatest role to play in engagement.

Another important aspect to analyze consists on multimodal learning that means what different learning styles and levels of knowledge the educational activities appealed to and how educational ways are conceived and designed for multiple users. Analyzing the contents is important to take into account at first if the multimedia devices used for the four thematic itineraries of the Italian University network allow different degree of knowledge, inspired to the concept of lifelong learning, if visitors can achieve a deep understanding of new themes and contents of the museum. At second it's necessary take into account the principles of the accessibility in the structuring the contents of the thematic itineraries for the web portal multimedia project.

The University Museum portal can have a big value also with non formal and informal learning environments in supporting young people's science learning needs. The engagement matter is essential for learning. In approching to science there must be positive engagement in particular at young ages and it is vital that we invest in young people and in the activities that will encourage their interest in science – not simply replicating the classroom experience. We must also support the adults who visit museums with them by understanding and designing intergenerational learning experiences to make a museum a truly valuable learning experience.

The Optics of Sapienza

The Optics of Sapienza is the name of an itinerary organized by the Museums of the University of Rome "La Sapienza". It can be red according to two different ways, the first referring to the content of the exposed collections, the second one to the specific perspective of Sapienza in the worldwide research framework.

The lens has been always a base component of scientific instrument. This component is relevant part of several instruments stored within the Museums of Sapienza.

The Optics instruments are largely used for the research in different areas such as medical clinical, cellular biology, chemistry, physics, environmental sciences, merceology.

Eight museums are included within the itinerary: Zoology Museum (electronic microscopy), Merceology Museum (microscopes, megascope, lanameter), Physics Museum (spectropolarimeter, projection lamp, heliostat), Chemistry Museum (reflection and fluorescence microscopes), Hygiene Museum (ultramiscoscope, old microscopes), Mineralogy Museum (gonimeters, polarizing microscope, refractometers), Medicine History Museum (photomicroscope, ancient microscopes), Anatomy Museum (electronic microscope).

From on glass observation to industrial products the cycle University - research - industry is completed. So the scientific itinerary becomes a cultural and educational incubator. The itinerary is supported by virtual and augmented reality, by both hard and digital and multi mediapress, by photos, videos, historical cartographies.

Conclusions

In order to create virtual places without space and time limits (places where anybody who is interested in a topic of the different disciplines involved in the collections of the University Museums can discuss and share experiences with other people), the web portal envisages to use social tools and content design interfaces typical of Web 2.0: they represent not only a new set of standards and services, but also an important change in relationship with our way of using internet. The emerging multichannel model, in which the web works as conductor: through distributed networks, and in particular social networks that will be adopted, connects not only cultural institutes to their users but also persons among them. This model is completely innovative for the University Museums involved in the project, which use mostly an information distribution model typical of web 1.0, that is to say the *broadcast* model in which contents are created by the cultural institutions themselves and then distributed to users through the web.

The use of social networks will be particularly relevant since it will allow to collect an audience interested in the specifically treated topics, contributing in creating a strong basis of users and/or followers that take part to the cultural life of museums. Thanks to the diffusion of the system, it will

be possible to spread the catchment area towards domains and social and cultural spheres not in direct connections with University Museums' specific activities, in order to spread broad reach and varied messages, communication, intellectual motivations.

Thanks to the collaboration of cultural associations of voluntary organizations, through the web portal it will be possible to realize common activities related to the collections of the University Museums aimed at social inclusion, with specific attention to migrants and all new citizens that bear cultural values and knowledge of various origin.
In particular a section of the portal specifically dedicated to young people is definitely innovative. This new section aims to create connections between the professional resources produced by the University within the field of knowledge, musealization and valorization of cultural historical scientific or naturalistic heritage and the world of work and research: such a service is still not present in the panorama of the organization of the University Museums. Into the web portal an informative service will be created with two main goals: to guide students in the choice of educational paths linked to scientific domain, and to guide young post-graduate through an innovative system for connections and diffusion/fruition of museum professional resources: the teleport of young museologists.

About the authors

The chapters about the catalog of collections, The Italian University Museums network web portal, Digital technologies for Italian University Museums web portal have to be assigned to Elena Corradini; The Optics of Sapienza to Luigi Campanella.

Aknowledgments

I thank Claudio Cadei for his useful and attentive collaboration.

Literature cited

Abate, D., R. Ciavarella, G. Furini, G. Guarnieri, S. Migliori & S. Pierattini 2011. 3D modeling and remote rendering technique of a high definition cultural heritage artifact. *Procedia Computer Science* 3: 848–852.

Amato, F., A. Mazzeo, V. Moscato & A. Picariello 2012. Building and retrieval of 3D objects in cultural heritage domain. In: *6th International Conference on Complex, Intelligent, and Software Intensive Systems*, ed. CISIS (Washington: IEEE Computer Society), 816-821.

Bouras, C. & T. Tsiatos 2004. Distributed virtual reality: building a multi-user layer for the EVE Platform. *Journal of Network and Computer Application*, 27, 2: 91-111.

Butchart, B. 2011. *Augmented reality for smartphones. A Guide for developers and content publishers*, Bristol (UK), JISC Observatory.

Buxton, W. 1997. Living in augmented reality: Ubiquitous media and reactive environments. In: *Video Mediated Communication*, eds. K. Finn, A. Sellen & S. Wilber (Hillsdale (NJ), Erlbaum), 363-384.

Carrozzino, M. & M. Bergamasco 2010. Beyond virtual museums: Experiencing immersive virtual reality in real museums. *Journal of Cultural Heritage* 11, 4: 452–458.

Chane, C.S., A. Mansouri, F.S. Marzani & F. Boochs 2013. Integration of 3D and multispectral data for cultural heritage applications: Survey and perspectives. *Original Research Article Image and Vision Computing* 31, 1: 91-102.

Flotynsky, J., J. Dalkowski & K. Walczack 2012. Building multi-platform 3D virtual museum exhibitions with Flex-VR. In: *18th International Conference on Virtual Systems and Multimedias* (Milano: Institute of Electrical and Electronics Engineers, Inc.), 391-398.

Goilekas, K. E 2001. *Visual effects in a digital world*. Morgan Kaufmann.

Gu, Y.X., N. Li, L. Chang & H.B. Duh 2011. A collaborative augmented reality networked platform for edutainment. In: *Mobile collaborative augmented reality system: Recent trends*, eds. T. Huang & L. Alem (New York: Springer), 1-9.

Koller, D., M. Turitzin, M. Levoy, M. Tarini, G. Croccia, P. Cignoni & R. Scopigno 2004. Protected interactive 3D graphics via remote rendering. In: *Proceedings of ACM SIGGRAPH 2004*, 695-703.

Lorenzo, C.M, M.A. Sicilia & S. Sánchez 2012. Studying the effectiveness of multi-user immersive environments for collaborative evaluation tasks. *Computers & Education* 59, 4: 1361–1376.

Loscos, C., F. Tecchia, A. Frisoli, M. Carrozzino, H. Ritter Widenfeld, D. Swapp & M. Bergamasco 2004. The museum of pure form: Touching real statues in an immersive virtual museum. In: *Proceedings of VAST 2004, The Eurographics Association. The 5th International Symposium on Virtual Reality, Archeology and Culture*: 271-279.

Moustakas, K. & D. Tzovaras 2010. Virtual simulation of cultural heritage works using haptic interaction. In: *Artificial Intelligence: Theories, models and applications* (New York: Springer), 389-394.

Pavlidis, G., A. Koutsoudis, F. Arnaotoglou, V. Tsioukas & C. Christodoulos 2007. Methods for 3D digitization of cultural heritage. *Journal of Cultural Heritage* 8, 1: 93-98.
Pieraccini M., G. Guidi & C. Atzeni 2001. 3D digitizing of cultural heritage. *Journal of Cultural Heritage* 2, 1: 63-70.
Rogers, D. & R. Earnshaw 1990. *Computer graphics techniques: Theory and practice*. New York: Springer.
Thomas, B. H. 2009. AR Visualization facilitating the architectural process: Using outdoor AR in Architectural Designing. In: *Mixed reality in architecture, design and construction*, ed. X. Wang (New York: Springer), 105-110.

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Keywords

Digital technologies - Network - Catalogue

University museum spaces, soft power and cross-cultural communication

Gina Hammond & Andrew Simpson

Abstract

A recent national policy initiative in Australia has the potential to affect the nature of exhibition work in university exhibition spaces. The "Australia in the Asian Century" document encourages cross-cultural discourse particularly in higher education. It is this sentiment that informed the final show at the Macquarie University Art Gallery for 2012; China India – Imaginings and Transformations. The rationale for this exhibition is briefly outlined and the potential implications of using the university museum and gallery space as an interface to foster and promote cross cultural literacy to a diversity of audiences is explored.

Museums and Soft Power

Museums have experienced a transformation in recent decades with an associated shift in focus from objects to people. Much has been written on this new repurposing of museums as active agents of social change rather than passive keepers and presenters of universal truths. This has been construed by some authors as seeking out proactive social justice agendas (e.g. Casey 2001; Sandell 2003).

The term "soft power" was first coined by Nye (2004) as an expression of the ability to persuade others through the power of attraction as opposed to the power of coercion. It has generally been applied to the field of international diplomacy, but increasingly, in recent years, many see a role of cultural production as a means of persuasion through attraction. Any cultural media therefore can be construed as a potential conduit for soft power. Sayers (2012) has spoken on the role of national museums in the cultural production of national identity and how this can be utilised as a cultural diplomacy mechanism. At a national scale Hammond and Simpson (2015) have proposed that the articulation of first nation voices in museum spaces is a measure of the adoption of soft power principles.

Museums are often construed as spaces for intercultural dialogue. Much of the literature on this typically focusses on larger state or nationally supported cultural institutions, there is little written on the purposeful intercultural deployment of university museums and gallery spaces. Much of the literature that discusses the purpose or role of the academic museum seems to focus on the three university functions of teaching research and community engagement (Stanbury 2003; Hammond et al 2012; Curtis 2012; Simpson 2012).

The nature of higher education has changed significantly in recent years, many universities now deliberately set out to establish a distinguishing set of characteristics, reformulating conceptions of institutional identity as a way of seeking marketplace advantage. This new thinking has led to growth in the literature involving the benchmarking of university community engagement (Garlick & Langworthy 2008). The rapidly changing environment and perceptions of instability are driving many institutions on the identity quest (Duke 2003). While this is a natural extension of the third role, i.e.: community engagement, the overlay of institutional aspiration on the activities within their cultural spaces appears to be relatively new. Some authors argue that this approach may have its origins in the creeping neoliberal managerialism that can be traced back to the 1980s (Mills 2012). Others maintain that the search for identity results from universities moving from a corporate-collegial model to a corporate mercantile model (Sanderson & Watters 2006).

Regardless of the reasons, a university attempting to carve out a distinctive identity is an opportunity for museums and gallery spaces to closely align themselves with institutional aspirations. By deploying soft power principles on a university gallery scale, interpretation of identity using the power of attraction at a grass roots level can be transmitted. What do we mean by that?

Temporary exhibitions spaces have the potential to become an increasingly important and safe space for such a dialogue to take place in. If they have the independence to pursue *unsafe* conversations as a means of exchanging and transmitting ideas, university exhibition spaces can have a particularly central role – as incubators for experiment, able to develop and transmit a deeper understanding of a wider breadth of cultural experiences in a safe, inclusive environment (Simpson 2012). This is more than working towards principles of providing avenues as lifelong learning spaces.

While there is certainly some evidence of university display spaces being used as a cross-cultural mechanism, this is often from a historic perspective (e.g. McComas 2011), rather than a deliberative attempt at confronting current perspectives and attitudes. In contrast to this there are occasional examples of exhibition work in university spaces that raise contemporary cross-cultural issues (e.g. Janiszewski & Alexakis 2011).

New geopolitical formations with the emergence of BRICS (Brazil, Russia, India, China and South Africa) countries, especially China and India, will have significant consequences for Australian aspirations in the Asian Region (Brutsch & Papa 2013). In 2012 the Australian Federal Government White Paper, on *Australia in the Asian Century*[1], was released, and built on an earlier proposal under the Keating Government entitled *Australia in Asia and Asia in Australia* (Mendoza 2005). In this discussion, we are specifically interested in the role of cultural exchange as 'soft power' here – and hence this paper offered a positive point of interaction. Artists have the creative energy to open up new pathways that add critical value to the political or economic mileage of the government strategy. Since

1 Australia in the Asian Century paper was archived on the 20 September 2013, the content however can be accessed National Library of Australia's Trove web archive: http://pandora.nla.gov.au/pan/133850/20130914-0122/asiancentury.dpmc.gov.au/index.html.

the September 2013 election that ushered in a change of leadership, this particular white paper has been archived by the Abbott Government – this should not be viewed as movement away from a commitment to Asia but rather a process of rebranding the role to suit the agenda moving forward (Bryde & Sullivan 2013).

Below we discuss one Macquarie University exhibition that was a deliberate attempt at responding to the Asian Century White paper. It was entitled *China India Imaginings and Transformations*. It is worth noting that Chinese and Indian students comprise a significant demographic at Macquarie University within the student body and have been so for a number of years.

Macquarie University's China India Exhibition

The exhibition was developed by Art Gallery staff and was on show during November and December, 2012. Local and international artists contributed by exploring the theme of the growing economic and political power of the two nations in influencing and transforming artistic and cultural works. The exhibition explored the notion of tradition as a mechanism for artistic innovation over a generational time period. The artists explored the theme of transformation by re-mixing and re-working symbols, motifs and socio-political statements. While these two nations emerge and transform as superpowers of the new century, changes bring social and political unrest and the diaspora represents the imaginings of the future. The intersections of art, history and culture eclipse the stereotypes and politics of representation. The artists Pablo Bartholomew, Kate Benyon, ShobhaBroota, Dongwang Fan, Li Li, DL Reddy, Xu Wang and Guan Wei contributed to the exhibition.

One of the artists Xu Wang, in creating the work exhibited interviewed over 70 now elderly survivors of the movement of suppression from the late 1950s in China (Wang 2012). In creating this powerful and emotive work of art he not only paid homage to the silenced, but also, using the university gallery space provided a secure location to seed new ways of engaging with the complexity of experiences and histories from other perspectives, times and places. Xu Wang's work also included video of many of the interviews that showcased previously unheard perspectives. Listening to the tortured stories of people who for so long had been silenced was confronting – while we knew the western interpretation of it, this was far removed from the raw original experiences.

For the university community, the exhibition represented a way of developing deeper understanding of an emerging and significant demographic. The curatorial brief elided the creation of an understanding and acceptance of different ways of knowing or seeing – making the unfamiliar familiar. In other words, the exhibition was a proactive and experimental cross-cultural exploration of identity. The curators' stated aim for *Imaginings and Transformations* was to explore the notion of tradition as a mechanism for artistic innovation over a generational time period.

For example, the fusion of traditional Chinese iconography with Western pop culture stylistic elements, so noticeable in the earlier works of Fan Dongwang have evolved, reflecting the continuity of change that is inherent within all extant cultures. There is subtleness in his latest work *Dragon in Water – mesmerizing viewers* to experience the depths of the Dragon's metamorphosis – phasing in and out of this water realm. The re-emergence and re-positioning of Fan's Dragon, sees it no longer as a representation of the emperor's unchallenged power and authority as it once was historically, but as indicative of the vitality of a modern Chinese cultural identity– an aspect which is captured in these transitionary works (Hammond 2012).

Globalisation has increased our connectivity, and with that comes the responsibility to engage, to ask questions, to learn and to fundamentally change ourselves, driving us forward into complex new cross cultural ecologies.

There are billions of people on the planet with an incredible diversity of culture, language, world views and heritage. We don't just need to preserve this diversity; we must ask questions of it, we must live it and celebrate it. Without doing this we will be condemned to a fairly bleak and miserable future. And this sort of inquiring, experimental, cross-cultural dialogue is best explored in the physical spaces of university art galleries. But in the neoliberal world of higher education these days, too many universities cover the walls of their gallery spaces with corporate wallpaper in an attempt to affect a delusional grand narrative about the power and significance of the institution and leverage funds from the pockets of potential benefactors.

This exhibition made the curators feel empowered and united by the excitement of the experiment of attempting to alter the thinking of the audience. While this is not unusual, there was a distinct feeling that the exhibition was pushing new boundaries for a university art gallery.

Concluding questions

Our experiences with this project raise a number of research questions worthy of further exploration:

How many university galleries have cross-cultural engagement as part of their core mission? Is this something that can be attributed to the deliberative influence of the university, or has it emerged independently? Is it a reflection of student and staff demographics on campus or more reflective of general societal cross-cultural issues?

There are probably many similar international examples of cross-cultural engagement through university museums and gallery spaces that can be identified, but to our knowledge no one has undertaken such a compilation as yet. It would be interesting to test whether the quantity of cross-cultural exhibition programing has increased in recent years in response to the increased competition between universities. Higher education exhibition spaces provide a specific institutional value proposition for their universities, but it is not one that is necessarily articulated in institutional policy documents. If university exhibition spaces are being increasingly used in this way, what are the implications for university based practitioners in terms of exhibition development and will this restrict the use of the space in other ways?

We contend that given the broad policy settings, university museum and gallery spaces can go beyond the traditional soft diplomacy role of major (non-university) cultural institutions and have specific roles to play in terms of experimentation, education, curatorial training and audience development.

We are interested in collaborating in exploring these questions with UMAC colleagues.

Literature cited

Brice, S. & H. Sullivan 2013. Abbott government may have new rhetoric, but it's still the 'Asian Century'. *The Conversation*, 8/11/2013. http://theconversation.com/abbott-government-may-have-new-rhetoric-but-its-still-the-asian-century-19769 (accessed November 11, 2013).

Brutsch, C. & M. Papa 2013. Deconstructing the BRICS: Bargaining coalition, imagined community or geopolitical fad? *Chinese Journal of International Politics* 6, 3: 299-327. http://connection.ebscohost.com/c/articles/89734744/deconstructing-brics-bargaining-coalition-imagined-community-geopolitical-fad (accessed November 11, 2013).

Casey, D. 2001. Museums as agents for social and political change. *Curator* 44, 3: 230-237.

Curtis, N.G.W. 2012. Public engagement, research and teaching: The shared aims of the University of Aberdeen. In *A handbook for academic museums: Beyond exhibitions and education*, eds. S. Jandl & M. Gold (MuseumsEtc), 62-86.

Duke, C. 2003. Changing identity in an ambiguous environment: A work in progress. *Higher Education Management and Policy* 15, 3: 51-67.

Garlick, S. & A. Langworthy 2008. Benchmarking University Community engagement: Developing a national approach in Australia. *Higher Education Management and Policy* 20, 2: 153-164.

Hammond, G. 2012. 'Re-Imagining the Dragon'. In: *China India: Imaginings and transformations*, eds. R. Davis, G. Hammond & L. Janiszewski (Macquarie University, North Ryde), 25.

Hammond, G. & A. Simpson 2015. Soft power working spaces and First Nation Voices, Museums and the power of attraction. In *China and the world. Theatres of soft power*, eds. N. Chitty & Q. Luo (Beijing: Communication University of China), 257-269.

Hammond, G., K. Van Dyke & A. Simpson 2012. Adding value: Universities and their museums. *University Museums and Collections Journal* 5: 7-16.

Janiszewski, L. & E. Alexakis 2011. A touch of Spice: Indian Australia. In *Place, space and identity: New directions for museums in NSW*, eds. P. Bentley, R. Pinchin & A. Simpson (Museums Australia, NSW Branch), 8.

McComas, J. 2011. Introducing German expressionism to the American heartland: The Indiana University Art Museum, 1941-1958. *Book of Abstracts, XI Annual Conference of the International Committee of ICOM for University Museums and Collections* (Lisbon: Museum of Science), 60.

Mendoza, O. 2005. Still engaged? Australia's relationship with Asia under Keating and Howard. *Cross-section* 1: 47-56. http://eview.anu.edu.au/cross-sections/vol1/pdf/ch06.pdf (Accessed on November 9, 2013).

Mills, N. 2012. The corporatisation of higher education. *Dissent Magazine*. www.dissentmagazine.org/article/the-corporatization-of-higher-education (accessed November 10, 2013).
Nye, J.S.Jr. 2004. *Soft Power: The means to success in world politics*. New York, N.Y.: Public Affairs.
PMC. 2012. Australia in the Asian Century, Department of the Prime Minister and Cabinet, Canberra, ACT. http://pandora.nla.gov.au/pan/133850/20130914-0122/asiancentury.dpmc.gov.au/index.html (accessed November 10, 2013).
Sandell, R. 2003. Social inclusion, the museum and the dynamics of sectoral change. *Museum and society* 1, 1: 45-62.
Sanderson, D. M. & J. J. Watters 2006. The corporatisation of higher education: A question of balance. In: *Proceedings Higher Education Research and Development Society of Australia Annual conference*, ed. S. Debowski (Perth, Western Australia: Higher Education Research and Development Society of Australia), 316-323. http://eprints.qut.edu.au/4772/1/4772.pdf (accessed November 1, 2013).
Sayers, A. 2012. Museums and their place in the world (speech, Lowy Institute, March 5 2012). www.lowyinstitute.org/publications/wednesday-lunch-lowy-museums-and-their-place-world-andrew-sayers-presentation (accessed August 12, 2012).
Simpson, A. 2012. Drifting to Asia. In *China India: Imaginings and transformations*, eds. R. Davis, G. Hammond & L. Janiszewski (Sidney: Macquarie University, North Ryde), 2-3.
Simpson, A. 2012. Modelling governance structures for university museums and collections. In *A Handbook for Academic Museums: Beyond exhibitions and education*, eds. S. Jandl & M. Gold (MuseumsEtc), 178-218.
Stanbury, P. 2003. Adding value to university collections. *Museologia* 3: 1-4.
Wang, X. 2012. Breaking the silence: Xu Wang. In *China India: Imaginings and Transformations*, eds. R. Davis, G. Hammond & L. Janiszewski (Macquarie University, North Ryde),42-45.

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Keywords
Soft power - Cross-cultural education - Museums

Digitisation, 3D printing and the future of museum space

Christopher G. Nelson

Abstract

3D printing, 3D scanning and virtual museums are all adopted tools of museology. They currently operate at a base level with little sharing of industry knowledge. For museums to combat the rising need to deaccession for space, minimize loss and become sustainable, these techniques need to work together under a single paradigm. Using metadata in virtual museums, along with a detailed 3D database, this technology could improve the current way objects are shared, displayed and deaccessioned.

Unsustainable space in museums

It is unrealistic to expect that, as time continues to pass, collection at its current rate can continue within museums unabated. Museums traditionally are by their very nature, conservative and thus, unsustainable in their current guise. While the role of museums since 1950 has been moving slowly away from collecting, much of the collection management paradigm has survived from that period. Within the structure of museum administration, this is operating much slower than is needed to adapt (Pearce 1995; Merriman 2008).

Within the last ten years far more has gone into museums, than has been taken out, and there is an increased push to collect "for the future" (Merriman 2008). However, with larger institutions this form of acquisition cannot be sustained. Nor can we ascribe value to an object that might be valuable in the future (Knell 2004). For the past few decades, methods have been approached to deal with impending "museum fullness". One solution, deaccession was considered ruthless or extreme until 2007, where it gained mainstream acceptance (though grudgingly) throughout the museum world (Merriman 2008). Though many within the industry regard the discarding of heritage with horror, the idea of deaccession is not as extreme as might be interpreted. Nationally and privately, there are deaccession strategies or policies that limit the need for such activity to occur too frivolously (Scholten 2001; Wilkink 200; Betts 2004; Merriman 2008; Whiting-Looze 2010). These deaccession policies go through a criteria of assessment where they are considered for continued storage, put on display or different levels of redistribution, the lowest level of which is deaccession (disposal).

Many of these options offer redistribution to schools or give out specimens in long term loans before ultimate disposal is a choice. Other institutions have experimented with auctions for museum material as financial benefits are clear for the institution. Online auctions have been experimented with recently, though in public or national institutions where the object originally was held in trust by the museum, this kind of action has been regarded as ethically dubious (Robertson 1990; Doylen 2001; Davies 2005).

Even if deaccessioning is approached carefully however, there are issues with taking too careful an approach and removing nothing from storage. A case in Canada at the Glenbow Museum, after a deaccession of 3000 objects indicated that whilst the action removed a great number of specimens, the total number relative to the entire collection was only 0.13%. In terms of making space, there is just too little currently being made by using deaccessioning alone (Ainslie 2004).

Offsite storage is another solution that museums are attempting to increase capacity (Agee & Naper 2006). This is however, only creating more finite space to fill up. If a museum continues to collect forever, then it must logically increase its construction forever. There is no financial feasibility in unlimited construction of an archival facility. Physical storage offsite is not a whovian construct. It is still unsustainable.

For many small museums, especially University museums, this collection management problem is damaging. The Macquarie University Museum of Biological Sciences is exhibiting such a stagnation. It has ceased collecting to manage its storage space, but as the museum is no longer collecting the perceived view by administration is that the museum is not operational and ineffectual, leading to a lack of support by the University Administration. Despite this, the collections have taken on other roles within the biology department, as educational tools. Cabinets are set up by independent staff, using the material from the collection.

While the danger is that in the absence of a dedicated conservator, these objects will degrade significantly, the collection has in a sense been taken out of the original curators hands and the role it originally had is continuing. The objects have gained value, and while the museum is failing as a structure the collection is well known.

The collection is being given meaning where it had been given no value by the administration. This coincides with what Merriman (2008) and Hooper-Greenhill (2001) refer to as the changing museum paradigm. There is a great need to ascribe value to a collection, and not just a value system that is financially translatable. Such values can then be weighed before further action can be taken to maximise space through deaccession.

It should be mentioned now however, that while deaccession may be inevitable for some specimens, maximising space does not necessarily mean a conservator cannot minimize loss through the applications of digital storage and scanning.

Independent information

Hooper-Greenhill (2001) talks about the European mentality of associating physical ownership with knowledge. However Since 1996, such knowledge has been accessible to the public, with the development of the internet. The explosion of digital culture within society, especially when associated with media downloading seems to argue a move away from such ideology and towards the idea of information being intangible and independent of physical objects. The development of the user generated content of Web 2.0 may have boosted the influx of information, but more recently, the means to sort through such data has driven web development (Greaves & Mika 2008). Such indicators of context are referred to as a metadatum. Metadata allows contextual searching based on independent parameters, allowing rapid searching for relevant information (Patel et al. 2005). It is this that indicates that while objects can be used to represent various concepts, information is ultimately independent and waiting to be expressed. The free nature of information is best observed in the interaction of social media and data piracy, where remarkable, curatorial processes are mirrored in the actions of data pirates; in storage, deaccession, restoration and collaboration (Trant 2006; Liebowitz 2012; De Kosnik 2012).

In this way, it is easy to observe an object (media file), observe selection criteria (the number of seeds, highest quality/file size ratio) and finally observe archival and exhibition. Where once it was argued that data pirates and many of the web users were hungry to express themselves online, it is becoming increasingly clear that users are actually hungry for independent information, but are selective based on quality (De Kosnik 2012).

Information has (because of the unsustainable nature of museum collections) become threatened because of its need for representation in the physical world which still dominates the museum industry.

Because of the way information now operates, it can stick to locations or objects, but because of the relationship of the modern museum to its object being physical entities and not representations of information, information very rarely gets a chance to attach to these objects. So this reduces the number of opportunities for information to be updated or represented in new ways. It thus relies upon curators to look through a collection of potential millions to find updates for the information available, a process that is slow, research intensive and impractical.

Development of virtual platforms

The need to communicate in more sophisticated ways has both facilitated and resulted from technological developments (Clark 2006). Digital text has been used for many decades and after binary and other complex computer code, was the first interface language that connects us with the digital world. Similarly the conversion of text through scanning into the digital realm has been the initial step towards digitizing existing information. OCR software has enabled rapid indexing of documents through long term scanning projects, setting a precedent for digitizing future documents and future collections.

The use of digital photography, while originally limited by storage space has since followed a similar series of developments as resolution and storage space have expanded, as well as technology to incorporate non-digital images into the digital world. The past twenty years has seen these forms of digitization grow. However there has been an erratic, broken interest in the incorporation of 3 Dimensional images and models into the digital world. The amount of post-capture processing is orders of magnitude greater than that required for text recognition. Digital archivists also struggle with digitizing large numbers of often unique objects and there is currently no standard methodology to follow regarding the scanning of object typologies to maximize scanning efficiency. Previous digitization efforts have been hindered, like digital photography before it, by the lack of support from storage hardware and camera resolution. Supporting technology has now caught up, and following the existing trend of data storage there will be exponentially growing space available for objects to come (Moore 1998; Eldering 1999). The work done today will facilitate and simplify workflows for digital archivists and future-proofing museums, creating virtual platforms for collections to extend past the walls of museums or galleries.

The earliest virtual museums and exhibitions were established between 1994 and 1996, either by existing institutions or collaborative efforts by new organizations taking advantage of the digital platform that the World Wide Web presented (Jarvis & Goldberg 2013).

The concept of virtuality has challenged many of the traditional philosophies of conservation in terms of object display and in regard to what the object actually represents. The main issue being that the digital representation is not the "real thing", and that a real museum provides not just the image or object, but a proximity to heritage (Tsichritzis & Gibbs 1991).

While physical specimens are still regarded as actual heritage, they are treated and used in a way where they represent far more than what they pertain to be. This form of representational object use as a means of teaching concepts is being generally accepted by modern museums using this philosophy. We could argue that a virtual museum operates no differently, moving away from the idea of heritage for heritage's sake, towards representation of history through objects and the representation of objects.

In their development, virtual museums have a great deal of variation, as many of them were established at a time when web access was far more limited and services we take for granted now had not yet been conceived of. The multigenerational attitude we possess in the western world over Internet use (whereby different demographics and generations use the internet in ever increasing complexity) is mirrored to some degree by the institutions and museums in the way that online information is presented. While some have adapted to incorporate newer elements of multi and social media into their online presence, others see the benefit, but lack much of the online presence of their fellow institutions. The objects on display in such virtual museums are commonly photographic in nature.

The term "virtual" has connotations of virtual reality: A fully immersive "walkthrough" of exhibits (Tsichritzis & Gibbs 1991; Walczak et al. 2006; Carrozzino 2010). These exhibits have differing degrees of limitations with regards to navigation depending on the complexity of the architecture of the virtual world. These have previously been constructed using 360° photography taken within an exhibition hall. While this form of virtual museum does immerse the individual within itself, the virtual museum is unable to provide access to greater detail to the objects and the information they represent.

This led to the development of a virtual augmented reality. Information is able to be viewed on screens through which the individual navigates through a virtual world. Objects and their data now are available just by selecting objects visible within the environment. Virtual museums using augmented virtual reality not only require a large record of objects, but dual architecture that supports the virtual location of that object in virtual space (Wojciechowski et al. 2004; Schweibenz 2004). Efforts have also been made to develop virtual museum experiences for gaming consoles and computer platforms, because much of the architecture to house information and object properties within the software are already present (Lepouras 2005).

Another type of virtual museum involves an artificial graphic user interface; one that does not mirror the real world, and similar to current web design (Tsichritzis & Gibbs 1991; Walczak et al. 2006; Carrozzino 2010). In many terms it is just another website. It is not virtual because of its association with virtual reality, but the virtual nature of the information being presented alone. These forms are easier to develop as they can be run on web platforms with relatively basic architecture. It also provides a better platform for alternative media as well as being able to virtually display more traditional forms. However, when observing objects individually on pages, interaction that is conveyed through object placement and clever curation in the real world is often lost.

There are no distinct advantages between the two. They both have drawbacks and benefits to their use. There is also the issue that while physical museums have protocols for how to display within physical space, little has been done with regards to standardising digital information in a virtual museum.

The Google Cultural Institute™ is one example where these two virtual forms of museums (both virtual walkthrough and website) are used as platforms for existing collections worldwide. The initiative is promoting the use of virtual museums and providing a base for the rest of a museum's collections to grow upon.

Projects such as Google Art Project™ and the Australian Museum's Virtual Museum of the Pacific™ also employ metadata to consolidate their collections. This form of archiving not only allows for regular database storage, but an interaction between objects based on common form, location, usage, colour etc. It is useful when comparing objects across cultures and species, but also a powerful tool for users to generate their own interpretations of the collection in order to create their own exhibi-

tion. This adds to the concept of "the post museum", a term coined by Hooper-Greenhill (2000) to indicate that heritage is created by society and is not contained within an object (Merriman 2008).

While initial storage of text and photography were digitized for space and convenience as well as the more sophisticated indexing algorithms available, the general acceptance and mainstream nature of modern digital media has come through media use within the internet and especially within social networking, advertising and distance education. For this reason, there is already an expectation by Internet users that what they will find online is not entirely genuine, but a representation of a concept of the original object, removing the need to physically observe at a single location. Still, institutions insist upon putting an emphasis on their physical collections despite the demand for information digitally. These museums then are physical institutions attempting to interact with new generations of visitors that operate in a post physicalist manner.

3D imaging

The digitization of text and images has been in effect for decades in order to expand the boundaries of libraries. The most recent step that some museums are appearing to take is the adoption of 3D scanning of objects within their collections, for use in exhibitions and online educational programs. The issue of objects within museums however has been problematic in that often they are still treated in the traditional sense of a museum object with dense historical value.

The idea of a heritage object is not incorrect, but because of the dependency of the physical object and the precedence it takes over information that it could represent, there is a great deal of initial hesitation to create an intangible copy of such an object and expect the public to react in the same way to it (Tsichritzis & Gibbs 1991). This might explain the mixed interest in 3d imaging across the museum world, the diversity of standards present and the policies that enable or limit the ability for them to be shared. Though, as discussed previously, the public already acknowledges the limitations of a digital copy and still embraces it (De Kosnik 2013; Patel et al. 2005).

The 3D imaging process involves the use of a scanner (be it triangulating or Xray scanning etc.) to construct a point cloud identifying inside and outside surfaces using points known as "normals" (Bernardini & Rushmeier 2002). There are a number of different devices for imaging:

XRay CT creates cross sectional 3D images at a high resolution (Gregory 2001).
Triangulation scanning employs a rig of cameras and projectors to generate structured light reflections. These work at a lower resolution and are only surface scanners but are cheaper to run (Celani et al. 2009; Rusinkiewicz 2002).
Laser and Doppler Scanners operate using the latter machine's namesake. They can be used to scan at low resolution for surfaces and large areas such as rooms or monuments, or smaller objects using a more flexible hand held scanner (Wulf & Wagner 2003; Allard 2005)).
MRI provides a high resolution image of a cross section of an object. However, MRI is often limited to biological material and cannot be used on metallic objects (Clark et al. 2004).

In CT, scanning can be fairly quick, taking a complete scan in a matter of minutes of all the angles inside and out without surface texture. Separate elements are able to be identified, isolated and removed to extract textured detail underneath. This has been particularly useful in archaeology where non-destructive methods of de-layering objects is preferable. A recent study has shown that a Cone Beam Computer Tomographer can digitally unwrap ancient Cuneiform Tablets at a resolution of approximately 20nm. An incredibly high accuracy. DECT (Dual Energy Computer Tomography) can also be employed not only for observing the internal structures of objects, but to non-invasively identify molecular composition through spectrography (McKenzie-Clark & Magnussen 2013)

Current developments in tomographic scans have also led to its use in the palaeontological field (Penney et al. 2007; Helmle et al. 2000; Schwarz et al. 2005). Its application in palaeontology has allowed samples to remain in situ while copies that can be manipulated digitally are observed on a computer. Where CT scans aren't necessary, 3D scanning can be used to feed this physical data into a CAD program (Niven 2009). In this digital space the objects can be made larger, or smaller to allow for easier anatomical comparison or description. Missing components can also be guessed at and created to assemble a full representation of a skeletal element or full skeleton (Kuzminsky 2012; Ryan et al. 2008). The work into the resolution of digital scanning technology has allowed for incredibly detailed images of very small objects (Otten et al. 2012).

Outside the field of conservation, there have been significant developments in scanning techniques. The development of X-ray tomography and digital imaging software that has occurred in the last two decades in conjunction with advances in the field of additive manufacturing (3D Printing) have been able to create high quality, high detail medical prostheses. The subject is scanned, the information is translated into data that can then be used to create digital design files that generate custom fit prosthetics, cranial and facial plates, joints and vertebra based on the skeletal element are to be replacing (Eufinger et al. 1995).

Constructing using a triangulation 3D scanner relies on visible light, both ambient and structured. Depending on the type of scanner used, the machine often requires calibration per object and per camera perspective. For more complex images, a degree of processing is required to unify separate scanning angles which the computer knits together. The quality of the scan in this case is reliant on calibration, scanning equipment acquired (a CCD camera, SLR texture camera and a projector) but also the angles required for scanning particular objects (Celani et al. 2009).

One element that may be suppressing its popularity is that the methods for scanning such objects have never been standardised with any success. Meaning that the skill of 3D scanning is taught and known informally, including methods for specific objects and that every institution starts at square one. The digitisation of objects already allows for high speed data transfer of 3D models though, to share in research and promote closer collaboration between institutions. As long as this ability to share data is maintained, collaboration may be extended to include the digital casting of these objects along with the cumulative knowledge of scanning techniques left undocumented.

3D printing

Additive manufacturing, despite falling under the umbrella of "3D printing" is a highly diverse series of methods that incorporate different materials and levels of detail into the objects that are manufactured. Modern "Desktop 3D Printers" available for domestic use, use FDM or Fused Deposit Modelling as a means of generating complex objects (Crump 1996; RPWorld 2011). The process involves feeding a thermal plastic through a robotic, heated print-head and deposited onto a plate that lowers itself to allow for multiple layers to be deposited. FDM is useful in that it can produce wholly enclosed mechanisms and their moving parts within. It can also construct around voids allowing an object to be significantly lighter and require far less material. Granular Materials Binding (GMB) is a more commercial form that uses laser, binding material or heat to fuse or bind particles together. This method cannot form completely enclosed voids but deposits layer upon layer of unconsolidated material that is then fused onto the object. This provides support for the object as it is constructed and means that there is far less post production work.

Two derivatives of SLS are Metal Laser Sintering and Sediment GMB. MLS allows for the production of metal objects in much the same way as SLS by using metal granules of steel, iron, titanium or aluminum (Hiemenz 2007). The material used is highly recyclable and again, the material cost can be reduced by hollowing out the cross section of the object if need be. Sediment GMB involves a glue inkjet instead of heat or a laser, and deposits powdered concrete, metal or quartz granules and a binding agent (organically based or synthetic) to develop large-scale mock-sandstone metallic or concrete structures that are recyclable and supported by a bed of unconsolidated granules (Klein et al. 2012; Utela 2008; McGurk et al. 1997; Bak 2003). The largest of these structures have been produced by the company D-shape, that constructs large sandstone sculptures in great detail up to three stories high and four metres wide in their own custom built GMB machine (Peels, 2009). These, once dried are completely weather proof and can be situated outside without concern for short term erosion or rusting.

Grains placed for 3DP can be wet or dry, with specific sizing reliant on physical properties, sphericity, chemical makeup and grain size to determine effects of mass grain aggregation (Utela 2008). These are all significant for producing options in a material that suits the context of the object. All these processes improve in speed of construction, cost of construction, materials used and weathering of objects allowing for an easier means of caring for the specimens on display over objects reproduced is resin or plaster.

Future museum spaces

To solve the shrinking museum space we are currently found with, we must turn to those developing technologies to create a new model for archival systems with a marriage of techniques to continue to conserve, educate and to share for research purposes.

The primary heart of this new model is how we regard the information that our collection represents. If we regard the physical objects as more valuable, it makes sense to employ the current model where digital representations with truncated images and limited access appear online. However, the way that individuals are using the digital world seem to be indicating that regardless of physicality, what is most important is the information that an object represents (Trant 2006; Liebowitz 2012; De Kosnik 2012). In order for museums to be considered a part of the digital world and appeal as sources of education, there must be full digital representation of the museum collection accessible online that can interface with the growing data relevant to the physical objects or the digital model as well as metadata to collate specimens (Chavan & Krishnan 2003; Patel 2005).

This digital representation could be constructed using photographic material that already exists for artwork and texts. More 3 dimensional objects 3D scans could be used to construct an archive of models, mirroring the archive of objects present within a collection, and simultaneously sharing the content between the physical and digital (Chavan & Krishnan 2003; Betts et al. 2011; Celani et al. 2009).

The presence of a detailed digital 3D model can then facilitate the production of object facsimiles for physical display through 3D printing. Using this technology the original object can be relieved of its duties on the exhibition floor to be restored or stored in a more hospitable environment or researched, while visitors or online viewers will be able to view an accurate copy (Kuzminsky 2012; Allard et al. 2011 Bimber et al. 2002). This will permit visitors to handle what would otherwise be a priceless object to observe how it works, or observing scale.

In larger natural history exhibitions, 3D printing could be used to produce high detail skeletal exhibits, rather than employing plaster casting. The material used can be chosen for indoor and outdoor use, custom designed for location and articulated to correct anatomical errors that are often costly and difficult to alter in a preexisting skeleton. Even body position could be modified to appear more animated. In this way, the object would interact with the exhibition in the same way visitors do. Printing can be performed onsite, or by dedicated companies, or in the home. If a digital archive exists and general access is permitted, a visitor or a licensed member could download and print full scale or smaller, versions of objects for educational programs or international exhibitions, where the transport of large items might be more expensive than creating a facsimile (Klein et al. 2012; Utela 2008; McGurk et al. 1997; Bak 2003). The turnover of objects printed this way in an exhibition could be increased due to the highly recyclable material used for 3D printing.

3D printing, scanning, the digital storage and digital preference provides a sustainable and dynamic system for future museums, as space requires efficient storage of physical specimens. As space within museums becomes a premium and deaccession is perhaps more frequent, this method of digitising specimens and objects will prove valuable in terms of minimising the loss whilst keeping physical space available for display. Due to the nature of digital storage, the total area taken up by 3D scans would remain relatively small as an average scan of a hand sized object can be approximately 5GB, 200 of which can fit on a single large hard drive, the size of a small book. Not only will these digital copies be stored digitally but displayed digitally, allowing every online user the opportunity of having an exhibition of their own on their desktop or tablet computer.

Conclusion

Whilst many elements of the new model are present in museums, they are dominated by a physicalist bias and therefore remain a sideshow to actual curatorial practice. Once the paradigm is changed however, and we recognize that we live in a time where the digital world takes precedence, these elements will take part in making museums a space sustaining industry.

Literature cited

Agee, J., & S. Naper 2007. Off-site storage: An analysis. *Collection building* 26, 1: 20-25.

Ainslie, P. 2004. Deaccessioning as a collections management tool. In *Museums and the future of collecting*, ed. S. Knell (Aldershot, UK: Ashgate), 235–241.

Allard, T.T., M. Sitchon, R. Sawatzky & R.D. Hoppa 2005. Use of hand-held laser scanning and 3D printing for creation of a museum exhibit. In: Proceedings of the *6th International Symposium on Virtual Reality, Archaeology and Cultural Heritage: Short and project papers*, eds. M. Mudge, N. Ryan & R. Scopigno (Pisa: ISTI-CNR), 97-101.

Bak, D. 2003. Rapid prototyping or rapid production? 3D printing processes move industry towards the latter. *Assembly Automation* 23, 4: 340-345.

Bernardini, F. & H. Rushmeier 2002. The 3D model acquisition pipeline. In *Computer Graphics Forum* 21, 2: 149-172.

Betts, M., H. Maschner, C. Schou, R. Schlader, J. Holmes, N. Clement & M. Smuin 2011. Virtual zooarchaeology: Building a web based reference collection of northern vertebrates for archaeofaunal research and education. *Journal of Archaeological Science* 38: 755-762.

Bimber, O., S. Gatesy, L. Witmer, R. Raskar & L.M. Encarnação 2002. Merging fossil specimens with computer-generated information. *IEEE Computer* 35, 9: 45-50.

Bradshaw, S., A. Bowyer & P. Haufe 2010. The intellectual property implications of low-cost 3D printing. *ScriptEd* 7, 1: 5-31.

Carrozzino, M. & M. Bergamasco 2010. Beyond virtual museums: Experiencing immersive virtual reality in real museums. *Journal of Cultural Heritage*: 453-458.

Celani, G., L. Cancherini, A. Jardini, M. Oliveira, J.V. Lopes da Silva & V. Piccoli 2009. 3D digitization of museum sculptures for model-making purposes: difficulties and possible solutions. *Anais do VRAP*.

Chavan, V. & S. Krishnan 2003. Natural history collections: A call for national information infrastructure. *Current Science-Bangalore* 84, 1: 34-42.

Chou, D., D. Wells, D. Hong, B. Lee, H. Kuhn & P. Kumta 2013. Novel processing of iron-manganese alloy-based biomaterials by inkjet 3-D printing. *Acta Biomaterialia* 9, 10: 8518-8533.

Clark N.D.L., C. Adams, T. Lawton, A.R.I. Cruickshank & K. Woods 2004. The Elgin marvel: Using magnetic resonance imaging to look at a mouldic fossil from the Permian of Elgin, Scotland, UK. *Magnetic Resonance Imaging* 22: 269-273.

Crump, S.S., J.W. Comb, W.R. Priedeman Jr & R.L. Zinniel 1996. *U.S. Patent No.*. 5,503,785. Washington, DC: U.S. Patent and Trademark Office.

Davies, M. 2005. Doing the hokey cokey: Fifty years of disposals from UK museums. Paper presented on June, 27th, at the "Surplus to requirements: A practical guide to disposal" seminar, Museums Association, London.

Deckard, C.R. 1989. *U.S. Patent No. 4,863,538*. Washington, DC: U.S. Patent and Trademark Office.

De Kosnik, A.T. 2012. Piracy cultures. The collector is the pirate. *International Journal of Communication* 6, 19: 529-541.

De Rijke, M. 2001. The Museum Inventory Project. In *Development in Dutch Museum Policy*, ed. F. Kuyvenhoven (Amsterdam, The Netherlands: Institute Collectie Nederland), 29-33.

Doylen, M. 2001. Experiments in deaccessioning: Archives and on-line auctions. *American Archivist* 64, 2: 350-362.

Eldering, C.A., M.L. Sylla & J.A. Eisenach 1999. Is there a Moore's law for bandwidth? *Communications Magazine* 37, 10: 117-121.

Eufinger, H., M. Wehmöller, E. Machtens, L. Heuser, A. Harders & D. Kruse 1995. Reconstruction of craniofacial bone defects with individual alloplastic implants based on CAD/CAM-manipulated CT-data. *Journal of Cranio-maxillofacial Surgery* 23, 3:175-181.

Greaves, M. & P. Mika 2008. *Semantic Web and Web 2.0.* Web Semantics Sci Serv Agents World Wide Web. doi:10.1016/j.websem.2007.12.002.

Michael, G. 2001. X-ray computed tomography. *Physics Education* 36, 6:442-451.

Helmle, K., R.E. Dodge & R.A. Ketcham 2000. Skeletal architecture and density banding in Diploria strigosa by X-ray computed tomography. In: *Proceedings 9th International Coral Reef Symposium, Bali, Indonesia, 23-27 October* 1: 365-371.

Hiemenz, J. 2007. Rapid prototypes move to metal components. Design Article from EE Times. www.eetimes.com/design/industrial-control/4013703/Rapid-prototypes-move-to-metal-components (accessed November 3, 2013).

Hooper, R. 2013. Printing out history. *New Scientist* 217, 2899: 17.

Hooper-Greenhill, E. 2000. *Museums and the interpretation of visual culture*. London: Routledge.

Jarvis, G. 2013. Virtual Museum of Contemporary Art. http://moca.virtual.museum/about.htm (accessed September 21, 2013).

Jones, N. 2012. Science in three dimensions: The print revolution. *Nature* 487, 7405: 22.

Kuzminsky, S.C. & M.S. Gardiner 2012. Three dimensional laser scanning: Potential uses for museum

conservation and scientific research. *Journal of Archaeological Science* 38: 2744-2751.
Klein, S., S. Simske, C. Parraman, P. Walters, D. Huson & S. Hoskins 2012. *3D Printing of Transparent Glass*. HP Laboratories.
Knell, S. (ed.) 2004. *Museums and the future of collecting*. Aldershot, UK: Ashgate.
Liebowitz, S. 2012. Policing pirates in the networked age. *Policy Analysis* 438: 1-28.
Lepouras, G. & C. Vassilakis 2005. Virtual museums for all: Employing game technology for edutainment. *Virtual Reality* 8: 96-106.
McKenzie-Clark, J., & J. Magnussen 2013. Dual energy computed tomography for the non-destructive analysis of ancient ceramics. *Archaeometry* 56, 4: 573-590.
Marchelli, G., R. Prabhakar, D. Storti & M. Ganter 2011. The guide to glass 3D printing: developments, methods, diagnostics, and results. *Rapid Prototyping Journal* 17, 3: 187-194.
Michaels, S., E.M. Sachs & M.J. Cima 1993. Metal parts generation by three dimensional printing. In *Proceedings of the Fourth International Conference on Rapid Prototyping*: 25-42.
Milosavljevic, M., R. Dale, S.J. Green, C. Paris & S. Williams 1998. Virtual museums on the information superhighway: Prospects and potholes. In: *User Modeling 2003. Proceedings of CIDOC*, eds. P. Brusilovsky, A. Corbett & F. de Rosis (New York: Springer), 98.
Moore, G. 1998. Cramming more components onto integrated circuits. *Proceedings of the IEEE* 86, 1: 82-85.
Niven, L., T.E. Steele, H. Finke, T. Gernat & J.J. Hublin 2009. Virtual skeletons: Using a structured light scanner to create a 3D faunal comparative collection. *Journal of Archaeological Science* 36, 9: 2018-2023.
Otten, W., R. Pajor, S. Schmidt, P.C. Baveye, R. Hague & R.E. Falconer 2012. Combining X-ray CT and 3D printing technology to produce microcosms with replicable, complex pore geometries. *Soil Biology and Biochemistry* 51: 1-134.
Patel, M., M. White, N. Mourkoussis, K. Walczak, R. Wojciechowski & J. Chmielewski 2005. Metadata requirements for digital museum environments. *International Journal on Digital Libraries* 5, 3: 179-192.
Pearce, S. 1992. *Museums, objects and collections: A cultural study*. Washington DC: Smithsonian Institution Press.
Peels, J. 2009. D-shape tech prints buildings. www.fabbaloo.com (accessed November 5, 2013).
Robertson, I. 1990. Infamous de-accessions. *Museums Journal* 90, 3: 32-34.
Rusinkiewicz, S., O. Hall-Holt & M. Levoy 2002. Real-time 3D model acquisition. *ACM Transactions on Graphics (TOG)* 21, 3: 438-446.
Ryan, T.M., D.A. Burney, L.R. Godfrey, U.B. Göhlich, W.L. Jungers, N. Vasey & G.W. Weber 2008. A reconstruction of the Vienna skull of Hadropithecus stenognathus. *Proceedings of the National Academy of Sciences* 105, 31: 10699-10702.
Scholten, S. 2001. The Delta Plan for the Preservation of the Cultural Heritage in the Netherlands. In *Developments in Dutch Museum Policy*, ed. F. Kuyvenhoren (Amsterdam, The Netherlands: Instituut Collectie Nederland), 29-33.
Schwarz, D., P. Vontobel, E.H. Lehmann, C.A. Meyer & G. Bongartz 2005. Neutron tomography of internal structures of vertebrate remains: a comparison with X-ray computed tomography. *Palaeontologia Electronica* 8, 2: 30A.
Schweibenz, W. 2004. Virtual Museums. *ICOM News* 3: 3.
Trant, J. 2006. Exploring the potential for social tagging and folksonomy in art museums: proof of concept. *New Review of Hypermedia and Multimedia* 12, 1: 83-105.
Tsichritzis, D. & S. Gibbs 1991. Virtual museums and virtual realities. In *International Conference on Hypermedia & Interactivity in Museums*, ed. D. Bearman. www.archimuse.com/publishing/ichim_91.html (accessed November 2, 2013).
Utela, B., D. Storti, R. anderson & M. Ganter 2008. A review of process development steps for new material systems in three dimensional printing (3DP). *Journal of Manufacturing Processes* 10: 96-104.
Walczak, K., W. Cellary & M. White 2006. Virtual museum exhibitions. *Computer* 39, 3: 93-95.
Weber, G.W. 2013. Another link between archaeology and anthropology: Virtual anthropology. *Digital Applications in Archaeology and Cultural Heritage* 1, 1: 3-11.
Whiting-Looze, B.M. 2010. Collections as communication: Deaccessioning policies and public trust. https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/10442/whitinglooze_capstone.pdf?sequence=1 (accessed November 2, 2013).
Willink, J. 2001. De-Accessioning only in public. In *Developments in Dutch Museum Policy*, ed. F. Kuyvenhoven (Amsterdam, The Netherlands: Instituut Collectie Nederland), 22-25.
Wojciechowski, R., K. Walczak, M. White & W. Cellary 2004. Building virtual and augmented reality museum exhibitions. In *Proceedings of the 9th International Conference on 3D Web technology*, ACM, 135-144.
Wulf, O. & B. Wagner 2003. Fast 3D scanning methods for laser measurement systems. In *Proceedings of the International conference on control systems and computer science (CSCS14), Bucharest, Romania, 2-5/07/2003* (Bucharest: Politehnica University).

Acknowledgements

Dr. Andrew Simpson of Macquarie University.
Dr. Jaye McKenzie-Clark & Prof. John Magnussen of Macquarie University provided opportunity to train using Mephisto scanning software, Triangulation Scanner and Dual Energy CT.

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Keywords
3D Printing - Museums - Sustainability

Nothing ever changes, really

Steph Scholten

Abstract

This paper argues that all university heritage is in essence intangible heritage. Its meaning changes with the change in the institutional, educational and scientific contexts in which university museums operate. The selection processes for objects and stories and their associated stories should fit the changed educational and scientific realities in which collections are created and kept.

Introduction

This paper bears the title '*Nothing ever changes, really*', in response to the theme of the ICOM-UMAC conference in Rio de Janeiro, *'Evaluating change'*. The title is taken from an advertisement the author seems to remember from younger years. It may have been for Jameson whiskey, but that is not certain and the internet does not provide an answer. The point though, whether true or a figment of the imagination of the author, is relevant: the whiskey producer aims to express that despite of all the changes in the world, his product and its quality remain unchanged over time.
And that is the first point of importance in this paper. At a certain level of abstraction, what universities do and what university museums do, doesn't really change. What changes is how it is done as well as the context in which universities and museums operate. That of course can be of tremendous influence, but let's start with a closer look at this first statement.

A university is an institute of higher learning and research. It has been that from its origins and it still is. Of course universities as institutions have grown in numbers and in size. They have proliferated all over the world, have specialized and founded many new (sub)disciplines. They have developed new methodologies and instruments and they have, in many places, become accessible for students of all backgrounds. But basically they are the same institutes for scientific education and research.
The same goes for museums and collections: less or more random, individual and groups of objects are being selected to be preserved, documented, researched, and presented. That's what museums do. Museums also have changed their methodologies, have specialized, proliferated as well, but museums also do basically the same what their predecessors have done in the past 2.5 centuries or so and many collectors before them.

Creating heritage: Adding meaning

At this point in this paper, a few hundred words will be used to sketch the philosophical background for the position that is presented on the role and function of cultural heritage. This position is based on the work of a number of authors on science studies and heritage studies, most notably Bruno Latour (1999) and Laurajane Smith (2011). One of the key points of both authors is that both science and heritage create meaning. Science gives meaning to the human existence by creating coherence in and thereby understanding of the many phenomena man can observe physically or with instruments in and around the world, close by and far away. What science and scientists tells us is not necessarily true or real, as it is philosophically very difficult to establish if truth and reality as it is commonly understood really exists, but at best they can point out probable relations between phenomena.

The museum and heritage industries are also preoccupied with the process of creating meaning. Smith goes as far as saying that "all heritage is intangible", by which she expresses that the meaning of objects, collections, buildings or sites, is not inherent in them, but is created in the process of human interaction with them. Objects, and in this paper that word is used from now on in the widest possible meaning encompassing all heritage categories, carry in themselves only formal characteristics, such as size, color, location etc. It is people, (heritage) professionals as well as private individuals that add or associate stories with them, e.g. who lived in this place, how was this object used, what discoveries were made with it, etc., but also that we find some objects special or important, 'better' than other objects.

In choosing which objects we label as relevant and what stories should be associated with them, that is when heritage is created, that is the moment at which meaning is given to objects. In that sense Smith's statement that all heritage is intangible, has to be correct.

Creating heritage in context

What objects and stories are selected as relevant for museum collections, is strongly dependent on context. A simple example. If something is unique, it in general gets attributed a higher value than something that exists in manifold. An instrument that has been used by a scientist who is considered important gets more attention than the same instrument used by someone like this author. Heritage that directly links to the history of a specific university is considered more important in for that specific context than similar heritage from other institutions. But if the context changes, e.g. when faculties merge and different collections that were previously separate, not 'ours' but 'theirs', attribution of value changes. If science is discredited, e.g. because of plagiarism or when knowledge becomes obsolete, the value of the associated objects decreases, etc.

And what is true at the level of objects and collections, can also be observed at the level of institu-

tions: meaning and value is attributed to museums as organisations and to the specific locations and buildings that they use. Changing organisations or having to move from one location to another, always meets with a lot of resistance. And that is not only because people do not like to change as it makes them insecure; there is also a strong immaterial sense of belonging to a specific place, however dodgy that place might be. A recent example from the University of Amsterdam is that the law faculty will have to move from their current very run down facilities to completely refurbished, state-of-the-art new facilities about 1 kilometer away. They don't want to go. And despite all the clear reasoning and the precise language the law professors use in their university work, in this case the line of reasoning was fully irrational, only about emotion and sentiment. That is fascinating.

So, if all of the assumptions presented above are correct, it indeed means that change is found not so much in what university museums do, but in the way they do it and in the context that it is done.

Relevance in changing contexts

Coming back on track with the theme of the UMAC conference, the topic has been redefined here into "how do we deal the changes in our context that is in the institutional, educational and scientific context in which we operate? How do we adapt our selection processes for objects and stories, how do we find new meanings for our collections that fit the changed context in which they are kept, in new educational and scientific realities?"

The most obvious change is of course when a scientific discipline is discontinued and/or if the science in a specific field changes so much that the associated collections lose their original meaning for that specific discipline. But there is more. Essential for university museums as specific academic institutions, is that they stay relevant for and connected to academia. The relevance for the universi-

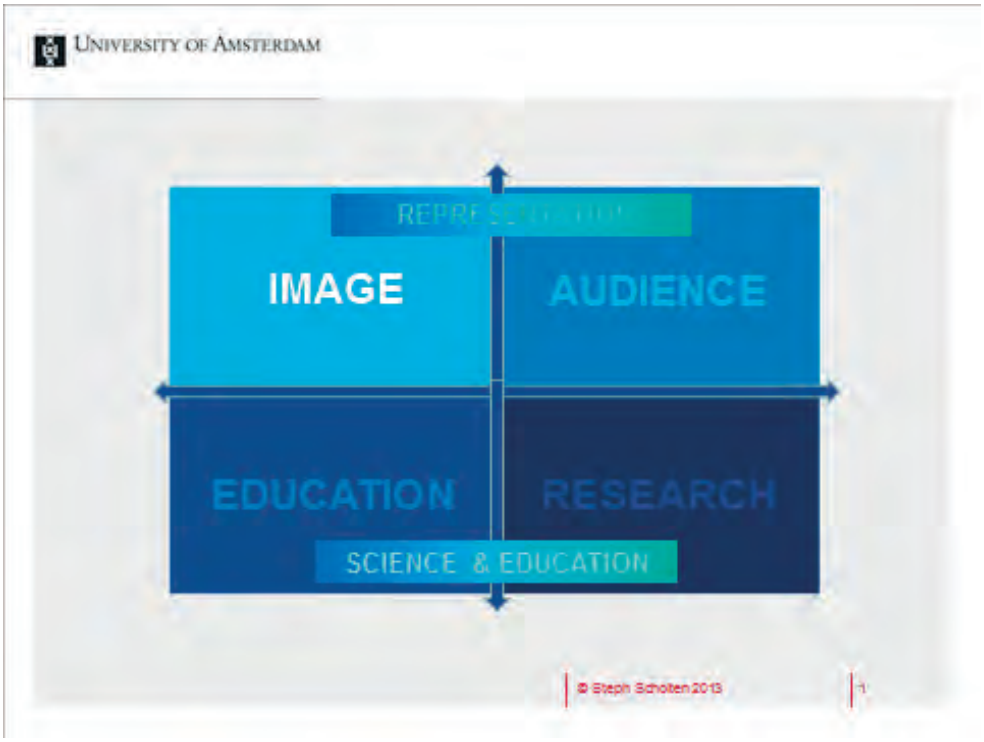

Fig. 1.
Schematic representation of domains of relevance of university museums ©Steph Scholten

ty lies in two domains as shown in figure 1.

Besides of the obvious relevance of the domain of education and research, there is a second important domain in which university museums need to be active: that of representation, which means the way how university museums and collections contribute to the public image of the university, e.g. how museums can make the university more attractive for future students, excellent researchers, sponsors and for instance for politicians who often make important decisions about universities. This author argued at last year's UMAC conference in Singapore in an unpublished paper that museums should strive to be relevant in both domains.

Relevance of the heritage collections of the University of Amsterdam

At the University of Amsterdam we try to be conscious of the necessity to be relevant in both domains and we take it into account in all decision making, strategies chosen, with the program of activities to implement. The heritage organization in Amsterdam encompasses both an established archaeology museum, called the Allard Pierson Museum, as well as the extremely large Special Collections of the University Library. The Special Collections are, in their present context, still a

very young institution. It was only in 2007 that the Dutch Queen opened the new building with greatly extended public facilities for exhibitions etc. In this new context the aim is to strengthen the academic profile of the collections and to represent the university. The academic profile is strengthened by e.g. the installment on the 1st of July 2013 of a privately funded professorate in Jewish book history. Our curator of the Jewish and Hebrew Special Collections was appointed as the first professor on this chair. Last May, a new curatorial position was created, co-funded by the humanities faculty and private funders, in historical cartography. In the archaeology museum, there now are three PhD students working, funded by the European Commission through projects and set up with the department of Media Studies of the Humanities Faculty. At the same time, we try to organize high profile events that often lead to good press coverage. In April 2013 Dutch Crown Princess (now Queen) Maximá came to visit an exhibition on women for Dutch history that was opened 6 weeks earlier by the Minister for Education, Science and Culture. In October 2013, His Royal Highness King Willem Alexander came to come visit and to open an exhibition on cartography. Of course one does not necessarily needs royalty to get media attention, but working with people who already have a high media profile certainly makes it easier to get media exposure.

One of the fields where changes in academic relevance of collections can be observed very clearly, at least in The Netherlands, is biology and the connected natural history collections. At the University of Amsterdam there existed, until recently, the Zoology Museum Amsterdam. It was first and foremost a large research collection and secondly a public museum, with limited possibilities for exhibitions and interaction with non-scientific audiences. But it had a long history: last year it was closed after over 125 years and the collections were moved to the city of Leiden, about 35 kilometers from Amsterdam, where they were merged with the collections of the National Natural History museum (Naturalis)[5]. Over the past years almost all academic zoological, geological and botanical collections at Dutch universities have been moved there. The main reason for this is of course is that classical taxonomy is no longer en vogue with cutting edge biology. It's all about genetics now and collections no longer play a role in either education or research. Naturalis, which has the subtitle of National Centre for Biodiversity, is both a big natural history museum and a large research institute that focusses on biodiversity. Taxonomy research and taxonomical collections are core business there and the research potential of the collections from Amsterdam will be exploited there.
But as you can imagine, there were many discussions about this move, mainly about "context issues". Some colleagues at my university, the University of Amsterdam, thought it was a disgrace that the zoological museum was closed and worse, that they were 'displaced'. They considered the historical and institutional context of the University of Amsterdam as well as the geographical context of the city of Amsterdam essential stories that contributed to the meaning of these collections and that would be lost in another institution and in another city. Others were glad that the collections found new scientific purpose and use and that they would represent the fields of biology and taxonomy in a museum that draws about 250.000 visitors yearly and that plays an important educational role for a general audience. So the conclusion can be that the collections lost something and gained something. Not necessarily good or bad, just change. In general, this author takes the position that redistributing collections in museums is not a bad thing. New contexts create new meanings, new stories. The old stories about the Zoology Museum in Amsterdam were documented in a book called *"A thousand and more stories on high spirits",* that serves as a memento (Reitsma 2012).

This article finishes with a recent discovery in the Special Collections, which show how new stories change the meaning of objects. It is about a book that was used last year during the Summer school in book history held in Amsterdam last summer. It was picked from the shelf by an English expert in bookbinding, Nicholas Pickwoad, who was looking for examples of books to show the students something about the recycling of vellum in book bindings. When he saw this book, he hew had something special in his hands and he called on the well-known medievalist Rosamond McKitterick, who also happened to be teaching in this Summer school. She recognized the binding for what it was: two pages from a 9th century manuscript that come from a Lectionarium that was used at the court of Charles the Bald, the grandson of Charlemagne.

The book was bought over 50 years ago by the university library, but up to now nobody had realized this. It was acquired at the time because it contains a religious text of 1565 by Calvin they found of interest. It also had interesting previous owners. Nobody had ever looked at this book as a material object. Now it is the second oldest object in our historical library and it has gained a completely new and different importance.

5 www.naturalis.nl/en/ – www.ligatus.org.uk/node/680

Fig. 2.
9th Century vellum bookbinding from the Special Collections, University of Amsterdam. ©www.foliaweb.nl

Literature cited

Latour, B. 1999. *Pandora's Hope. Essays on the reality of science studies.* Cambridge, MA; London, UK: Harvard University Press.
Smith, L. 2011. *Reinwardt Memorial Lecture 2011 All Heritage is Intangible*, Critical Heritage Studies and Museums. Amsterdam: Reinwardt Academy.
Reitsma, E. 2012. *Duizend en meer verhalen op sterk water*. Wormerveer: Stichting Uitgeverij Noord-Holland.

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Keywords

Intangible heritage - Relevance - Context

A Tale of Two Collections

Louise Anne D. Marcelino

Abstract

This essay tells the story of two collections that permeate the walls of two universities: the University of Santo Tomas Museum of Arts and Sciences and the University of the Philippines Vargas Museum. I focus on select exhibitionary practices and trace how the logic of collecting weaves and manifests in the current discourse of these museums. I reflect on the ways the institutions impose order on objects and proffer means of constructing knowledge through narratives engendered in display and exhibition.

A glimpse of the Natural History Cabinets of the UST Museum

As one enters the central portion of the University of Santo Tomas (UST) Arts and Sciences building, an aura of grandeur and authority beckons. One has to ascend a stone staircase flanked by religious imagery before reaching the museum. At one point in history, this large room served as the *paraninfo*, an auditorium where commencement exercises, conferences, and similar university affairs were held (Aparicio 1991). Constructed from 1925-1927, the configuration of space reinforces the ecclesiastical orientation of the university with its four hundred year history. Today, the *paraninfo* is the museum's history and metaphor where stories are told. It is a gathering place for people and a place for gathering objects. Here we find physical forms or actual objects as well as traces of the collecting institution's interests and motivations. In the past, the university clergy would echo their teachings in the *paraninfo* for the obedient reception of students expected to imbibe the ideals set forth by the university. Today, the absentee clergy's voice and presence are nonetheless felt within the museum's walls. Viewers are called to heed to the dictum of objects on display. The latter suggests, quite cogently, that the spirit of religiosity and mission guided the formation of a massive collection. The potency of objects in teaching conformed with the aspiration of instilling a particular worldview to generations of students and visitors.

Protomuseums in the Philippines trace its roots from the *gabinete de fisica*, a laboratory representing the three kingdoms of nature. One of the earliest museums established in the country is the UST Museum of Arts and Sciences which names the *gabinete* as its predecessor. The current collection of the UST Museum is comprised of 16-20th century Philippine Art, ceramics, ethnographic materials, numismatic and university memorabilia, religious sculptures, and natural history specimens. Only a portion of the natural history collection is being exhibited in the first floor of the museum. Known as a collection highlight, it has a shock value and prompts viewers to wonder on the authenticity of the pieces. Were these animals once truly alive? Stuffed and preserved as testaments of both life and death, the zoological specimens seem to suspend time and take viewers to a period where the history of acquisition is as telling as the objects themselves. The natural history collection of the UST Museum is what this paper focuses on, in relation to a contemporary art exhibition at the University of the Philippines Vargas Museum.

The UST Museum was founded in 1871 through the efforts of Father Ramon Martinez Vigil, a professor in Natural History. Father Casto de Elera on the other hand, was recognized for initiating the systematic gathering and cataloguing of collections. A Museum Studies scholar clarifies that the UST museum was created in response to an educational reform that mandated first class secondary schools teaching modern sciences to form a natural history museum and laboratory (Baluyut 2013). The UST was one of the institutions affected by this law. To be specific, it was a government issued regulation in 1865 that prompted the formation of natural history collections that included products found in the country, as well as classified collections of zoology and mineralogy. Samples of actual species and other physical forms were required in the pedagogy of the natural sciences. Vitrines and cabinets containing animal and mineral specimens bedecked the walls of a room on campus situated in the walled city of colonial Manila, Philippines. This was prior to the Second World War. The collections were later transferred to the *paraninfo* of the Arts and Sciences building.

Museum publications and guided tours never fall short of emphasizing collections management activities that took place during the war years (1942-1945). Converted into a temporary interment camp during the Japanese Occupation, selected detainees were tasked to document and catalogue the collections. This was an indication that despite the uncertainties brought about by the war; duties in the museum and the university marched on. The museum's former director Father Angel Aparicio continues to note that there were many efforts on cataloguing and scientific gathering of objects (1991). He underscores the museum's participation in various international exhibitions where it received awards. In 1895, a catalogue on the natural history collection was released on the occasion of the Philippine Regional Exposition. Consisting of three volumes, the catalogue documented the *Zoological Collection of the Museum of the Dominican Fathers*. It scans through documentation of around 6,000 animal species. Its objectives were extensive and ambitious. It aimed to record known Philippine fauna up to the present, consolidating data found in various published materials as well as to categorize discovered species and varieties gathered by collectors of the UST Museum through sojourns or field trips around the archipelago. Few years later, in 1915, Fr. Elera released a book titled *Contribution to the Philippine Fauna* which commended the efforts of university professors who contributed original research as they are "understood by natural scientists of their day" (1991). Father Elera regards the natural history collections as a "monument to the painstaking efforts of the scientific spirit of men who have controlled the destiny of the Manila University of Santo Tomas", to borrow his statement (qtd. in Aparicio 1991).

The natural history cabinets of the UST tell us that it was involved in active gathering and collecting through the deployment of its professor-clergy from the Dominican order across various places in search for new variety of specimens. The force which guided the synergy of collecting, however, is not simply based on the need to conform to an educational mandate. The impulse to amass: from the familiar Birds of Paradise from the Mollucas islands, to the Mouse Deer from Balabac, western Philippines, and on to the shocking brown bear, or a crocodile from a Philippine river; testifies to the belief that a collection "provides a microcosm or mirror of nature that would aid the interpretation of the divine text" (Macdonald 2011). This mode of thinking has insinuations to Creation as described in the Holy Bible. This collecting activity was facilitated in the wake of new technologies and practices, and always, in accordance with the colonial order. Reference materials and publications allowed for more travels and provided possibilities for discoveries and exchanges, in platforms such as international expositions. Inventories and catalogues allowed collectors (or collecting institutions) to examine the breadth of their collections. The production of catalogues and the display of objects according to a system of arrangement responded to new ideas of classifying and ordering objects. Drawing a natural scheme was made possible by the logic of physical likeness or difference among things and specimens. Here, the scholar Sharon Macdonald enlightens: "the systematic observation and comparison of objects became a key feature of natural science; and the cabinet and the museum maintained and even strengthened their role as principal means of bringing together and organizing objects in order to map the world's patterns" (2011). The current permanent exhibition of zoological specimens and shell collections bears traces of attempts to order a world.

Siting curiosities at the Vargas Museum

I now shift to the practice of collecting curiosities prevalent in the 16th century. This mode of collecting gathers the new, the unseen, the strange or the exotic. In the cabinets of *naturalia* of the UST Museum, we find this tendency. It revels on the idea of wonder and spectacle and that of exchange and prestige in gaining ownership of objects. In curiosities, the placement of order is provisional. The critic Stephen Bann has observed recent trends in museum display of collections of art and the natural sciences. He has noted efforts to "return to curiosity". He clarifies that museums did not originate from curiosity cabinets per se, rather it indicated a shift in knowledge paradigm to ensure that museum collections were to assume another contextual status (2003). New systems of classification, logic of arrangement, and display mainly for the purpose of instruction replaced the feeling of awe, wonder, and spectacle elicited by curiosities. A return to curiosity suggests "…a running back in time, which is exemplified in the display of such historic objects and artifacts, but at the same time occurs in the conception and presentation of certain works of art that are being made at the moment." (Bann 2003).

The Vargas Museum at the University of the Philippines established in 1987 exhibited the works of the intermedia artist Geraldine Javier in February 2013 as part of its temporary exhibition program. The museum originated from a private collection comprising of art, stamps, coins, and archives of the politician and collector Jorge B. Vargas. An active contemporary art program coexists with the museum's permanent art collection that includes works by Filipino artists from the late 19th century to the 1960s. The Vargas Library and Archives are activated as well through a multi-disciplinary approach in exhibition-making. The former is crucial to institutional history and beyond; as it reveals the collector's varied collecting dispositions.

In *Curiosities*, the artist Geraldine Javier exhibited installations and dioramas in the 3F spaces of the museum. She was invited to produce a work in conversation with the Vargas Archives: family photos, postcards, and other travel memorabilia. Javier reverts to the idea of curiosities to forward critical questions on collecting and possessing, memory and history, as well as systems of display and categorization engendered by the museum. Javier experiments and layers mediums, techniques, and forms. Her works transcend painting or sculpture to invest on time-consuming and intimate processes of: crocheting, collaging, layering with wax, installing, drying leaves, preserving insects or deboning dead animals. She performs the role of the curator as well, charged with the encasing, arranging, and storytelling of objects. In this exhibition, the artist recalls childhood memories and juxtaposes this personal subjectivity in the archives of the collector Jorge Vargas. While Vargas the collector collected history, he may well have been motivated by the impulse to gather traces of personal memories. It is in this crevice of storytelling in contemporary art where we can find the possibility of intersection between memory and history. Bann provides us with another perspective on the seeming impulsive accumulation of objects: "curiosity has the valuable role of signaling to us that the object on display is invariably a nexus of interrelated meanings"; as such, it has the potential to "threaten the benevolent ideal of useful instruction and the progressive onward march of progressive history" (2003). In other words, curiosity is embraced here not simply as a conglomeration of objects, but as an objective. It is suggested as a subversive paradigm in knowledge production.

These two cases impart to us that the act of collecting is a wellspring of possibilities. Here, narratives can be constructed and ways of perceiving can be instructed. They can also be critically revisited and be retold as new stories so that the museum would cease to become simply a 'tale as old as time'.

Literature cited

Aparicio, A. 1991. *Museum of Arts and Sciences: University of Santo Tomas*. Manila: UST Museum and Spanish Embassy in the Philippines.

Baluyut, P. 2013. Faith and/in formaldehyde. Lecture at the National Museum of the Philippines.

Bann, S. 2003. The return to curiosity: Shifting paradigms in contemporary museum display. In: *Art and its publics,* ed. A. Mc Clellan (UK: Blackwell), 117-129.

Macdonald, S. 2011. Collecting practices. In: *A companion to museum studies*, ed. S. Macdonald (UK: Wiley-Blackwell), 81-97.

Acknowledgements

UST Museum
Vargas Museum
UP Office of the Vice Chancellor for Research and Development
Buen Calubayan

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Keywords

Curiosities - Collecting - Natural history - Contemporary art

New museology and museum education at the University of Brasília's Seismologic Display

Thomas F.S. Nizio, Ingrid Orlandi Meira & George Sand França

Abstract

The Seismologic Display is a small university museum located at the University of Brasília which presents the seismologic knowledge to diverse social groups through its collection, exhibition and museum education activities as university students production of models and visits at schools of Brasilia. The museum is located inside the Seismologic Observatory, a research centre that has grown exponentially in the earthquakes and induced seismicity studies over Brazilian territory. The goal of this paper is to present a brief Display's work relation with the Brazilian new museology, informal education's comprehension and museum's audience communication with the seismologic knowledge.

Introduction: The creation and transformation of the Sismologic Display

The Permanent Seismologic Display is a small museum with the proposition of the scientific knowledge dissemination to the whole of society. Among its objectives is the educational proposal which this small museum has offered to its audience composed by spontaneous visitors and student groups interested on the seismology knowledge and earthquake phenomena. Its space offers participative activities through its pedagogic objectives developing a potential for new expographic solutions.

At 2009, the SIS former chief, George Sand França, became the University Extension Project Coordinator to foment the Seismologic Display development intending the promotion of the scientific knowledge at schools of several regions of Brasília and new social groups that could have access to the exhibition. Such work would be achieved through George Sand idea of interaction: production of handmade and interactive models made by the graduation extensionists that work at the Display. Therefore, the discourse and the social propose of a new Seismologic Display have been integrated as a science museum of educational space according Marandino (2005): "Science Museums are considered as educational spaces. At them the lived experiences project themselves beyond delight and entertainment. Programs and educational projects are generated, on base of cultural and social models."

1. The Sismologic Display informal learning

Both Seismologic Display and science museums missions are against the ideology of "banking concept of education", a term that Paulo Freire criticized on the traditional schools didacticism. Therefore these institutions are intended to promote new interests to the scientific area, as well as building new scientists as stated by Senac (2012) when quoting Moya: "The collections have the pedagogic function to communicate to the visitors the spirit and the mentality of a scientist with intentions to promote their natural inclination for science."

The use of interactive objects is an approach of great museums that have disseminated the scientific knowledge through the exuberant collection that could bring the scientific curiosity already at the 19th Century in museums of natural history at London, Paris and Philadelphia. Therefore, the development of these museums achieved the search of interactivity with the audience, a common action, nowadays, at the Exploratorium of San Francisco, the Museum of Natural History of New York and the Museu de Astronomia de Ciências Afins (MAST) at Rio de Janeiro. According to Cazelli (1999) about the science museums communication process: "The tendencies of education in sciences and the pedagogic proposals present in museums, emphasizes the part of actions of subject at learning experience. Thus, the interactive objects present different possibilities of interaction. Beyond the apparatuses of only response, there are used in smaller proportion objects with open response, which varies according with the visitor's choice that could react with freedom and more control above the proposed phenomenon. "

Maximea (2001) claims that museums and Science centers have proposed the use of interactivity through the hands-on objects. These, which propagates the tactile contact with the exhibit for its comprehension, have happened at the Montreal's Biodôme and at the National Air and Space Museum in Washington DC. Other forms of interactive objects can be found at these museums as the objects that propose the Minds-On interaction, stating the reflection of the scientific knowledge.

Since its creation, the Display didn't have transformations on its exhibition language, and the lack of resources made impossible the exhibition development. Therefore monitors participation was a reasonable alternative to keep the Display mission propagating the seismologic knowledge to different social groups that were visiting the space, as schools and families. The graduations students, working as monitors, became exhibition mediators. Mediation is common at contemporary art exhibitions and science museums according to Queiroz (2002), contemplating the mediator as important part of the interaction and comprehension of the visitor to the museum collection.

To invest on the mediation concept at the Display's proposal, the University Extension Project presented the graduation students as part of the mediation team of the Seismologic Display. With this attention, the exhibition could enlarge its divulgation to several student groups who had been, by then, a frequent audience through the informal learning, enabling a communication that could reach the interactive action of science museums.

Presenting the term "Informal Learning", it's a matter of greater importance to say that the Display comprehends the use of the term according to Marandino (2004) who presented the discussion with the term "non-formal learning". In resume, the non-formal learning by Marandino perspective is learning through other educational sectors like Cultural Centers and Museums. Informal Learning is for any aspect, place and language that could pass and transpass the idea of knowledge. The Seismologic Display's direction believes that both comprehension includes the Display mission, exhibition and discourse. Therefore, the models of earth dynamics could instigate and create reflection of possibilities of comprehension through the tactile perception that the informal learning claims according Marandino (2003): "On this perspective, instead of looking at the ideal model of interactive aparatusses for a scientific and thematic exhibition. It should be found in integration

of exhibits with aligned different profiles for one of the same thematics. Therefore, an exhibition in a science museum could be composed by an ensemble of objects with distinct characteristics heading to the manipulative and contemplative interaction. From different interactions, there are requested to enlace the curiosity, familiarity, the ludic, the introspection, the exploration and the shared use of languages.

On that matter, it is important the emphasis of all this characteristics already found at Science museums to comprehend the new museology. Including social groups in the discourse of living experience at the museums. This is subject of extreme importance for the social movement of the museology. The experience of the scientific phenomena can be possible by the generation of doubts in the visitors' minds. Therefore, actions about communication development made with the audience at the Display were the subject of research and study.

2. Communication actions

The Seismologic Display was headquartered, since its founding, in a rectangular room, a small space for a museum with a large collection, but it was adequate for its propose of science communication and for the public attended by then.

Given the new expographic research, the Display presents an exhibition that goes through small changes, such as the acquisition of new pedagogical objects, and the renewal of expository texts. Even after those changes there are questions about whether they would attract visitors or not.

Authors like Rico (2006) understand that exhibitions with the characteristics of the space of the Seismologic Display are not physically adequate at first glance, but there are same proposals that may be submitted to the site according to the author. In the case of science museums, there other issues to be raised: "Las expociciones actuales normalmente están estructuradas en una serie de apartados que, a sua vez, se subdividen en distintos puntos experimentales en donde el visitante tiene la possibilidad de manipular, probar y comprovar diversos procesos. Para ello necesita primero leer una explicación tanto de la teoria en que se basea como de la manera de ponerlo en práctica... A partir de eso momento el comportamiento se relaja y si nos vamos al final del camino expositivo, nos encontramos con un absoluto caos en que las piezas se manipulan sin ninguna información ni critério."

Rico (2006) states that large exhibitions of science can lead to neglect of the public to the scientific content of the display during the course of the visit. He suggests that in this case the visits should have a limited time, because for him it is already shown that to remain effective, exhibits must avoid a large amount of information. Thus, analyzing the space of the Seismologic Display can prioritize a speech with more concise content, that could have pedagogical objects properly selected, making it practical mainly because of its current audience: elementary students and high school students.

3. Objects and didacticism

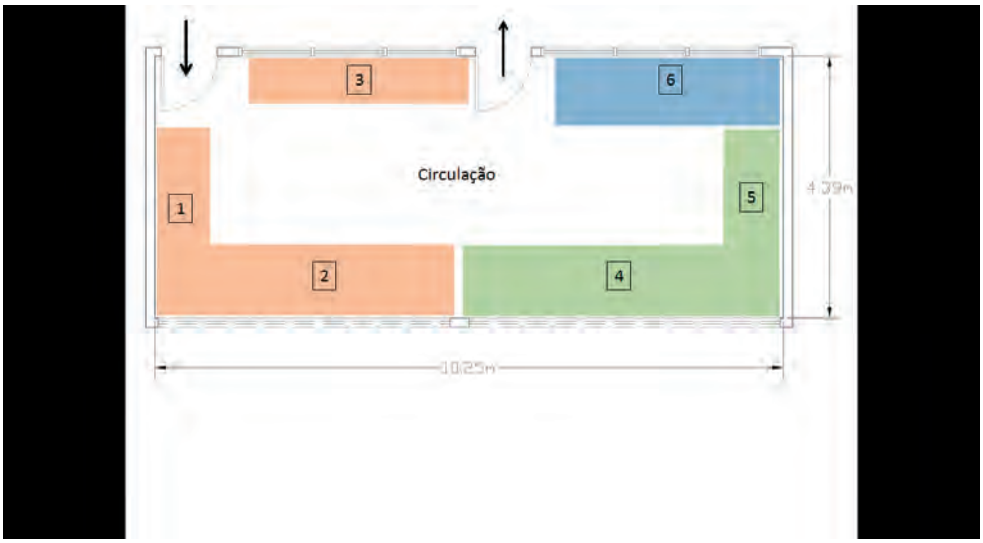

Fig.1
Floor plan of the new proposal of the Seismologic Display

The floor plan of the Sismologic Display represented by the figure above (Fig. 1) is a proposal for a route, as well as a division of the three moments of Exhibition. The three moments of visitation were designed according to theories of Lourenço (2000), who proposes to classify the objects found in a scientific display in order to obtain three different groups. The first group consists in "Scientific Historical Objects", the second in "Pedagogical Objects" and the third in "Scientific Dissemination Objects". For this paper it will be given greater emphasis on the Pedagogical Objects.

The "Pedagogical Objects" are those produced for the purpose of transmitting the knowledge of science. In the case of the Seismological Display, the transmission of knowledge is focused on informal education of public in school age. The objects in the collection of the Display that are representatives of this category are mainly interactive objects. The use of these types of objects makes the museum more attractive and exciting for the audience. The Tsunamis Model (Fig. 2) and the Building Model (Fig. 2) are examples of Pedagogical Objetcs presented in the Sismological Display. The Tsunamis Model is made in the form of a large aquarium where mechanically, with the participation of a visitor, waves are produced, exemplifying how tsunamis occur, and the Building Model, which is formed by a "skate" connected to rulers of different sizes representing buildings, demonstrates in a simple and didactic way how an earthquake can be felt in different heights.

Fig.2
Model of Tsunamis and building model

4. Final Considerations

The Seismologic Display was conceived with proposal of the dissemination of the scientific knowledge. Nowadays the space presents a great educational character with perspectives and potential for a developed commucation that can reach new audiences. To achieve the educational mission, the Display was fomented by projects of exhibition mediation, pedagogical objects and social works.This paper shows that the Seismologic Display can be a new study object for new museology practices.

Literature cited

Cazelli, S., G. Queiroz, F. Alves, D. Falcão, M.E. Valentes, G. Gouvêa & D. Colinvaux 1999. Tendências pedagógicas das exposições de um museu de ciência. *Encontro Nacional de Pesquisa em Educação em Ciências*. http://fep.if.usp.br/~profis/arquivos/iienpec/Dados/trabalhos/G48.pdf (accessed October 30, 2013).

Lourenço, M.C.C. 2000. Museus de Ciência e Técnica: Que Objectos? Dissertação para obtenção do grau de Mestre em Museologia e Patrimônio. Universidade Nova de Lisboa.

Marandino, M. (ed.) 2004. A educação não formal e a divulgação científica: o que pensa quem faz? In: *Atas do IV Encontro Nacional de Pesquisa em Ensino de Ciências*. http://paje.fe.usp.br/estrutura/geenf/textos/oquepensa_trabcongresso5.pdf (accessed October 30, 2013).

Marandino, M. 2005. Museus de Ciências como espaços de educação. In: *Museus: dos gabinetes de curiosidade à museografia moderna*, eds. B.G. Figueiredo & D.G. Vidal (Belo Horizonte, Argumentum), 165 -175.

Maximea, H. 2001. Exhibition galleries. In: *The manual of museum exhibitions*, eds. B. Lord & G.D. Lord (AltaMira), 143-196.

Queiroz, G. 2002. Construindo saberes da mediação na educação em museus de ciências; o caso dos mediadores do museu de astronomia e ciências afins/Brasil. *Revista ABRAPEC* 2, 2: 77-88.

Rico, J.C. 2006. *Manual práctico de museología, museografía y Técnicas expositivas*. Madrid: Editora Sílex.

Senac, A. 2012. Os objetos nos museus de ciências: o papel dos modelos pedagógicos na aprendizagem. Tese de Doutorado em Educação. Universidade de São Paulo.

Veloso, J.A.V. 1997. *O Observatório Sismológico da Universidade de Brasília: realizações e projetos*. Brasília: BCE-UnB.

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Keywords

Science Museums - Museum Education - University Museums.

University museums diagnosis by fuzzy logic

María del Carmen Maza, Graciela Weisinger Cordero & Tomás del Carril

Abstract

How is a Museum to be evaluated in terms of its adjustment to changes? The mathematical expression proposed for the Rio 2013 General Conference, has led us to analyse its terms and the interrelationship between them, so as to determine if it actually reflects the specific goals that should drive the management of a university museum. Once the expression is open to reformulation, the interest arises to choose a series of variables influencing management, criteria and diagnosis methods. We find that variables are numerous, its appraisal highly subjective, and that there are several criteria to be used for their diagnosis depending on the place, the discipline and the time of the assessment.

New ways to analyse and deal with fields of knowledge have been addressed from a logical- mathematical viewpoint, and museums could benefit from using them. We have found it very interesting to use a mathematical tool developed in the 20th Century: Fuzzy Logic. Dealing with approximate appraisals of unclearly determined variables, this tool aims at developing processes resulting from judgement and assessment by humans, who usually apply approximate reasoning because this is inherent in their nature.

This paper aims to reflect upon a viable procedure to carry out such diagnosis because the positive outcome of a museum adjusting to social changes leads to social growth.

Introduction

The theme of *ICOM 23rd General Conference*, represented by mathematical symbols, has taken us along paths related to the exact sciences in order to find new ways to analyse and address museology areas.

How can we measure museums' activity vis-à-vis their adjustment to social changes applying such broad concepts as memory and creativity, in search for an answer that will not be merely yes – no? What system allows us to obtain useful, concrete results, which are also flexible and let us decide about the right policies or necessary steps in any of the various areas comprised in a museum?

Is it possible to find a diagnosis system allowing us to know the different *degrees of correctness* necessary in those areas that are not working properly according to the goal-s set forth? And how can we identify and prioritise the use of resources in order to achieve those goals?

Considering the importance for museums to adjust to social changes, a more comprehensive formula will be suggested. At the same time, a diagnosis system based on fuzzy logic will be considered.

The expression used in the General Conference theme

1. Formula vs. equation

Museums may positively affect human development by getting millions of people to become involved in the cultural sphere. Hence, arises the challenge to express the people's rich heritage and creative nature through an equation that unites these concepts, demonstrating the inclusive disposition of these institutions.

"The mathematical equation […] suggests that this work arises from a composition between creative freshness and the memory constructed and entrusted to these museums. Behind this equation there are numerous individuals strengthened each day: professionals and especially the public, full of aspirations, acting as engines of this movement" (Duarte Candido, 2013).

Museums are spaces that aim at a harmonious, equitable future, constructing on the basis of memory and leading world changes. The wording and word relations in the General Conference Theme's proposal have been carefully chosen in order to achieve an expression that is deemed both hopeful and optimistic:

MUSEUMS (MEMORY + CREATIVITY) = SOCIAL CHANGE

An approximate mathematical reading of the idea put forward may be that memory, as contemplation of the past, rendered with creativity, seen as a breeder of ideas, would turn museums into agents of social changes.

This proposition leads us to ask ourselves if we are dealing with an equation –relation of equality containing one or more variables– or a formula –a practical means of solving a controversial issue or executing something difficult[1]. The expression displaying the Conference theme is closer to the definition of formula.

The mathematical sciences have developed new ways of analysing and addressing the fields of knowledge. Issues have been approached from a logical-mathematical viewpoint, and museums could take advantage of this with a view to examining their performance.

2. Reformulating the expression

For museums, memory is the peoples' material and immaterial heritage. Their responsibility is to preserve it, to research and disseminate it. On the other hand, creativity implies innovating in the way to communicate and spread patrimony. Their challenge is generating ways of involving the museum in today's society.

Thus, a more comprehensive expression, which reflects this rich and complex idea, would entail a new reformulation of the theme:

1 Translations of definitions from the Royal Spanish Academy (RAE) Dictionary.

$$MUSEUMS = \iint (MEMORY \cap CREATIVITY)\, ds\, dt \rightarrow SOCIETY'S\ DEVELOPMENT$$

This formula states that **museums** *add* **memory** elements and **creative resources** through time (t), and at a specific space (s), to contribute to **society's development**[2]. The differentials, space differential (***ds***) and time differential (***dt***), are each of the memory events linked to creativity impulses at specific times and spaces. The (double) integral is *indefinite* since it does not acknowledge limits: it begins and ends at an uncertain space and time.

Museums constitute a **double integration** in the space and time of the ***intersection***[3] (∩) between memory and creativity aimed at society's development[4]. This figure shows an example of intersection for a specific case: in a Museum Universe, made up of its heritage and creative human resources. The intersection takes place between a selection of patrimonial objects and the creative proposals to design an exhibition script.

A ∩ B = objects intervened by creativity

The arrow (–>) in the formula indicates that the result implies a *trend towards society's growth.*

In the new formula, the concept *social change* has been substituted with that of ***society's development.*** The justification for this lies in the fact that not all changes are positive, while the adopted concept is so.

A museum may count on a management policy focused on adjusting to social changes in order to contribute to society's development. Yet, to make sure that actions are properly geared, or to know if it is necessary to make adjustments in them, diagnosis is required. From the analysis of results new suggestions will arise about the steps necessary to achieve the expected outcomes.

Museum diagnosis system

1. Need for a flexible diagnosis tool

A director in charge of several museums may lack knowledge about every single area of the different types of museums he or she is to manage. It is also possible that the director of ONE museum may not be certain of the decisions to make about a given problem. In both cases they should be aware that there are many variables they ignore, which may impact the problems their museums pose. Whoever runs a museum or a managing organization may be a specialist in one or several disciplines related to museum operations but not in all of them. For instance, a director may know a lot about economy and finances but they may ignore specific aspects about informal education, conservation or security.

Thus, the need arises to have effective techniques allowing us to detect weaknesses and set priorities to solve them. This will allow, among other things, to redirect economic or human resources available in museums to raise the efficacy of the services they should provide to society.

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2 As a mathematical expression, the integral $\int_a^b f(x)\,dx$ is a sign (∫) represented by an elongated ´s´, and it indicates the sum of small fractions called differentials (dx). The letters, a and b, set the limits between which the sum is carried out. When they are absent, the integral is said to be indefinite.

3 The symbol ´∩´ represents the operation called intersection, which indicates the selection of different kinds of elements sharing a common characteristic.

4 Refer to the Santiago de Chile Declaration about the importance and development of contemporary museums. (…) The transformation of museological activities calls for a steady change of thinking by curators and managers, and in the guidelines of the structures they depend upon. On the other hand, the Integral Museum will call for the aid –permanent or temporary – of specialists from various disciplines, as well as of specialists in social science.

Most factors involved in museum management are not likely to be evaluated in an accurate way because they are, in many cases, vague or little defined issues. Only few characteristics will be precise and unchanging. For example, the diagnosis made of museums' ability to adjust to social change is vague, but the surface of their exhibition rooms is accurate.

Thus, diagnosis calls for the aid of specialists to determine the conditions in which both their internal and external operation are in. Information may also be obtained about the areas that would optimize or generate a given activity that the museum is not conducting and should carry out. Finally, it will offer the manager or director a chance to use a tool that will allow him/her to make decisions aimed at boosting efficiency.

In other words, our proposal is working with fuzzy or not neatly defined information so that management will be efficient and as accurate as possible. Hence we came up with the idea of using a possibilistic approach, as this type of methods is currently referred to.

2. Fuzzy Sets Theory and Fuzzy Logic

Numerous authors trace the roots of Possibilism back to Plato and Aristotle's philosophy. However, it would be after the second half of the 19th Century when they gain prominence, following the development of algebra and logic – the basis for *Modern Logic*. It was George Boole[5], in his 1854 work, *An Investigation of the Laws of Thought,* who proposed applying logical analysis and symbolic processes to fields foreign to mathematics. Twenty years later, Georg Cantor[6] – German mathematician, physicist and philosopher - developed his *Set Theory and Mathematics of the Infinite*. He no longer referred to a specific event but to sets of events. *Accuracy* was substituted with *approximation* –a key concept to this new mathematics. The results were not measured just according to their certainty but also their degree of probability.

In a great leap forward in the history of modern mathematics, the 20th Century arrived. In 1965 Lotfi A. Zadeh[7] presented his work titled *Fuzzy Sets* (Zadeh 1965, 338-353), where he explained his concept of **Fuzzy Logic** (Zadeh 1994, 7-84) **and Fuzzy Sets Theory**.

In Fuzzy Logic accurate thought is just an extreme case of approximate reasoning. Through induction we may not achieve absolutely certain, reliable knowledge. Coming across a single counterexample brings about the rejection of the universal validity of a law. A theory can never encompass all of reality. Hence, the truth of a theory allows for gradation (Popper 1980). Fuzzy Logic works on approximate appraisements of variables not clearly determined. It aims at developing processes resulting from judgement, and it emulates human evaluation, which uses approximate reasoning, inherent in its nature[8].

Zadeh's Fuzzy Sets Theory allows us to shape natural language expressions into mathematical terms without altering their expressive power, and to operate with them. It carries out **operations using words** instead of numbers. Fuzzy Sets represent the values of the words they operate with. These operations with word values allow us to obtain results that are also Fuzzy Sets: **values expressed through words**.

5 G. Boole (Lincoln 1815 – Ballintemple 1864), British mathematician and logician.
6 G.F.L.P. Cantor (***Sint Petersburg*** 1845 – Halle 1918) worked with Debekind and Fregue in the development of Set Theory.
7 L.A. Zadeh (Bakú, 1921), Azerbaijanis mathematician, electrical engineer, computer scientist, and professor at the University of California, Berkeley.
8 It constitutes an alternative to DETERMINISM –the right or wrong one-to-one logic which dictates that things are either black or white, there are no greys– and to PROBABILISM –a computation of the most likely value by means of a statistical method where uncertainties are dispersions of the average value.

3. Diagnosis method

Diagnosis concepts which are so rich, on the one hand, and so imprecise, on the other, as well as so imbued with subjectivity, described in ´literary´ or ´linguistic´ terms, entails challenging traditional logic. Getting results under these circumstances is a complex undertaking due to the characteristics of the elements involved.

It is difficult or arbitrary to find a number which grades, with desired accuracy, ideas originating in thoughts, feelings and perceptions of the world around us. Knowing the actual variables are essentially uncertain, vague[9], confusing, imprecise, incomplete, subjective, etc.: this is what is expressed as *fuzzy*.

In order to turn what appears to be a weakness into a strength, using the logic-mathematical tool developed by Fuzzy Logic has proved very appealing.

We propose a system allowing us to get a diagnosis of the museum tasks by means of an indicator called ***MUSEUM DIAGNOSIS INDEX***. This index considers, in a balanced way, all the parameters involved in estimating the actual state of a museum. The index would point to conditions for making decisions, such as:
Critical Situation: the museum calls for an urgent revision of the totality of its strategic action plan.
Immediate Attention: changes should be made in certain areas of the museum. Otherwise, a critical situation would ensue within a specific period.
Preventive Measures: actions deemed advisable to prevent delay or maladjustment processes from developing, which are so far beginning to appear.

Strategies aimed at making changes or adjustments will be based on this indicator, or index. To this end, besides the Diagnosis Index, the system will provide **indicators** that will point out the problems in need of solutions in each museum, and will supply information about the necessary resources.

4. Selecting diagnosis variables and criteria

When dealing with this type of problems, human common sense, natural language usage, and decision-making mechanisms play a decisive role. Thus, these problems call for the use of models beyond the classic true/false logic (Trillas et al. 1995).

The index will cover the highest possible amount of parameters leading to consider the condition a museum is in. The index assessment will result from weighing four basic variables. A *first level* analysis could include: **administrative management**, **heritage communication**, **research support**, and **adjustment to social changes.**

The nature of these four variables will be linguistic. By way of example: the museum's Heritage Communication is VERY GOOD, or its Administrative Management is FAIR. To operate with them and obtain the Museum Diagnosis Index, operations will be necessary which are not common in the binary logic we are used to.

In turn, each of the four variables referred to in the first level will take up a value that will depend on weighing another set of variables to be considered in the second. Similarly, these second level parameters will result from weighing *third level* values, and so on. By adding levels, we can reach the degree of detail deemed appropriate according to the information that is available or that we are in a position to survey and diagnose.

Using the variables from the different levels we get a hierarchical tree (figure 1)[10].

9 However, vagueness should be perfectly differentiated from ambiguity. That which is ambiguous is polysemic; it has more than one possible meaning or interpretation in a given context. A vague word or expression has only one meaning in a given context, but this meaning is hard to figure out or apply. An example of ambiguity: The exhibition was ´very special´, could mean that it was a) a particular or peculiar exhibition for a specific public or a special activity or function; b) exceptional because it was surprising and uncommon, unexpected or unusual; c) an extra exhibition added to a regular schedule. Vagueness is synonymous with uncertainty or lack of certainty. It can result either from lack or excess of information. An example of uncertainty: The display of the exhibition turned out to be "Not very attractive".
10 This example of a hieratical tree is just tentative.

Specialists in the various disciplines will diagnose these variables after thorough survey and analysis: finances, communication, marketing, design, sociology, education, etc. Experts will give their opinions on the variables from the most detailed level, resorting to their science and expertise in each specific subject[11]. Diagnosis will be carried out ´linguistically´, which comes natural to man. For instance, an Education expert may point out: "the Courses offered at this museum are VERY GOOD", and a Music expert may state: "the Concerts are FAIR".

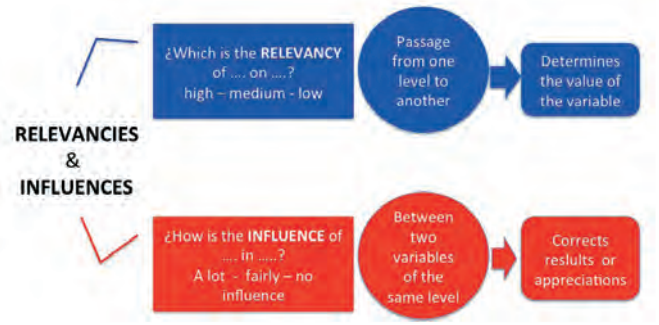
LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
MUSEUM DIAGNOSIS INDEX	ADMINISTRATIVE MANAGEMENT	MARKETING		
		HUMAN RESOURCES		
		ECONOMIC RESOURCES		
		SECURITY		
		LEGAL		
	HERITAGE COMMUNICATION	EXHIBITIONS	REFERENCE	
			SYNTHESIS	
		DIFFUSION	GRAPHIC	
			WEB & SOCIAL NETWORKS	
			RADIO & TV	
	RESEACH SUPPORT	ON HERITAGE	HISTORICAL	
			ARTISTIC	
			SCIENTIFIC	
		RELATED ISSUES	CONSERVATION	
			INTERDISCIPLINARY	
		VISITORS SURVEYS	INTERNAL	
			EXTERNAL	
	ADJUSTMENT TO SOCIAL CHANGES	LOCATION	NEIGHBOURHOOD	
			HOURS	
			EASE OF TRANSPORTATION	
		BUILDING	SECURITY	
			MAINTENANCE	
			ACCESSIBILITY	
		VISITORS	AGE	
			SOCIO-ECONOMIC BACKGROUND	
			EDUCATIONAL BACKGROUND	
		EDUCATION AND EXTENSION	GUIDED TOURS	
			SUPLEMENTARY ACTIVITIES	COURSES
				SEMINARIES
				WORKSHOPS
			EXTENSION ACTIVITIES	CONCERTS
				BOOK PRESENTATIONS
				FILMS & PLAYS
				CHILDREN

Figure 1

Once the variables from the most detailed levels have been diagnosed, obtaining the Museum Diagnosis Index of a given museum will be an automatised process, carried out by a software programme.

The variables from one level, for example, from Level 4, in this case, will determine the literary value or opinion of those from Level 3. This operation involves taking into account the RELEVANCY that the variables from one level bear on those belonging in the previous level. Going back to our previous example: Courses and Seminars' relevancy among Supplementary Activities is HIGH, but Workshops' relevancy is LOW.

In turn, when designing a hierarchical tree, we may take into account the INFLUENCE that some variables from the same level exert on one another. This automatically alters the way they are viewed. Going back again to our previous example, if the museum offers many very good Courses, the Seminars' Relevancy will diminish. Software can automatically correct the Seminars' Relevancy upon Supplementary Activities in light of the Courses' higher quality[12].



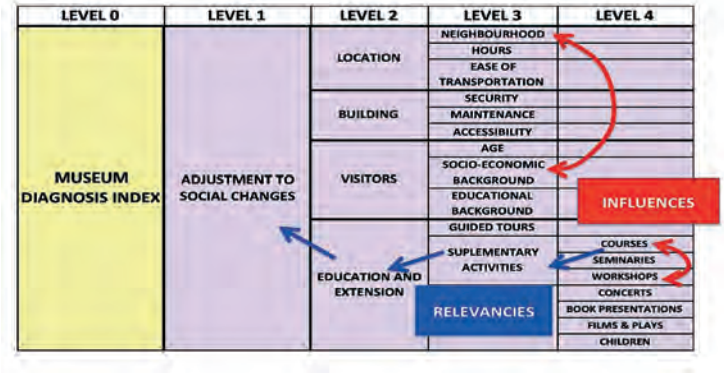
11 Diagnosis could also be made by the responsible person for every department or area of the Museum although, in that case, the diagnosis will be less objective.

12 During the General Conference of ICOM in Rio de Janeiro 2013, Jorge Wagenberg referred to the ´influence´ of the neighbourhood were the museum is located over the social level of the visitors. "There are two aspects in a museum: activities, which I understand are universal. We never target to a particular population […] rich, cultivate, regular people, kids, etc. […] talking about museography there is no difference because you are using stimulus, emotions. […] On the other side are the activities: you use words, written or spoken words. In this case of course you have to select different levels. […] We did a survey, […] and we saw that people of low economic level didn´t come to [our] museum, but it was not because of the price, it´s cheap: the entrance to the museum is 3€. It was because the museum is located in a rich part of the city, and they did not feel well in this neighbourhood. So, in this case, you have to make a survey in order [identify] the holes and invent a solution to the problem". www.forumpermanente.org/event_pres/encontros/icom-2013/videos/o-museu-observatorio-um-novo-conceito-baseado-no-gozo-intelectual (accessed September 13, 2013).

All RELEVANCIES and INFLUENCES should be pre-set by the software design team of experts together with the museum Director who requests the evaluation, on the basis of two premises:
• Thorough knowledge by the individual(s) who set(s) the ´linguistic´ values.
• The desired museological policy **criterion** for management.

At a given time, as we have pointed out, Adjustment to Social Changes may be appropriate. To that end, the software designer will give higher RELEVANCY to this variable over the others. This prioritisation will result in ranking museums according to their higher or lower level of Adjustment to Social Changes.

Having predetermined Relevancies and Influences among all the variables considered in the hierarchical tree, the problem of obtaining the MUSEUM DIAGNOSIS INDEX would become automatised through a software algorithm[13].



5. Diagnosing museums' adjustment to social changes and measures to implement in order to achieve it

The resolutions adopted by the Round Table of Santiago (Chile) pointed out "That museums should establish systems of evaluation in order to verify their effectiveness in relation to the community". Most museums have implemented visitor statistics systems, but these are generally quantitative. And, as we know, a significant number of visitors is not synonymous with ´efficiency. It may be just the result of a good marketing strategy.

Implementing the procedure described here, it is possible to obtain an approximate appraisal of the quality of the services offered by a museum, and to gather information about the possible steps to take in order to improve its adjustment to social changes. Concurrently, data will be available on sectors or issues in need of attention so as to achieve the set goals.

We include in this proposal a schematic sample of the diagnosis of a museum, referred to as Museum ´A´.

Experts have issued fuzzy diagnosis for Level 2, which are recorded in the ´OPINION ON MUSEUM A´ column. Then, the software works by applying to these fuzzy values the RELEVANCIES listed in the adjacent column. The relevancies were set when the software was designed. The algorithm works with these elements and obtains values, represented by the fuzzy sets charted in the right column, for the Level 1 variables.

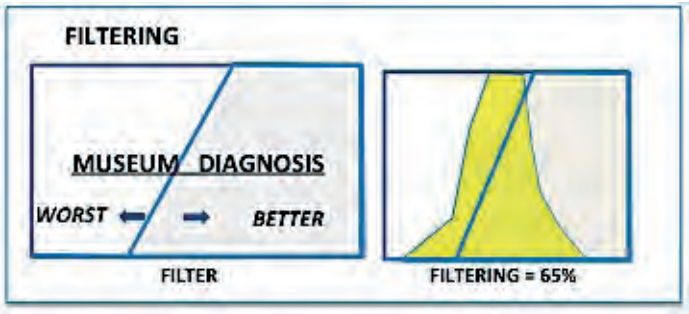
With these values as well as the relevancies laid down for the Level 1 variables, we get a fuzzy set for a global grading of Museum ´A´. With this set along with the fuzzy logic operation called FILTERING, we get a Diagnosis Index numeric value (between 0 and 100) that allows comparing different museums. Additionally, with the SIMILARITY operation the resulting set allows determining the condition Museum ´A´ is in – in the example: ´Preventive Measures Required´. Along the process of obtaining the index, flaws or weaknesses identified in the museum are recorded, which provide orientation on Preventive Measures to take. Filtering and Similarity[14] are briefly described later.

13 Sequential and finite set of procedures for solving a problem.
14 Fuzzy logic operations are described by way of illustration of a methodology. When actually designing the system by means of a software program, work should be more rigorous, using more complex or better-defined operations that will solve the problems raised. Other details should also be considered which have not been addressed here since they are not essential to this paper.

LEVEL 2	OPINION ON MUSEUM "A"	RELEVANCE	LEVEL 1	RELEVANCE	FUZZY SET EXPRESSING THE RESULTING VALUE FOR LEVEL 1	LEVEL 0
MARKETING	GOOD	MEDIUM	ADMINISTRATIVE MANAGEMENT	LOW		MUSEUM 'A' DIAGNOSIS INDEX MDI=64 (*) 'IMMEDIATE ATTENTION' REQUIRED (**)
HUMAN RESOURCES	VERY GOOD	HIGH				
ECONOMIC RESOURCES	FAIR	HIGH				
SECURITY	VERY GOOD	MEDIUM				
LEGAL	VERY GOOD	LOW				
EXHIBITIONS	VERY GOOD	HIGH	HERITAGE COMMUNICATION	MEDIUM		
DIFFUSION	BAD	HIGH				
ON HERITAGE	VERY GOOD	HIGH	RESEARCH SUPPORT	MEDIUM		
RELATED ISSUES	FAIR	MEDIUM				
VISITORS SURVEYS	BAD	HIGH				
LOCATION	VERY GOOD	LOW	ADJUSTMENT TO SOCIAL CHANGES	HIGH		
BUILDING	VERY GOOD	MEDIUM				
VISITORS	VERY GOOD	HIGH				
EDUCATION AND EXTENSION	VERY GOOD	HIGH				

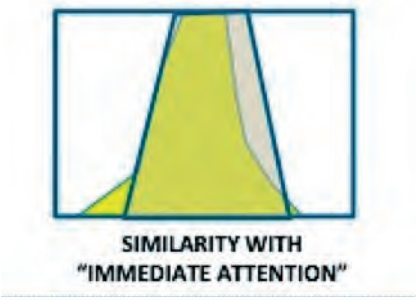
Figure 2

(*) The index number is obtained through the FILTERING operation shown in the figure. The ´FILTER´ is a criterion set in advance.



(**) The action to take is obtained through the SIMILARITY operation. The figure below shows the actions to take as fuzzy sets, which have also been established in advance.

Then, the operation is performed to determine what action should be taken according to the set resulting from the process carried out.



Similar operations would be performed for each museum, and priorities and actions to take in each of them would be obtained.

Conclusions

This paper suggests an alternative, more expressive and comprehensive formula to point out how important it is for museums to adjust to social changes, and the need for these changes to aim at society's development.

Also, we have set the basis for developing a diagnosis system for museums. This system relies on the natural way in which humans make value judgements on concepts that are not sharply defined. To that end, we have resorted to Fuzzy Logic, a tool of mathematical logic that is more comprehensive and flexible than the so-called binary logic. Owing to its multifaceted or multicriteria nature, this system allows setting priorities in line with the juncture at a given time.

We think it appropriate to present this idea along with the challenge of furthering studies at UMAC due to the diversity offered by university museums as well as the context they are in. Research is opened up with a view to reflecting on carrying out a pilot test that allows to fulfil this proposal and to implement a software programme performing the task of systematically grading and prioritising the activities of a museum or group of museums.

Literature cited

Duarte Candido, M. M. On behalf of the Content Sub-committee of the Organizing Committee, *Conference theme*. http://icom.museum/fileadmin/user_upload/pdf/ICOM_2013/Doc_promo_CG_2013_mayENG.pdf (accessed January 10, 2013).

Bignoli, A. J. 1995. *Teoría elemental de los conjuntosborrosos*. Buenos Aires: Academia Nacional de Ingeniería.

Boole, G. 1854. *Investigación*sobrelasleyes *del pensamiento*. Madrid: Thompson Paraninfo S. A.

Icofom-Lam. 1972. *Carta de Santiago de Chile*. Santiago de Chile: Comité Regional del Icofom en América Latina y el Caribe.

MC Neill, F. M. & E. Thro. 1994. *Fuzzy Logic: a practical approach*. Cambridge (Mass.): Academic Press.

Popper, K. R. 1980. *La lógica de la investigacióncientífica*. Madrid: Editorial Tecnos.

Trillas, E., C. Alsina & J. M. Terricabras. 1995. *Introducción a la lógicaborrosa*. Barcelona: Ariel S.A.

Wagensberg, J. 2013. O museuobservatório: um novo conceitobaseado no gozo intellectual. *23rd General Conference of ICOM*. www.forumpermanente.org/event_pres/encontros/icom-2013/videos/o-museu-observatorio-um-novo-conceito-baseado-no-gozo-intelectual (accessed September 13, 2013).

Zadeh, L. A. 2000. Fuzzy logic, neural networks, and soft computing. *Communications of the ACM* 37 (3), 77-84.

Zadeh, L. A. 1965. Fuzzy sets. *Information and Control* 8, 338-353.

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Keywords

University museums - Fuzzy Logic - Diagnosis system

The revitalization of museums of University History in the Republic of Armenia

Marine Mkrtchyan

Abstract

Armenian university museums were established in the Soviet period. The majority of them are museums that document the history of the university. During the Soviet period the cardinal aim for these museums was to show education in the context of Soviet ideology. After the collapse of the Soviet Union, these museums dealing with the history of the university lost their reason for being. Today, universities in the Republic of Armenia have worked hard to reestablish university museums with new purposes. This paper compares two university history museums: The History Museum of Yerevan State University and The History Museum of Armenian State Pedagogical University.

Introduction

A museum of university history may be classified as a history museum but it is a different kind of museum from many others of its type. It is an important place where a university is presented as a whole. The museum of university history presents the university's historical, scientific, research, teaching, and cultural missions. These kinds of museums collect, research and present the historical and cultural values of the university for students and society in general. They uncover the unique culture and student life of a university.

The reason of their creation in Armenia

In the countries in the former Soviet Union, museums of university history were created in the second half of the 20th century. In the 1960s and 70s in the countries of the former Soviet Union, high value was placed on education and the museum of university history was a place where the university could represent its development and achievements.

But in retrospect, it is clear that the main purpose of these university history museum exhibitions was to strengthen Soviet ideology and educate young people about Soviet ideology and goals.
Museum of Yerevan State University Historyas the first museum of university history in Armenia
Yerevan State University was the first non-religious institution of higher education in Armenia. It was founded on May 16, 1919, during the period of the First Republic of Armenia. Since then, Yerevan State University has been considered to be the main higher education institution in Armenia.

The foundation of the Yerevan State University History Museum in 1959 was not just an accident. It first operated as an archive where documents and objects connected with the history of university were preserved. The collections were enriched with personal belongings of famous professors, documents concerning the foundation of university, and other similar documents. The organization of the collections was made according to the political and scientific ideology of the time.
In 1980 the archives of the Yerevan State University were transformed into a museum open to the public. The opening ceremony of the museum's permanent exhibition took place in the main building of the YSU. The aim of the YSU history museum was to educate students about the communist ideology that was the underlying aim of the University from shortly after its founding.

The first exposition of the YSU History Museum began with a presentation of medieval Armenian monastery complexes where schools and academies were first located. Other Armenian higher educational institutions were presented in chronological order. The history of Yerevan State University was presented to emphasize that it was there that the major developments in science and education in Armenia took place. The chronological and thematic principles of the exposition and its design were consistent with the demands of the time, which were to emphasize the principle that Soviet education was superior. There were well-equipped cinema and temporary exhibition halls in the exposition. In spite of the ideological orientation, the museum staff managed to organize interesting exhibits showing the multifaceted research that took place at the University, and its broad reach.

Museum of the University History in Armenian reality today

After the collapse of the Soviet Union due to economic and political changes, funds for museums were limited. Museums of university history lost their importance because their ideological underpinnings were no longer important to society or to the university.
Nevertheless, the museums of university history didn't stop their activity. Each university history museum has reconsidered its mission, aim and challenges during last decades. Universities began to use their history museums as a branding tool for their educational institutions. Some new museums of university history opened. One of them is Armenian State Pedagogical University History Museum.

The new Exhibition of Museum of Yerevan State University History – The museum as a tool for recovering the real history of the university

The Yerevan State University History Museum was one of those university history museums that constructed a new mission based on contemporary reality and goals. The main activity of the museum after independence was researching YSU history. Another important goal was to preserve funding for the museum -basically, to ensure the museum's survival.
The attraction of visitors was not a major goal and so nothing was done to renew the exhibition or to publicize it. However, in 2007 the management of the university changed and they decided to reconstruct the history museum at YSU and give it more prominence.
Unlike the previous ideological goals, the aim of the new exposition is to show the process of establishment of higher education in Armenia from early twentieth century to today. The new exposition tells about the foundation, structure, faculties, rectors, and famous professors of the Yerevan State University. It also examines student life and leisure.
In the new exposition one can see some original items and documents that were forbidden to be viewed during Soviet times. For example, in the previous exhibition, from Soviet times, the foundation of the YSU was shown as dating to 1920, when Soviet rule was established in Armenia. In reality YSU was founded in 1919 during the First Armenian Republic. More original and unique objects are used in the exhibit to make the exhibits more attractive and interesting to the public. Other changes

are the use of wide LCD monitors that show documentary films concerning the history, foundation, faculties, and individuals of Yerevan State University.

The new exhibition of Armenian State Pedagogical University History Museum – New technology as an interactive way of presentation of history

As mentioned earlier, since the collapse of Soviet rule some new university history museums have opened. One is the museum of the History of the Armenian State Pedagogical University (ASPU). This new museum of Armenian State Pedagogical University History was founded in 2002 and operated in one room of the university till 2012. On November 19, 2012, a new exhibition was opened at the initiative of a new rector and was dedicated to the 90th anniversary of the Armenian State Pedagogical University. The mission of the museum is to present the history of the university from the very first days till nowadays, emphasizing the role of the university in the structure of pedagogical education.

In contrast to the Museum of YSU History, the new Museum of Armenian State Pedagogical University History's collection is not so rich in objects and the museum space is not so large. This means that an emphasis has been given to new technology such as touch screens, holographic images, and large-format printed banners. The exposition was designed by a professional exhibition designer. His challenge, as posed by the rector, was to make visitors proud of being a student of the pedagogical university. Thus, the museum and new exposition have become, in a sense, devices for evaluating the university.

The permanent exposition of the Museum of Armenian State Pedagogical University History starts from the lobby of the main building of the university. Because the actual museum space is so small, the designer of the exposition used the lobby of this building like a part of the exposition and each visitor receives information there and is invited to the museum. It operates as a good introduction and as publicity for the museum.

As both of the museums (at YSU and ASPU) are devoted to the history of their universities, their permanent exhibitions have some similarities. The new exhibit at ASPU includes elements of both the old (1986) and new (2007) exhibitions at Yerevan State University History museum.

The exposition of Museum of ASPU History starts with the history of ideas about pedagogy, the creation of the Armenian alphabet, and the most famous and important educational centers in medieval Armenia. It presents the founder of modern Armenian education theory, the nineteenth century writer and philosopher Khachatur Abovyan, who opposed dogmatism and formalism in the system of education in Armenia.

A touch screen in the middle of the exposition informs students and other visitors about news about the university and connects them to the official website of Armenian State Pedagogical University. In another four halls the history of the foundation, structure, faculties, and student life of the university are represented. The masterpiece of the exposition is the holographic image of Khachatur Abovyan who talks to visitors. The use of holographic images is new in Armenian museums and the history museum of Armenian State Pedagogical University is only the second museum in the country to use it.

Conclusion

Some people might think that the history museum of a university would be of interest only to students and professors of the university and that its visitors would be limited to those audiences. However, experience in Armenia shows that the museums of university history are part of the country's history and can give concrete and valuable information to a much wider audience. Both the museums at YSU and ASPU are important research, educational, and informational centers for preservation and dissemination of information about the university's history and development.

In conclusion, an examination of the exhibits of these museums of university history —the one at Yerevan State University and the one at Armenian State Pedagogical University— shows that although the museums present nearly the same thematic and chronological sequences, each of them has a distinct way to present the material. Thanks to an interesting exposition design that uses more new technology and is more interactive, the one at the Armenian State Pedagogical University has more visitors and is more popular even though the museum at Yerevan State University has richer collections and a longer tradition.

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Keywords

University - History - Technology

New scenarios to evaluate changes in university museums

Luisa Fernanda Rico Mansard

Abstract

Every university, because of being a university, is subject to be evaluated in different aspects. Because of this, museums have to be evaluated too. In this sense, there is a big distance between universities and universitys´ museums. The former ones have established academical rigid ways of working, which constantly are subject to several types of evaluation, but universitys´ museums have been oscillating between formal, informal education and entertaining aspects, that is why these evaluations have had different kind of aims.

But as for the universitys´ museums are becoming more and more an integral part of the university itself, it is important that evaluations have to respond to the interest of the whole university. To begin with, they need basic evaluations (such as spaces, audiences, heritages, etc.) This is meant just as a previous research so to evaluate proceedings and transformations.

More than considering the collections at universities as a legacy, they should be appreciated with a sense of current heritage –as "patrimony"-, and instead of seeing the museums just as repositories, they have to be opened as cultural centers, so that collections and museums can get more senses and meanings for the university´s community and the society in general.

Regarding Mexico, there are few museums which are managed with a sense of modernity and there are less that undertake the new universities' duties: innovation and binding. No sooner than February the UNAM has announced the establishment of the COORDINATION FOR DIGITAL UNIVERTY'S COLLECTIONS (CCUD standing for COORDINACIÓN DE COLECCIONES UNIVERSITARIA DIGITALES) that will let us know about the amount, the typology and the condition of the objects in each institute, laboratory or university museum which

will enable the analysis of their real condition and to propose another uses.
The main change of our universitys' museums lies in letting out their vertically management and create new scenarios in a horizontal way in order to establish an internal net communication system that allows the diversification of museographies and museological services. Only so, will universities be able to renew the use of their collections and to take over more measurements, according to the needs of the modern world.

The paper highlights different stages of the relationship collection-university museums and the visitor, called as scenarios. These go from the objects exhibition in the positivist sense to the exhibitions which promote social interaction and knowledge societies. More than vertical decisions in museum designs and services, the paper proposes horizontal and transversal works that support the development of university museums.

It also suggests the safeguarding of cultural expressions as intangible heritage of the university community to preserve the memory of the university itself. This can only be done through constant qualitative and quantitative evaluations, adapted to the needs of each museum.

1. Scenarios

Universe, universal and university are tightly related terms. Terms which highlight the whole existence, the inclusion of all natural, scientific, social, humanistic and spiritual aspects, as well as their study and diffusion in higher studies institutions.

We also know that, from ancient times, objects or, in its case, their accessible representations were key elements to comprehend the universe and nature, and thus, to transmit knowledge. Specimens of flowers and animals, graphic reproductions, schemes and tri-dimensional models of the cosmos transformed the transmission of knowledge, gradually leaving aside philosophic speculations of the so-called objective knowledge. Many of these materials became the initial nuclei of didactic collections which, through the years, would move to formal teaching institutions and museums.

The next revolution to acquire knowledge was that started by Gutenberg, who captured all information in printed books, making reading and writing compulsory for anyone who wanted to know more or to communicate with other people. These first materials and writings became documentary collections and libraries which also required special spaces for their conservation and consultation.

In many cases, the ideal places to concentrate objects, collections and printings were the universities. This is idea was based mainly in three reasons to be considered:
Universities held the most prepared people in each specialty.
Universities kept and enriched the 'universal knowledge'.
Universities had the best spaces for the study, preservation and exhibition of specimens and art pieces.
Thus, universities collected large libraries and had the first display cabinets for collections. We can consider these show cases and exhibitions as the first scenarios for the visiting public. Scenarios in the theatrical sense (relation proscenium-audience) in which a group of actors –in this case specialists and museographers- decided, in a vertical way, what to present and how to do it. The specialized knowledge marked the division between the show and the spectator. The visitors, mainly students in this case, played a static role as passive receptors.

The proliferation of state or private museums, with different political and social functions has not diminished the value of university museums. Each museum sets its objects 'in scene', under specific themes, intentions and histories. But, as offer increases, competition must enhance their quality; ensure the attractiveness of the exhibition designs and the museums' services to attract more visitors. Visitors who have now access to new technologies and, in consequence, to more information.

Therefore, university museums have also to be more competitive, and have a greater institutional commitment. As they depend from a university -devoted to teaching, research and diffusion of cul-

ture- they have to provide, not only up-to-date information, but also to promote visitors' knowledge starting from its objects and exhibitions.

It is implied that in this great museum enterprise, only the most important universities, or those with a greater historic tradition can establish formal academic collections, can handle historic archives in museums and establish museums for the dissemination of different subjects. These universities are those that lead museum works and are lighthouses that guide the smaller or newer universities. Specifically nowadays, when universities must promote and foster the dissemination of expert knowledge (scientific, technological, humanistic, artistic…) for the formation of fair, plural, democratic and inclusive knowledge societies (Olivé 2007). In these new scenarios, the establishment of a wide and inclusive state policy in higher and university education is required (Didriksson 2006:14) to include inter-institutional, national, regional and macro regional relationship, university museums and academic collections must not be excluded from this process.

2. Visitors

The need of preparing a professional society caused the creation of a lot of universities and high studies schools (specialized, technological, poly-technical, etc.). But the pressure to comply with academic functions has been so strong that many of them have not been able to dedicate themselves to establish museums, to design exhibitions and museum activities, to acquire collections, even to reevaluate their own heritage. This lack of museum experience and heritage perspective of what is owned –either tangible or intangible – has led to the misuse and even loss of universities' cultural heritage.

We have to point out; that the value of university collections and museums is not only for the university, but it extends to society in general. It means added value for the community where the university is located and a tourist attraction for any traveler. A university that has important art collections, with original or new scientific specimens, or which frequently promotes itself with temporary exhibitions has more social impact than a university which is circumscribed only to academic aspects. If this is also disseminated with the support of new technologies, traditional physical barriers can be broken to achieve a fairer and more democratic society. In this sense, appreciation of museum scenarios in universities changed again.

Nowadays, the visitors of university museums have also changed, because they are not only intra and extra university people, but we have to consider them as public at large, users, observers, spectators and especially cultural consumers. Consumers of any kind, with a lot of cultural offers to choose from, but who have to be attracted to university museums, activities and knowledge.

3. New scenarios and new visitors

In the same way as teaching and research are leaving the traditional four walls, academic collections and university museums have to transcend their own spaces. We are returning to the opening or diffusion ideas of past times, but from now on, from social networks. First, we approach the virtual objects; then their descriptions and interpretations. We begin with the verticality direction of the message, but the Internet user has the facility of changing it to horizontal or transversal directions, according to his/her interests. So, the passive receptor can easily and freely access information and, later, can construct his/her own knowledge through interaction with other visitors or informers. The new receptor is in itself a co-constructor of the museum.

The challenge for each museum is not to remain at that level, but to get the visitor to attend the museum in person, to have a face to face contact and to appreciate the relation among pieces-collections-spaces and surroundings.

The artifacts in museums can be meaningless or have little social value for the present visitor. However, in order to abate this situation, I suggest to point out the patrimonial sense –the heritagisation and musealisation processes (Desvallées & Mairesse 2010, 50 & 56)- of pieces and collections, regarding their different uses in time and space as well as the added values given by university members, museographers and society in general. This can give more meanings to museums and collections and inspire a sense of social belonging and identity among university people.

In contrast with many other museums, university museums have a great advantage: They have the expertise to approach visitors to collections or museums, based on theoretical methodologies and technical practices in formal, non-formal and informal education or entertainment activities as well. Each educational purpose combined with the different kinds of messages, exhibition designs and museum activities create again special scenarios for our museums.

In order to take advantage of this situation, it is important for the visitor to have a personal and independent approach to university museums, but through collaborative work, trying to increase

the motivation, attention, concentration and, in general, the advantageous use of information and communication media (Cuaed 2012).

Now, the new scenarios point to a greater horizontal cooperation among institutions and sectors to be structured in community networks and spaces to work in collaboration and without losing their institutional identity (Didriksson 2006, 13). Taking advantage of these new scenarios and new visitors will allow the increase of university heritage, tangible and intangible patrimonies as well.

"Intangible heritage is made up of processes and practices and therefore needs another safeguarding approach and methodology than the tangible heritage. It is fragile by its very nature and therefore much more vulnerable than other forms of heritage because it hinges on actors and social and environmental conditions which do not change too rapidly. Safeguarding intangible heritage involves collection, documentation and filing as well as the protection and support of its bearers. While the tangible cultural heritage is designed to survive long after the dead of the person who produced or commissioned it, the fate of intangible heritage is much more closely related to its creators as it depends in most cases on oral transmission" (Bouchenaki 2004, 9).

All universities produce a large number of cultural expressions. In order to safeguard intangible heritage, it needs also to be 'translated' from its oral form into some manifestation of materiality, be it files, inventories, museums, audiovisual records. Although this might be regarded as 'freezing' intangible heritage into documents, it should be clear that this is only an aspect of safeguarding and will require great thoughtfulness and care with regard to the most appropriate methods and materials chosen for this task (Bouchenaki 2004, 9).

A university is a system as a whole. It is a living entity formed by buildings, furniture, laboratories, objects, artifacts… where academic communities gather to interact in different levels. In this sense, we recognize it with a special habitus and habitat. It's important to sustain the whole system as a living entity and not just collect 'intangible artifacts' (Kirshenblatt-Gimblett 2004, 53). Many university museums have already the experience in appreciating and preserving the tangible artifacts as well as the intangible artifacts. We must continue in this direction.

4. Evaluations

New changes demand reflective analyses and constant evaluations. The quantitative-qualitative evaluation is inevitable and must be adapted to each university and museum. Evaluations must include traditional questions: What kind of pieces and collections has the university? How many museum spaces does it have? In which conditions are they? How are they communicated to the university community? How many people visit the museum? How many students? These answers can help us to solve many operative aspects, but it is important to handle this information in a horizontal level and share it with other museums, in order to optimize the museum services.

But, they must go further and include other aspects, like: Which intra and extra university audiences does the museum serve? Which are the new audience categories? Do they promote university identity? Is there museum literacy? Which museum offers do they prefer and, among these, where does the university offer stand? Which is the relation: social networks, tangible patrimony and intangible patrimony? How is the traditional museum discourse insert in non-formal teaching and entertainment? How can we deal with patrimony horizontally and transversally? Are university collections and museums innovating knowledge or are they limited to archive digitalization? ... All of this will help to comprehend the university museums' role in the modern society.

Each of these questions has a different theoretical basis and requires the creation of specific evaluation formats.To measure new scenarios and changes it is necessary that universities themselves give a protagonist role to their collections and museums. We have to avoid infra-utilization of university cultural heritage and recreate the intangible heritage, which is constantly manifested in our universities. Above all, if we consider that, up to now, higher education institutions which register museums in Mexico represent more than 10% of the national museums offer (Rico et al. 2012).

Litterature cited

Bouchenaki, M. 2004. Editorial. In: *Views and visions of the intangible (= Museum International* 221-224) 56: 5-10.
Coordinación de Universidad Abierta y Educación a Distancia UNAM. Programa 2012. www.cuaed.unam.mx/portal/index.php (accessed March 12, 2013).
Desvallées, A. & F. Mairesse 2010. *Key concepts of museology*. Paris: Armand Colin.
Didriksson, A. 2006. La autonomía universitaria desde su contemporaneidad. *Universidades* (México, UDUAL) 56, 31: 3-16.
Kirschenblatt-Gimblett, B. 2004. Intangible heritage as metacultural production. *Views and visions of the intangible* (= *Museum International 221-224*) 56: 52-65.
Olivé, L. 2007. *La ciencia y la tecnología en la sociedad del conocimiento. Ética, política y epistemología*. México: Fondo de Cultura Económica.
Rico, L. et al. 2012. *Museos universitarios de México. Memorias y reflexiones*. México: UNAM-UAEM-UIC y CD interactivo.

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Keywords

Tangible and intangible heritage - Social development - Knowledge societies

2.

Positioning academic heritage. Challenges for universities, museums and society in the 21st Century Ghent, 17-20th November 2013

Positioning academic heritage: Challenges for universities, museums and society in the 21st Century

Danny Segers, Willem Dedobbeleer

Abstract

In this introduction to the UMAC journal Managing University Museums, some general insights about the nature of academic heritage are highlighted. The particular case of positioning academic heritage within the legislative framework is explained. Flemish academic heritage risks to fall between the different relevant legislations, which causes huge challenges for the people involved with managing the heritage. As it is assumed that throughout the world there are similarities with the Flemish case, this was for Ghent University the incentive to organize an international colloquium on positioning academic heritage, focussing on four relevant topics.

Introduction

Many universities have elaborate object collections. Most of those collections originate from scientific research purposes or from an educational context. Some core collections are often attributed to a certain professor. He/she often is the central person who started a new fundamental scientific research or who renewed teaching in a certain discipline by using special demonstration equipment.

When those objects are no longer actively used for these original purposes and are deemed valuable enough to be kept and preserved, they become "heritage".

Discussion

1. Positioning academic heritage

1.1. What is academic heritage and what is the difference with scientific heritage?
How can we define "Academic Heritage"?
In the Netherlands, on the webpage of the Foundation of Academic Heritage (SAE "Stichting Academisch Erfggoed") (Boeles 2014), no distinction is made between scientific heritage, university heritage and academic heritage. It is considered as a collective name for "objects that are the spin-off of the scientific activity through the ages". Nonetheless, the link with the heritage of the universities is ubiquitous throughout their activities.

Within the academic heritage project of the Interuniversity Platform for Academic Heritage in Flanders, funded by the Flemish Department of Arts and Culture, academic heritage is defined as (Interuniversitair Project voor Academisch Erfgoed 2014) "collections [that] are important witnesses of institutional, scientific, cultural and social changes in the histories of universities and society". Many domains are covered by this broad definition. The scope of the project itself is, however, limited to the tangible and intangible aspects of objects which are the result of the activities in education and research at the universities and university colleges.

UNIVERSEUM, the European Academic Heritage Network, on its turn, announces on its webpage (Talas 2014) that they are concerned with academic heritage in its broadest sense, tangible and intangible. It aims at the preservation, study, access and promotion of university collections, museums, archives, libraries, botanical gardens, astronomical observatories, etc. Universeum is open to heritage and museum professionals, researchers, students, university administrators and all those involved with university heritage.

Above all, it is clear that academic heritage has a very close connection with the broad activities within universities and/or university colleges. This means that the objects present within an academic collection have to be regarded within a much broader scope. There is an interrelation with other academic activities (such as teaching, research, ceremonies, festivities, etc.) and also with the history of the institution (as embodied in the professor databases, university libraries, university publications, university archives, etc.).

This means that in this contribution, we make a distinction between "academic heritage" on the one hand and similar (instrument and object) collections from industrial laboratories or in private ownership on the other hand. Here, we define the latter as "scientific collections". The type of objects (e.g. microscopes) may not be so different, but the main difference between the types of collections comes forward when the context and the interrelation with other aspects around the objects is taken into account.

For the private collections, the owner has built up the collection because of a certain personal interest, e.g. in a particular type of instrument (astrolabes, microscopes). The interrelation between the object and the original user and context of use of this object (e.g. the scientific output produced with it) is lost.

For the collections from industrial laboratories there still is a connection with the policy of the firm in question. It tells a story about industrial research and product development and production. However, one of the key objectives of academic institutions is not present: there is no interrelation with teaching/education.

1.2. Where to position academic heritage at universities in Flanders?
In Belgium, Culture and Heritage is the domain of the regional governments. One way of coping with the academic heritage at our universities in Flanders could be to regard it as an element within the Cultural Heritage legislation, making it eligible for structural support and perhaps funding through the Agency of Arts and Heritage of the Flemish administration.

In the Flemish administration, however, funding an academic museum through the Cultural Heritage legislation raises two questions:
Academic collections also have an active role in education and research, thus their primary role is not limited to exhibition and conservation.
As a result of this active use of the objects, it is suggested that the collections ask for support by the Ministry of Education or by the Ministry of Innovation.

For the people involved with academic collections, this point of view raises on its turn some key issues.
It is important to understand that research on academic collections is different from fundamental research. Up to now, not a single academic collection succeeded to get any funding for research from the Research Foundation - Flanders (Flemish administration) or the Ministry of Innovation (Flemish administration). However the equipment, when it was used as research or demonstration equipment, was financed by those instances. This heritage is inextricably bound up with the evolution of research and teaching as financed by the government or the instances for fundamental research.
As museums do get funding for their activities in education and research on their collections, why could academic museums or collections not be eligible for the same kind of funding? Yes, there are differences in some types of education and research. But there are many similarities as well. Moreover, academic museums are also active in the kind of education and research that other museums do, namely focussed on the general audience (and not only for students and scholars).
For the Flemish educational department or universities and university colleges, taking care for their heritage is not part of their policy. Also, heritage is not incorporated in the Decree for Higher Education.
If an active role of academic collections in education is an argument not to support academic heritage, this would contradict the definition of Cultural Heritage itself as defined by The International Council on Monuments and Sites, ICOMOS (Brooks 2002):
"Cultural Heritage is an expression of the ways of living developed by a Community and passed on from generation to generation, including customs, practices, places, objects, artistic expression and values. Cultural Heritage is often expressed as either Intangible or Tangible Cultural Heritage."

In essence, this all implies that academic heritage in Flanders risks to fall between each legislative framework, meaning Cultural Heritage, Education and Innovation. It is clear that the people throughout the Flemish universities with a role in managing academic heritage have an important responsibility on their own to try to break this impasse and put academic heritage on the legislative agenda.

2. Colloquium 'Positioning Academic Heritage: challenges for Universities, Museums and Society in the 21st Century, (Ghent University, November, 18-20, 2013)

Probably, the Flemish case sounds familiar for universities throughout the world. Surely, questions concerning each university museum and collections are not limited to the objects of the collections alone. The collections have to be considered within a much broader context of the activities within the university (college). The main objective is the question how to treat our academic heritage and how to position it within the much broader context of our cultural heritage and educational and research policy.

As Ghent University had indeed the idea that this important issue was not only limited to Flanders, but was rather common throughout the world, it took the initiative to bring together researchers, experts and professionals from the field throughout the world and to share ideas and expertise among each other.

This resulted in the organization of an inspiring international colloquium that took place from November, 18th to November, 20th 2013 in "*Het Pand*", Culture and Convention Centre of Ghent University, located in the hearth of the medieval city centre. It was co-organized by the U4 consortium, which is a collaboration between the universities of Ghent (Belgium), Göttingen (Germany), Groningen (The Netherlands) and Uppsala (Sweden). The organization of the colloquium was supported by a local organizing committee and an international scientific committee (For the members of both committees, see Ghent University Museums 2014a). The colloquium also fitted within the project of Ghent University to establish a new, global university museum about the scientific practice.

In order to discuss the topics properly, the central question of the colloquium was subdivided into four sessions (Ghent University Museums 2014b), namely:
Academic Collections and Heritage: how to bring university collections together
Science Popularization and Communication
Relevance to Society
Museum Management.
This subdivision incorporated diverse aspects of dealing with academic heritage. This wide range of topics was indeed one of the key assets of the colloquium.

Fig. 1
Opening session of the international colloquium "Positioning Academic Heritage. Challenges for Universities, Museums and Society in the 21st Century"
Photo: Alexander Jonckheere (Ghent University Museums)

More than 80 participants from all over the world attended the colloquium, which was opened by Prof. Danny Segers (Spokesman Ghent University Museums), Prof. Freddy Mortier (Vice-rector Ghent University), Daniël Termont (Mayor of the City of Ghent), Prof. Hugues Dreyssé (President of UMAC) and prof. Sofia Talas (President of Universeum). Each session was introduced by two invited speakers. Another 34 participants presented a contributed talk. The colloquium was finally concluded by parallel discussion sessions about the four topics of the colloquium.

Conclusion

It was an inspiring colloquium for all participants with interesting insights, ideas, contacts and best practices. The 7th edition of the UMAC-Journal publishes the contributions of most of the invited speakers and the general conclusions of the colloquium. Therefore, thanks to UMAC and all contributors, a tangible result of the colloquium is hereby presented.

Acknowledgments

We would like to thank Simon Leenknegt, project officer for the Interuniversity Platform for Academic Heritage Flanders, for carefully reading the manuscript and acting as a sounding board.
For financially supporting the colloquium we also thank The Research Foundation – Flanders, Ghent University, the Faculty of Arts and the Faculty of Sciences.

Literature Cited

Boeles, E. 2014. *Wat is academisch erfgoed?* www.academischerfgoed.nl (accessed March 3, 2014).
Brooks, G. 2002. *ICOMOS, International Cultural Tourism Charter. Principles and guidelines for managing tourism at palaces of cultural and heritage significance.* www.icomos.org (accessed March 11, 2014).
Ghent University Museums 2014a. *Organizing committees*. www.sciencemuseum.ugent.be/colloquium/organizing-committees.html (accessed March 11, 2014).
Ghent University Museums 2014b. *Sessions*. www.sciencemuseum.ugent.be/colloquium/sessions.html (accessed March 11, 2014).
Interuniversitair platform voor Academisch erfgoed 2014. *Wat is academisch erfgoed*. www.academischerfgoed.be (accessed March 10, 2014).
Talas, S. 2014. *UNIVERSEUM*. http://universeum.it/index.html (accessed March 3, 2014).

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Keywords

Academic heritage – Ghent university museums – Challenges

Challenging collections: The public engagement role of the University of Aberdeen's Museums

Neil Curtis

Abstract

While many university museum collections have developed from close links between disciplines, research and collecting, collections have also been part of the public face of universities for centuries with donations by alumni and friends. In Scotland, there is now an explicit recognition by government of the importance of public engagement and the social impact of universities alongside their teaching and research roles, with resulting opportunities and challenges for university museums. This paper focuses on the response of the University of Aberdeen's museums and their role in the university's public engagement with research strategy. In particular, it considers how the museums' exhibitions, schools service and events programme have been affected, and how ideas of co-curation and co-production of research have affected the roles of academics and curators. It also discusses how changes in university teaching and the development of research that focuses on the history, social and political roles of museums is highlighting the importance of museum processes and activities in place of collections-based research and teaching. The paper argues that there is thus a specific role for university museums as places for challenge and experimentation instead of their traditional role as repositories of factual knowledge.

Introduction

The University of Aberdeen's museum collections have a long history, from the acquisition of valuable items to support the prestige of a Renaissance institution, including what is perhaps the earliest

date in Scotland for the acquisition of a specimen for a museum–1727 (Curtis 2012). While the 20th century saw a weakening of the relationship between the museums and the rest of the university, the past decade has seen many changes as the university's museums have become more involved in teaching and research, while the formal acknowledgment of the importance of public engagement has had a significant impact on activities. This paper considers these developments to argue that university museums now have an opportunity to become radical places of challenge and experimentation that lie at the heart of academia, instead of being conservative institutions controlling access to supposedly factual knowledge.

The University of Aberdeen and the creation of its museums

The first university in Aberdeen was King's College, founded in 1495 near the cathedral. Although the North-East of Scotland was the region least affected by the ravages of the Reformation, many of the college's possessions were dispersed or destroyed, with rare survivals including the oak choir stalls of King's College Chapel, some books, charters and one panel of a triptych from the chapel which depicted the founder, Bishop William Elphinstone (McLaren 2000). The Reformed King's College was joined in 1593 by a second college, Marischal College. The Calvinist attitudes of the reformed Church of Scotland were probably inimical to the creation of museum collections, unlike Italy where one of the most impressive museums was that of the Jesuit College in Rome. Instead, the colleges established impressive libraries, including the donation to Marischal College of the personal library of Thomas Reid (d.1624), Latin Secretary to King James VI (Beavan, Davidson & Stevenson 2011).

Through the eighteenth century, Enlightenment thinking took a strong hold in Aberdeen with, for example, James Beattie (1735-1803) and Thomas Reid (1710-96) both teaching in King's College (Carter & McLaren 1994). It was in this context that material started to be assembled by members of staff to support their teaching, such as William Ogilvie who established a demonstration collection of coins, fossils and zoological specimens in King's College from the 1760s (*ibid*) and with some material being preserved in the college libraries in a way that we would today recognise as resembling a modern museum collection. The surviving records suggest that these collections were very diverse, rather than being the result of disciplined, or disciplinary, collecting. Nonetheless, a room was opened as the college museum in 1786 in Marischal College (Curtis 2007). The construction of new buildings in both colleges included purpose-built museum galleries, with that in Marischal College opening in 1837 at the ceremonial heart of the institution, on the raised first floor next to college hall and library. The collections included material collected in North America, Polynesia and Africa, catalogued alongside preserved animal specimens, geological specimens and Classical statuary, alongside manuscripts, rare books and portraits.

Rather than being primarily a teaching or research resource, it can be argued that such a museum marked and amplified the status of the institution. There are three aspects to this. First, donations by college professors, graduates and local dignitaries emphasised the centrality of the colleges in elite social networks, emphasised by the recording of details of donors in the earliest listings of the collection. The troubled politics of the eighteenth century affected both colleges, as the claims of the Stuarts to the throne had many Jacobite adherents in the region. As a result, the defeat of the Jacobite Rising of 1715 saw the patron of Marischal College, the Earl Marischal, disinherited and many staff expelled from both colleges (Carter & McLaren 1994). Where loyalty to the Stuarts had previously been seen in the display of portraits of the Stuart monarchs, instead a large portrait of the Earl of Bute, prime minister to King George III, was to take pride of place in the Hall of Marischal College.

Second, as institutions that saw the importance of Classical learning as paramount, with the languages of teaching being Latin and Greek, the collection of Classical antiquities was important. A statue of Aesculapius in Marischal College, composed of an antique head and eighteenth-century reconstruction of the body, stands as a perfect synecdoche. Likewise, a rusty iron loop was acquired as supposedly part of the chariot of the Caledonian leader Calgacus, who was recorded by Tacitus as having been defeated at the battle of Mons Graupius in Scotland by the Roman army. A section of a later nineteenth century catalogue for 'Romano-British Antiquities' shows the continuation of this importance, though ironically all items there recorded can now be seen to be very different origins, as does the creation of a large coin cabinet which includes many examples of Ancient Greek and Roman coins.

Third, the place of material that would have been seen as 'primitive' had a part to play in this approach. Whether deriving from contemporary contacts with non-European people, including items collected in the South Pacific, Africa or North America, or local antiquities from a barbaric past, such as a set of branks (scold's bridle), these items were regarded as 'Curiosities'. Most dramatic among these is a Greenlandic kayak which was found a few kilometers north of Aberdeen about 1720 with an Inuit man on board who died shortly afterwards. The display of such items would have helped to emphasise the international connections of the colleges, at the same time emphasising the intellectual distance between the people who made and used these things and the values of Christianity and Classical civilisation expounded by teaching in the colleges.

The two colleges, each teaching a similar range of subjects, were fused to form the University of Aberdeen in 1860. The teaching of arts and divinity became focused on King's College, while in Marischal College the teaching of science and medicine predominated (Carter & McLaren 1994). As a result, the two general college museums took on disciplinary characters with collections moved accordingly, so that that in King's College became known as the 'Archaeological Museum' by the 1880s, in which the display of Egyptian antiquities related well to both the history of writing and to Biblical history, while the museum in Marischal College was re-established as a natural history museum.

The growth of scientific disciplines in the nineteenth century saw collections become more important as teaching resources with a range of new departments and associated museums being established. New buildings at Marischal College opened in 1906 in which disciplines such as geology, surgery, zoology, anatomy, surgery and education each included a museum alongside laboratories and lecture theatres. As part of this scheme, a new library was built and the professor of Anatomy, Robert Reid, was responsible for opening a new 'Anthropological Museum' in the old library (Reid 1912). This museum drew together the collections of the Archaeological Museum in King's College, ancient Greek pots and coins that had been housed in the library, the Wilson Museum of Classical and Near Eastern archaeology, ethnographic material previously displayed in a small museum in the Anatomy Department and other museum material from elsewhere in the university (Southwood 2003b). Reid was also responsible for the Anatomy Museum on a lower floor of the college, resulting in a spatial metaphor dividing the study of the body from the study of culture. With the Anthropological Museum displaying material relating to archaeology and social anthropology, this complex clearly shows the conception of 'three-field' anthropology that was dominant at the time and within which Reid operated.

The collections of the Anthropological Museum saw their most rapid growth in the early twentieth century as alumni who had served overseas as missionaries, soldiers and colonial administrators donated their collections to the museum (Southwood 2003b). Prime among these was Sir William MacGregor, son of a farm labourer from Aberdeenshire who studied medicine in the university. After being Medical Officer in Fiji, he went on to be governor in New Guinea, Nigeria, Newfoundland and Queensland and donated his collection to show other students that there was 'more to the world than Aberdeen and twal mile roon' (a twelve mile, 20km, radius) (Hunt 1986). The displays and catalogues of the Anthropological Museum were arranged in an order that resembled a route around the world from Europe, through North Africa, Asia, the Americas, Polynesia, Melanesia and Australia to Africa south of the Sahara. Metaphorically confirming the idea of the Western gaze as students were free to observe other cultures laid out in front of them, the displays also highlighted race as a structuring principal, with the ancient Egyptian collections placed adjacent to those of Europe, while those of Africa 'South of the Sahara' were placed adjacent to Australian and New Guinea (Southwood 2003b).The museum would therefore have had an active role in the teaching of medical students, normalising ideas of race encountered in both comparative anatomy and in the cultural collections before many of them went on to serve as medical officers in overseas colonies.

Becoming public museums

While the early twentieth century therefore saw very close links between academic disciplines and collections, this association weakened through the century with a lessening in the academic value of collections. While some survived due to a continuing link between teaching, research and collections (e.g. Zoology and Geology), other museums subsequently disappeared entirely (e.g. Education), while others were absorbed into other collections (e.g. Surgery). Despite the dissolution of anthropology into three separate disciplines during the twentieth century, the curatorship of the Anthropological Museum continued to be held by anatomists until 1979. The combination of this lack of engagement with the developing disciplines of archaeology and anthropology, and the decreasing interest in material culture by these disciplines as they developed an interest in aspects

such as language and social structure, therefore led to the Anthropological Museum becoming increasing dissociated with teaching and research. Indeed, apart from research associated with the important collections of human remains that had been found in association with prehistoric pottery in Scotland (such as Beakers), there is little evidence of academic research making use of these collections during most of the century.

As the activities of the university's museums came to more closely resemble those of other public museums, their role of being the public face of the university became more significant. The appointment of the first professional curator in 1979 saw major changes in the displays of the museum in Marischal College to make them more attractive to the visiting public (Southwood 2007), resulting in it winning the Scottish Museum of the Year Award in 1985 (Curtis, 1995). Strong links also developed with museum professional bodies, such as the Scottish Museums Council and the Scottish Society of Museum Archaeologists, while the establishment of UMIS: University Museums in Scotland demonstrated the increasing commonality of museum staff in different institutions as they saw their loyalties to the museum profession grow in place of a prime identification with an academic discipline in their home institutions. The increasing professionalism of the University's museums has continued, with basic standards now enshrined in the Museum Accreditation scheme and more professional staff now appointed to the university's museums. The removal of teaching from Marischal College to new buildings in King's College and the medical school near Aberdeen Royal Infirmary ultimately resulted in the closure to the public of the museum in Marischal College, with a new small museum, King's Museum, being opened in King's College to display changing exhibitions drawn from across the collections. The art collection is displayed in a variety of venues across the university, while the university's scientific collections continue to be housed in their respective academic departments with curatorial responsibility involving academic staff. Of these collections, the Zoology Museum is open to the public in galleries purpose built in the 1970s, while there are small displays elsewhere of material from the Herbarium, Geology, Pathology & Forensic Medicine and Natural Philosophy collections. The Anatomy Museum has been moved to new accommodation in a medical teaching building as access is restricted by legislation to medical students and staff.

Despite their status as collections 'Recognised' by the Scottish Government as being of national significance, their size (c300,000 items) and wide scope, there are only seven core staff and limited facilities. While this is a significant increase from the four permanent posts at the end of the 20th century, it demonstrates the relative unimportance accorded to the museums during the previous decades. The scientific collections have also seen a decline in the availability of technical support offered to their Honorary Curators (academic staff responsible for the collections), which has been further exacerbated by the retiral of a number of Honorary Curators.

Research and teaching

As discussed above, the teaching use of the museum collections by academic staff had declined by the later twentieth century, surviving in only a few courses in subjects such as medicine, geology and the life sciences. Museum staff have, however, become increasingly active in university teaching, initially providing classes in subjects closely allied to the collections, such as History and History of Art. The establishment of new degree programmes in Anthropology, Archaeology and Scottish Ethnology has been particularly important in offering opportunities for the collections to be used for teaching. There has also been a growth in disciplines in which the collections themselves may not be of prime interest, but which are very interested in the social role of museums and in the ways in which collections have been developed and used. These include subjects such as Medical Humanities, Visual Culture, Law, Education and Museum Studies, which have also offered a helpful critical challenge to the thinking of museum staff about the purpose of museums today.

Although this increase in university teaching and research by museum staff has come at a cost to curatorial work, it has resulted in much greater contact with academic staff. This has meant that the needs of academic staff and students are properly understood by the museum, while academic staff treat museum staff as their peers. The contribution to teaching and its impact on museum activities was recognised by the university through the appointment of an additional member of staff to the museum.

Research using the museum has also increased to cover historical, collections-focused and practice-focused aspects, such as work on the history of the university's art collection (Pryor 2002), the cultural history of the Marischal College museum in the twentieth century (Southwood 2003a), ancient Greek pottery (Moignard 2007), studies of antiquarianism and museum history (Curtis, 2007), and repatriation from museums (Curtis 2008, 2010). Funding from the Leverhulme Trust has also

enabled the museum to lead a project which included radiocarbon dating and stable isotope analysis of Beaker-associated human skeletons in North-East Scotland and a study of the pottery and other grave goods (Curtis & Wilkin 2012), while a Chemistry PhD has investigated the composition and manufacture of Iron Age glass beads (Bertini *et al.*, 2011). Alongside this work external researchers continue to make use of the collections as part of wider studies.

The opening of King's Museum to house changing exhibitions, and the move of some staff to King's College has further strengthened the social connections between the museum staff and the rest of the university. As a result, the museum is now much more closely integrated into the university than in the past, with staff serving on university committees and being more involved in consultation and discussion. With the decline in the importance of Honorary Curators, in 2011 a new scheme was established in which academic staff who work with the collections are being appointed as Honorary Curatorial Fellows. These posts do not have curatorial or managerial responsibility for collections, instead having enhanced rights of access so that they can study material or use it for teaching without the need for supervision by museum staff. The museum also featured in the university's strategic plan (University of Aberdeen, 2007) and its development has been highlighted as part of one of the university's research theme focusing on 'North', with the proposal for the establishment of a 'Museum of the North' on campus. While in some ways this can be seen as a return to the place of the museum a century ago, connections are now not focused on individual collections and disciplines but are able to make links with new areas of study.

Links across traditional disciplinary boundaries are also seen in the exhibitions in King's Museum which include material from both the scientific and cultural collections. There has also been a staff re-structuring, in which staff previously only responsible for the museum in Marischal College are now also working to support the scientific collections, with a single forward plan for all the University's museums in place of separate ones for each collection.

Public engagement with research

The university's museums have long had a public role, including visits by local school classes since the 1920s, later developing into a schools service that focused on object-handling sessions linked to curricular topics led by curatorial staff (Curtis 2006). Since the late 1980s there have been attempts to raise external funding from sources such as the local authorities, but this has only been intermittently successful, though an educational centre using the Zoology Museum was established in 1995. Initially with support from Museums Galleries Scotland a full-time post of Curator (Learning and Access) has been established. Previous successful internal funding has been the result of demonstrating the value of the links established with schools as part of student recruitment, while the national recognition of the importance of demonstrating the public 'impact' of research offers a current focus for this work. Likewise, the exhibition, evening lecture and events programmes are designed to attract a variety of people from without the university community.

As part of the structure for assessing the value of government research funding, the Research Excellence Framework has been established across the UK. As well as assessing the quality of research, this is also considering the public benefit of that research with an 'explicit element to assess the 'impact' arising from excellent research, alongside the 'outputs' and 'environment' elements, in which case studies have been submitted to demonstrate the 'social, economic or cultural impact or benefit beyond academia that has taken place during the assessment period, and was underpinned by excellent research produced by the submitting institution within a given timeframe' (REF2014 2011, 1). As a result, a 'Manifesto for Public Engagement' that stated that 'research organisations have a strategic commitment to public engagement' (NCCPE 2010) has been signed by many universities, including Aberdeen.

While in some ways, such statements merely formally recognise long-standing practice by university staff, they have has also offered ways for university museums to highlight their public role as one of the missions of the university alongside teaching and research. In Aberdeen, a Public Engagement with Research Unit has been established with additional support following the only successful application in Scotland for public engagement 'Catalyst' funding by Research Councils UK. It is also worth noting that the Vice-Principal for External Affairs now has responsibility for issues relating to museums.

The museums team has therefore engaged in a review of all activities, driven partly by the demands of museum Accreditation, the university's new strategic plan and the focus on public engagement, but also from the opportunities raised by a recently restructured team that includes a significant

proportion of recently appointed staff. At the same time as continuing to deliver a service that meets existing expectations, this can be unsettling, but it is a rare opportunity to establish a fresh model for the university's museums. The museum's new strategic plan therefore highlights priorities for development, including that 'the museum will be an important aspect of the University's research profile, reflecting major research themes as well as the strengths of the collection', that 'the museum will be part of a cultural hub for the university, contributing to its social and intellectual life through events, recruitment, public engagement and being an inspiring and welcoming part of campus' and that 'the museum collections and academic research will lie at the heart of the public engagement programme, contributing to public lectures, schools programme, exhibitions and other events, and ensuring a wide disciplinary spread of activities.'
(University of Aberdeen 2013). Relating to the focus on public engagement with research, there have been a number of developments:

• Increasing the use of information technology to improve access to the collections and the international profile of the museums. This is building on the 2000-2003 'LEMUR: Learning with Museum Resources' project which had £183,000 funding from JISC (the Joint Information Systems Committee of the UK Higher Education Funding Councils) which developed online resources for university teaching and the development of an image database. Other funding resulted in the creation of an online version of the museum database, along with the more recent 'Revealing the Hidden Collections' project, which was funded by the Scottish Funding Council and led by Aberdeen. This has created a single online portal to all electronic records of the museum collections of the Scottish university museums, including almost 2000 detailed collection descriptions to provide information about the entire collections and an increased number of images. Rather than creating a new database, this project harvests data from institutional databases to ensure that the portal is sustainable, with each institution responsible for maintaining quality and updating records.

• Increasing engagement with students, including continuing involvement of the museum in a widening range of taught courses as well as the development of a postgraduate programme in Museum Studies. This is not only about providing vocational training for those interested in working in museums, but also providing opportunities for a wide range of students to learn ways of communicating their learning with other people. Recent curriculum reform in the university has also highlighted the importance of transferable skills and inter-disciplinary thinking: both aspects that offer opportunities for the museum to contribute to teaching a wide range of disciplines. Curriculum reform has also highlighted the 'co-curriculum', so there is now an increased emphasis on developing a range of volunteering and internship opportunities for students, supported in 2011-12 by the appointment of a Museums Galleries Scotland intern focusing on volunteer development and the inclusion of museum volunteering in a university award scheme. At the same time, the museum has identified student-age people as a key demographic for marketing, resulting in an increased use of social media and opportunities for involvement in the museum.

• Participation in externally funded public engagement projects. This has included a series of four Arts and Humanities Research Council 'Connected Communities' projects in which the museum has provided advice to community groups about the care and documentation of collections and the creation of exhibitions. Similar work has seen the museum provide curatorial advice to local museum and heritage groups, which is also helping in the development of resources used in university teaching.

• The involvement of university staff and students in the museum, including curating exhibitions to ensure that museum exhibitions reflect current academic thinking and that they form part of the university's public engagement with research agenda. This includes the Museum Studies students having responsibility for the curation of the summer exhibition in King's Museum, with other exhibitions curated with staff in Archaeology, Anthropology, and Food and Nutrition. Individual staff who use the museum for teaching and research have been appointed as Honorary Curatorial Fellows. This status brings with it enhanced access to the collections that enables unsupervised use of the collections, but without the managerial and curatorial responsibility that Honorary curators had in the past. Over twenty such staff have now been appointed from a wide range of disciplines, who also form a valuable network of champions throughout the university.

• Developing the service to schools to bring together the collections, school curriculum and expertise within the university. This is including the use of a full-size re-creation of a 17th century Hainhofer cabinet of curiosities for use with schools and other groups to encourage people to think about ideas of collecting, classification and display, and greater involvement with the School of

Education in initial teacher education. As well as providing a service that is relevant for schools, the university's museums will also be able to contribute to educational research and to new approaches to pedagogy and the curriculum.

A radical vision for university museums

Linking all these projects is the attempt to develop the specific role for a university museum. This is only possibly by building strong relationships with a range of people in the university so that the museum can become a core part of the institution's strategy. Teaching, research and public engagement are not separate aspects, nor do they undermine traditional curatorial aims, but are intertwined and inseparable institutional priorities that can offer opportunities for university museums. For example, the museums' forward plan aims that 'exhibitions will focus on displaying the collection in accessible yet challenging ways, making strong links between academic research, the collections and the public' (University of Aberdeen 2013).

As with other museums, the present is a time of great change, with traditional practices increasingly challenged and the social role of museums under greater scrutiny, but with many new opportunities. As part of institutions that value new thinking, university museums can experiment with ways of bringing together aims that might be seen as contradictory, such as their role as public museums, developing disciplinary collections-based research, being places of museological critique and building closer links to academic teaching. Among the approaches that support this vision is the manifesto for creating science, technology and medicine exhibitions by Ken Arnold and Thomas Söderqvist (Arnold & Söderqvist 2011), which was inspired by Dogme 95, a manifesto to purify the art of film-making proposed by Danish film directors Lars von Trier and Thomas Vinterberg. The 'Museum Dogme' makes various suggestions, including that exhibitions should be research-led and draw on real expertise, that those people who create exhibitions should be credited and held responsible for their contents and impact. They also suggest that exhibitions should be made for inquisitive adults, rather than 'under-achieving primary school children' and that curators should not 'be afraid to bend, break or reinvent the rules'.

The challenge facing the University of Aberdeen's museums, and indeed many other university museums, is twofold. First, there is the decline of the old model of discipline-specific collections supported by their host academic disciplines and an increasing managerial challenge to justify their survival. Second, there is the development of the Humboldtian model of the inter-relationship of university teaching and research to include the importance of enabling public benefit. Without developing a clear role for university museums, there is a risk that the growth of new approaches to public engagement could bypass museums and so lead to their further decline. I argue that by embracing ideas such as the Museum Dogme, university museums can become places where excellent collections can combine with critical consideration and experimentation to become the natural home for the 'public intellectual' to work with a wide public. Doing this will involve much greater collaboration with university staff, students and the public in the co-production of museum research, exhibitions and other activities, instead of seeing museums and their staff as repositories of expertise. This will be much less predictable or controllable, but will ensure that university museums lie at the heart of the purpose of universities.

Acknowledgements

This paper has grown out of discussions with many people about the history of the University of Aberdeen's museums and the purposes of museums and collections. I would particularly like to thank colleagues past and present in the University and fellow members of University Museums in Scotland, while I would also like to thank the organisers of the Ghent colloquium for creating such a friendly and interesting discussion in person and on paper.

Literature cited

Arnold, K. & T. Söderqvist 2011. *A manifesto for making science, technology and medicine exhibitions.* http://www.museion.ku.dk/2011/02/a-back-to-basics-manifesto-for-creating-museum-exhibitions/ (accessed April 26, 2016).

Beavan, I., P. Davidson & J. Stevenson (eds.) 2011. *The Library and Archive Collections of the University of Aberdeen: An introduction and description*. Manchester: Manchester University Press.

Bertini, M., A. Shortland, K.B. Milek & E.M. Krupp 2011. 'Investigation of Iron Age north-eastern Scottish glass beads using element analysis with LA-ICP-MS'. *Journal of Archaeological Science* 38, 10: 2750-2766.

Carter, J.J. & C.A. McLaren 1994. *Crown and Gown 1495-1995: An illustrated history of the University of Aberdeen*. Aberdeen: Aberdeen University Press.

Curtis, N.G.W. & N.C.A. Wilkin 2012. 'The regionality of beakers and bodies in the Chalcolithic of North-East Scotland'. In: *Is there a British Chalcolithic? People, place and polity in the later 3rd millennium*, eds. M.J. Allen, J. Gardiner & A. Sheridan, Prehistoric Society Research Paper 4 (Oxford: Oxbow Books), 237-256

Curtis, N.G.W. 1995. An archaeological approach to display: The "Encyclopaedia of the North-East". *Scottish Archaeological Review* 9-10: 142-144.

Curtis, N.G.W. 2006. Education and Marischal Museum: A century of teaching, learning and research. *Education in the North* 14: 31-38.

Curtis, N.G.W. 2007. "The original may yet be discovered": Seven Bronze Age swords supposedly from Netherley, Kincardineshire. *Proceedings of the Society of Antiquaries of Scotland* 137: 487-500.

Curtis, N.G.W. 2008. Thinking about the right home. Repatriation and the University of Aberdeen. In: *Utimut: Past Heritage – Future Partnerships. Discussions on repatriation in the 21st century*, eds. M. Gabriel & J. Dahl (Copenhagen/Nuuk: IWGA/NKA), 44-54.

Curtis, N.G.W. 2012. Public engagement, research and teaching: The shared aims of the University of Aberdeen and its museums. In: *A Handbook for Academic Museums: Beyond exhibitions and education*, eds. S.S. Jandl & M.S. Gold, (Aberdeen: MuseumsEtc.), 43-68.

Hunt, C. 1986. New displays in Aberdeen. *Scottish Museum News*: 6-7.

McLaren, C.A. 2000. The Chapel, the College and the University, 1560-1945. In: *King's College Chapel, Aberdeen, 1500-2000*, ed. J. Geddes (Northern Universities Press), 157-164.

Moignard, E. 2007. *Corpus Vasorum Antiquorum: Great Britain – Aberdeen University, Marischal Collection*. British Academy.

NCCPE (National Co-ordinating Centre for Public Engagement) 2010. *The engaged university - A manifesto for public engagement.* https://www.publicengagement.ac.uk/why-does-it-matter/manifesto (accessed April 26, 2016).

Pryor, M.P. 2002. *Painting the profile: Imagery and identity in the art collection of King's and Marischal Colleges, 1495-1860*. Aberdeen: University of Aberdeen PhD thesis.

REF2014 2011. *Decisions on assessing research impact* http://www.ref.ac.uk/pubs/2011-01 (accessed April 26, 2016).

Reid, R.W. 1912. *Illustrated catalogue of the Anthropological Museum, University of Aberdeen*. Aberdeen: University of Aberdeen.

Southwood, H. 2003a. *A cultural history of Marischal Anthropological Museum in the twentieth century*. Aberdeen: University of Aberdeen PhD thesis.

Southwood, H. 2003b. The history and wonder of Marischal museum's catalogues, 1900-2000. *Journal of Museum Ethnography* 19, 94-108.

Southwood, H. 2007. Dust, history and politics: Assigning meanings to objects at Marischal Museum, 1980-2000. *Journal of Museum Ethnography* 19: 121-134.

University of Aberdeen 2011. *Strategic Plan 2011-2015*. http://www.abdn.ac.uk/cad/documents/DSC_Case_Studies_May12/strategic-plan-2011-2015.pdf (accessed April 26, 2016).

University of Aberdeen 2013. *University of Aberdeen Museums Strategic Plan 2013-18*. http://www.abdn.ac.uk/museums/about/policies.php (accessed April 26, 2016).

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Keywords

University of Aberdeen – Public engagement – Museum Dogme

Academic heritage and science communication

Monique Mourits

Abstract

The University Museum of Utrecht, the Netherlands, keeps a collection of 182,000 objects, documenting the history of the university and its research and teaching. The museum is a bridge between university and society, and aims at increasing the understanding of science and the enthusiasm for research and scientific education. The starting point for exhibitions is to transform the visitor into a researcher who explores the exhibits and gets inspired by science and scientists.

In recent years the museum gained experience with developing interactive exhibits and gaming in the museum. The challenge for the coming years is to combine this experience with the special collections of the university.

At Utrecht University scientists work on solutions to issues in society that can materially affect our future. Because of its embedding in the university, the museum is in the unique position to connect the history of science with current issues and research. To realize this, the museum works closely with the Utrecht valorization centre and scientists of the designated strategic themes of Utrecht University (Fig.1).

Fig.1
Utrecht University Museum

We have something in common. Our enthusiasm for academic heritage and collections. The University of Utrecht is one of the Dutch universities that has taken good care of its heritage and has not only preserved the special collections of the University Library, but also owns a large collection of 3D objects.

When it comes to museums which preserve academic heritage, we have in the Netherlands several small and some larger museums where academic heritage is preserved and can be seen. These include archeological museums, natural history museums, even a bio diversity centre, and museums on the history of science, medical collections and natural sciences.

So why would a university in this day and age value its history and the preservation of collections? That a university *has* a museum is understandable, it stems from the past. But that a university chooses to maintain a museum, in fact, that it considers developing and creating a coherent, strong museum with all formerly separate collections together like here in Ghent, is this a natural role for a university nowadays? My answer to this question will hardly surprise you: Yes, I'm convinced it is. A university can benefit greatly from a university museum. Especially now.

This is the perspective of the owner of the collections, the provider.... but is there any real *demand* for a university museum? Are museum visitors interested in seeing academic collections in the context of a University?
Speaking from my daily experience in Utrecht, my reply is: yes. Yes, they are. Managing a collection is a costly affair, and there are limits to what a university can and should preserve. Noting that; consider how blessed are we in Utrecht with a university that hung on to so much of its past. I won't show you much of our special collections today. This is because, rather than show off the collection, I wish to share with you **why** it makes sense for a university to cherish a historical collection, or even better: **how** we make sense of that.
Doing so, I speak not only out of love for history, but also for the importance of historical knowledge and for the history of science; I speak not only out of love for beauty – but note how beautiful many of these objects are.
I also speak with appreciation for the use of the collection for outreach, because of the possibilities it offers for education (Fig.2).

Fig.2
The use of collection for outreach. A young visitor tries to use the replica of the Van Leeuwenhoek microscope

The collection is valuable as a means to connect science and science education with society, as a means to communicate about research on knowledge and how data are being collected, or created - and about the reliability of knowledge. First I will give you a brief outline on the history and development of the Utrecht collection. In 1918, in the attic of one of the historic university buildings, a special collection was found. It was a collection of about a thousand scientific instruments, from the Natural History Society Utrecht. This society was founded back in 1777. The tools that were found in the attic can be dated back to roughly 1650 to 1850. And a very nice collection it was.

And so important that the value of the collection was recognized. After the discovery of these instruments, the University Museum of Utrecht was founded. The aim was to gather knowledge about the history of the University and to encourage interest in the history of academic education. The collection of the museum grew rapidly and now covers many of the academic disciplines at the university. Growth sometimes went in large steps at a time, I will mention a few: the donation of a University History collection in 1936; the acquisition of the 18th century Zoological preparations of professor Bleuland, of the Faculty of Biology; the collections of Veterinary Medicine, Dentistry; the ophthalmology Collection from the hospital for eye diseases; the collections of the Zoological Museum; of fraternities, of the faculty of Art History and most recently, only two years ago: the collection of pharmacy. And that constitutes, more or less, the collection we now preserve, of about 180.000 objects.

What were they used for? What could you do with them? The collection gives us insight into the development of science in Utrecht and of academic education. It tells us which scientific questions were asked in different periods, which research was done, which faculty was founded. The collection reveals the different stages in science by the principles of organizing, observing, searching for explanations. Of course we don't keep these collections all for ourselves. A special collection of masks is part of the permanent exhibition in the new Rijksmuseum in Amsterdam, our oldest heart-lung machine can be seen in museum Boerhaave, a collection of art history is on display in the Van Gogh Museum for the exhibition 'Van Gogh at work' and part of our special collection Blaschka's added splendor to an exhibition at the Glass museum in Leerdam.
But still this question remains: Why does the UU preserve its collections and uphold a University Museum?

If we had never changed anything, Utrecht would have had only a historic museum. But progress is irreversible. The museum changed, it was a living and vivid institution. And that's fine, for it is because of the courage and ability to change, that we still *have* a museum in Utrecht.

We welcome about 55.000 visitors a year, mostly families with children, also many school classes. And - of course - an important target group is the stakeholders of the university: students, staff, and alumni. The mission, first phrased in 1918, changed along with the museum. In 2013 it is less about the history of education - and more about understanding what science is, what it means when knowledge is the result of scientific research and what its value is.

And there's still more to it. The University has the responsibility of sharing the results of research with society. Understanding how results of research come about helps to increase the ability of people to think about these results, to have a critical attitude towards information that comes to them through mass communication. Science and scientific research is regularly a subject of public debate. That is fine – as long as the public is equipped to engage in a debate and has understanding of how scientific knowledge comes about. The way in which the public discussion goes forward, frequently shows the importance of making societal impact of research on society visible and to enlarge understanding of science. And that continues to be relevant. Because when people are asked about their idea of science or a scientist, often they still think of the eccentric genius or the professor who scribbles incomprehensible formulas on a blackboard. The University Museum lowers the threshold to the public, forms a bridge between university and society.

That scribbler on the blackboard is Utrecht Nobel laureate Gerard 't Hooft, who wrote his formula on a plate for an exhibition at the museum. He spent many hours, days being in our museum. When he was a child, it was in a museum that his curiosity and fascination for science were awakened. And that is exactly what we aim at.
We change our visitors into 'researchers' and teach them how a scientific process works. How it might work - because theory and practice often diverge. We do show phenomena like other science museums. But it is not the straightforward transmission of knowledge that is our main goal. We want our visitors to discover what research really means, in their personal lives and for society. We do this with modern tools and interactive exhibits (Fig.3).

Fig.3
Young visitor shows Nobel laureate Gerard 't Hooft her invention

We have an exhibition on the issue of sustainability. Visitors play an interactive game to experience the impact of their own behavior on the future of our planet. This exhibition was developed in close cooperation with scientists of the Utrecht Sustainability Institute. We always work together with faculties and scientists of Utrecht University.
Recently we have gained experience with new interactive resources like games and apps. And now that we have this experience, we tend to use the collection more and more. Because it is authentic, because it's the 'real thing' that you can hold in your hands in our museum. And that is fascinating. And because we can connect history of research with contemporary, actual research projects. Thanks to this combination of academic heritage and modern research, the University Museum is able to show the long lines of scientific development; from Buys Ballot to actual climate research in Utrecht, from professor Hubrecht to stem cell research at the Hubrecht Laboratory today.

Our way of presenting the University Museum combines the best of a museum and science center, and more than that, thanks to innovative educational resources from the faculties, interactive exhibits, games and animations. In addition, we utilize the experience that we built inside the museum with cooperating with researchers, methods of inquiry-based learning and pilots in the field of interactivity.

I could give you many more examples, but I think you have the message. We show our public what is happening in Utrecht Science Park and want to engage them in science (Fig.4).

Fig.4
De werkplek Research at Utrecht Science Park. The museum's future collection?

The museum wants to contribute to a dialogue with society. A modern museum makes close connections with the public and takes the contribution of the visitor seriously. In Utrecht, we introduce next to a concept like crowdsourcing, the concept *crowd science* and shift the focus to a museum that shows the social impact of research of the UU and that interacts with the public.
And of course we keep our eyes keep open for new collection, and collection of the future.

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Keywords
Collection – Science – Outreach

Communicating scientific information to the general public

Nicole Gesché-Koning

Abstract

Disseminating scientific knowledge to broad audiences avoiding simplification and respecting the research approach is a challenging task. How to attract the public's attention, interest and participation in the research process when dealing with people from different origin, cultural background and language? Correct wording, psychology and appropriate communication tools are essential to show to non-scholars how attractive academic collections and the research process are.

Introduction

Speaking of scientific popularization places immediately the debate within the frame of 'popularization', 'scientific', 'popular science'. A brief analysis through an abundant literature on the topic reveals these words are mainly related to science.

Popularization *per se* is defined as: "making (something difficult) easily understandable to ordinary people by a simple explanation" (Longman Dictionary, s.v. *popularize*). This rather condescending definition is found also in other languages: "Volkssprache, verständlich/zugänglich machen, populäre leichtverständliche Bearbeitung", "vulgarisation scientifique, accessible au plus grand nombre"; the pejorative connotation of the Latin origin of "vulgus" marks the distance between 'popular' and 'educated' (langue "vulgaire" vs. "littéraire", vulgar language vs. literature)! Some definitions tough are less condescending: "all texts through which people relate academic knowledge to their lives and assess its claims" (Myers 1996, 41-42); "the acquisition of new science and technology for improving one's social and economic life; the de-mystification and de-dogmatization of science and technology" (Roberts, Bhola, Pehl & Cheng 1989, 30): this added social dimension to the

dissemination of science and technology is also developed by Massarani and de Castro Moreira (2004, 79): "activity in permanent process of re-construction ... striving to make it more effective and integrated in the social reality of each country"; the same idea appears in the targets of the 13th Public Communication of Science and Technology conference on *Science communication for social inclusion and political engagement* encouraging the participation of all, considering the "voice and views of locals, countryside, indigenous, and the people that are so often forgotten in the so commonly called 'public'" (www.pcst-2014 programme, accessed April 29, 2016). This social goal is clearly defined in editor Gattone's interview in *Ciencia Hoy* (2007): "to spread the social good called "scientific knowledge" acquired by a group of people trained in the scientific methodology to the rest of the society for its benefice" (translation mine). Whereas some of the above definitions associate popularization and science popularization -as if only science needed to be popularized!- scientific popularization needs to be considered in a broader sense, not limiting itself solely to science. Science popularization seems to deliberately ignore Humanities popularization. Which place is theirs? Can translation and interpretation as mentioned above not be considered as an art? And if one nowadays generally accepts that art equally needs to be popularized, then to what extent? Why not consider with Dicke (1996), popularization as the "excitement of communicating one's own excitement about science to others"? To the above considerations, let me add my own definition: whatever the topic, scientific popularization is the will to share with the broadest audience and for its benefit, one's knowledge and mainly enthusiasm in a field, for a better awareness and understanding of key scientific, cultural, social, technological and economic issues, emphasizing on the words 'communication', 'sharing', 'knowledge' and 'enthusiasm'.

Popularization: A brief tour through history

Popularization and educating the masses is nothing new. The Belgian author of the first treaty of museology Samuel Quiccheberg (1529-1567) spent his life classifying topics and objects in order to spread knowledge and make it more accessible, showing when grouped objects could be linked together to reach audiences by telling a story (Quiccheberg [1565]; Meadow & Robertson 2013). Quiccheberg became most popular through an exhibition organized at the Royal Museum of Mariemont on the occasion of the 50th anniversary of the Belgian radio and television, mere popularization tools (Mairesse 2003). His sorting of objects must be closely connected to the famous curiosity cabinets. Their access limited primarily to some 'happy few', became the core of the first public museum in the UK with Lord Ashmole (1617-1692). Today, Nardone's contemporary *Wunderkammer* presented at the Venice Biennale (2013) and at the Academia Belgica in Rome witnesses how modern the idea of a curiosity cabinet still is: works by artists living in Belgium, among which Jan Fabre and Wim Delvoye are assembled following the concept of the cabinet of curiosities from the Renaissance. The focus is set on the imaginary worlds artists create, while toying around with elements from science and superstition. The success lies in the combination of emotion generated by wonder and curiousness, which remains the best way to leading to knowledge. Why Diderot (1713-1784) and d'Alambert's (1717-1783) *Encyclopedie ou Dictionnaire raisonné des sciences, des arts et des métiers* (1751-1772) prove so successful lies in the combination of 'useful knowledge', texts scientifically acknowledged, and drawings. Photography and slide shows played another important role in popularization lectures. Abbott Moigno (1804-1884) convinced that popularization needs to use other tools than only texts, i.e. language and images, is one of the first to use from 1863 projections for his lectures describing their use in *L'Art des projections* (1872). During the 18th and 19th C. the varied optical views kept in the Royal Art and History Museums in Brussels remained one of the only ways to be informed about the world (Deltour-Levie 2009). Since 1924 curator Jean Capart created in this museum two renowned popularization tools: the famous 'Magasin des Images d'Art' and the slide library, the 'Diathèque' (Gesché-Koning 2008).

Why at all popularize?

Research is conducted thanks to public and private funding. All sponsors have therefore the right to know how their money is spent and researchers have thus the obligation to communicate the

Fig. 1
Heritage awareness.
G. de Guichen, *The story of the angel*
1986 © G. de Guichen

process and results of their research. They usually do it for their peers but too often lack transmitting these to a broader audience. An analysis of the popularization activities of researchers at the CNRS (Centre national de la recherche scientifique) conducted between 2004 and 2006 (Jensen & Croissant 2007, 4) show that 51% of researchers have not taken part in popularization activities in the past three years, 2/3 of which have at the best done one activity. The study identifies 3 categories of researchers: the so-called "majorité silencieuse" or silent majority (1 out of 2 has never participated in a popularization activity), researchers open to popularization (1 to 4 times a year) and active popularizers, among which, those in Humanities seeming more active than in science (more than 4 times a year)! Scientists have still a long way to go to fulfil their popularization mission!

Popularization: a difficult but challenging task

Scientific popularization needs to be thought, knowing exactly what type of information is to be spread and for whom. Convinced that 'scientifically correct', 'ideologically acceptable', 'effective' or 'objective' popularization of science is a reachable ideal, Cornelis (1996, 150) focuses on the conditions to be met: the need to select which information is to be explained, how it will be translated in a language suitable and understandable to a large and varied audience; most difficult, he says, scientists have to accept the idea that part of the information will be lost and that at a certain point, one is unable to really measure what has been perceived of the message, how it is understood and interpreted.
These concepts of perception, understanding and interpretation are key issues in spreading scientific information or knowledge mediation (Davallon 2004, 38). Which must be the role of the mediator and how can he/she fulfil the challenging task of playing the role of interface between the scientist and the public? Popularization must by no means be considered as a secondary discourse to science but rather another discourse, which must be considered as neither superior nor inferior (Thomas 1999 quoted in Campion 2012, 32).

The idea of excitement of communicating one's own enthusiasm about scientific matters to others seems to me the key starting point to adequately bridge the gap between the scientific and wider worlds. The same goes for sharing, which does not appear in any of the definitions quoted above. To share means to communicate and this requires a clear understanding of communication techniques. How will the message be communicated? How will the public receive it? As important as its content, this relational component of communication is too often neglected (Campion 2012, *passim*). People need to be touched emotionally to be receptive to new knowledge or unfamiliar topics. Scientific popularization must thus aim at building social relationships, searching the most appropriate media (texts, books, audio-visuals, internet, exhibitions) to serve their purpose: leading non specialists to acquire

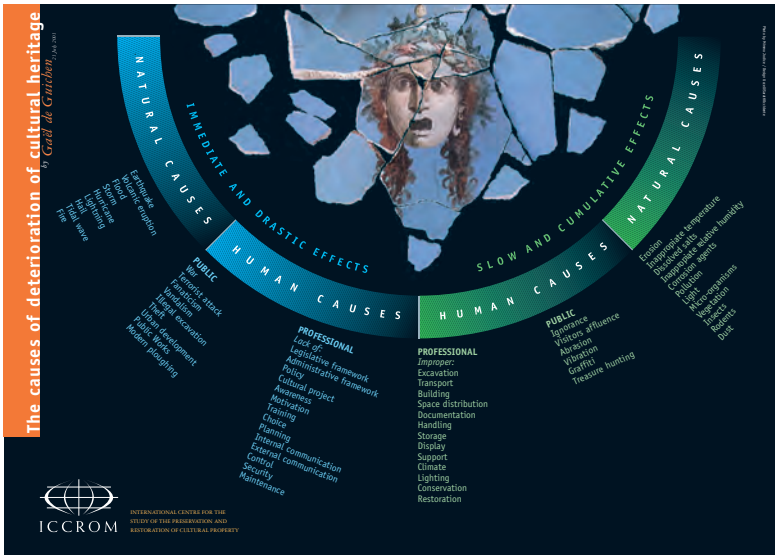

Fig. 2
G. de Guichen,
The causes of deterioration of cultural heritage - © ICCROM

new knowledge and engaging them in the research process (Jacobi & Schiele 1990, 84).
In a field I have specialized in, i.e. conservation-restoration, the scientific world is more and more convinced that an active engagement of the public is needed to protect our heritage for future generations (Fig. 1 & 2). Science alone will not prevent it from deteriorating if people continue neglecting it. The same applies to scientific environmental issues, which greatly benefit from being supported by the mass, gained to the cause of global warming and its disastrous effects or to healthier behaviours to face new diseases.

Efficient scientific popularization

To reach a broad audience and engage people in the research process needs elementary conditions. Many museums and exhibition designers still nowadays ignore some basic rules used by journalism: using clear language, making things understandable, the structure clear and interesting, encouraging curiousness, considering the person addressed at his/her level without underestimating him/her and using appropriate pictures (Serrell 1996; Ravelli 2006; Viatte 2007).

1. Clear goal and message

Following the concept of "less is more", the key to any good communication is concision, not only in wording but also regarding the quantity of ideas to be spread. At the *Prehistomuseum in Ramioul* (Belgium), former Préhistosite, which opened 2016, the entire museum - which considers itself as mediator -, its collections and activities are conceived as ONE main tool for awareness of what one knows about Prehistoric men and how one knows it. To reach this one goal various supports are used to demystify heritage and science, allowing thus the public to get the information in whatever form suits him/her best, engaging him/herself in the whole musealization process and inviting him/her to construct his/her own personal view. The public is guided in this research process by the museum team, which shares with all their personal research and hypotheses regarding following topics: what is public awareness? What does heritage preservation mean? How to combine scientific culture and respect for the natural environment? Where to place values like tolerance and neutrality, humanity and citizenship when speaking of Prehistoric times? The museum team as a whole considers itself as a mediator, an interpreter or popularizer which they define as being "an artist, a journalist, a citizen, passionate, professional, manager, educator, pedagogue, open to listening, curious, generous, modest and ambitious. If the museum would be a person, it should be all this" (Collin & Véra 2013).

The experience is quite different at the new *Neanderthal museum in Krapina* on Hušnjakovo hill (Croatia) opened in 2010. If the concrete architecture is perfectly adapted to the environment, the visit to this museum clearly questions the concept of popularization. A big hall welcomes the public invited to discover the Neanderthal men during a short and moving film presentation. He/she then enters in a reconstructed area featuring the street and house of the discoverer in 1899. An adjacent room brings the visitor from 1899 back in time to the 15th C. to discover how European science has developed through the centuries preceding the scientific discovery in Krapina. Among the documents exhibited one finds: an allusion to Galileo Galilei's research instruments; Masaccio's *Adam and Eva chased from Paradise* from the Brancacci Chapel in Florence; da Vinci's *Vitruvian man*; a human skull; a replica of the Renaissance arcade of the Hospital of Innocents in Florence divides the room into two narrow corridors with time indications on the floor. Pictures introduce then the visitor to

CENTRE DE RECHERCHES ET D'ÉTUDES TECHNOLOGIQUES DES ARTS PLASTIQUES (CREA-PATRIMOINE)

ART & CUISINE = 1

Tout art n'est-il pas le résultat d'un savant mélange d'ingrédients ? Ne parle-t-on pas d'*art culinaire*, de *food design*, désormais enseigné dans les Académies des beaux-arts ?

Homard-courgette © Joan François de Witte & Françoise Laskar

Les recettes et ingrédients de la peinture

Le Centre de recherches et d'études technologiques des arts plastiques (CReA-Patrimoine, Centre de recherches en archéologie et patrimoine) a pour principal but l'étude et l'analyse des techniques d'exécution des œuvres d'art, éléments indispensables et préalables à tout travail de conservation-restauration.

Il présente une abondante documentation sur la peinture italienne et flamande.
Notre connaissance de la technique des enlumineurs et peintres repose sur quelques traités anciens et sur les résultats des examens scientifiques réalisés dans des institutions spécialisées, comme l'Institut royal du Patrimoine artistique et l'École nationale des arts visuels de la Cambre, avec lesquelles l'Université entretient des liens étroits.

Une peinture est le résultat de la combinaison de plusieurs éléments :
- support (mur, parchemin, vélin, panneau de bois, toile, etc.)
- pigments colorés
- liants.

Anciens livres de « recettes » picturales

Notre connaissance des liants et colles nécessaires pour permettre aux pigments colorés d'adhérer aux surfaces repose sur d'anciens traités et manuscrits.
Les traités les plus connus sont le *Diversarum artium schedula* du moine Théophile et le *Trattato della pittura* de l'Italien Cennino Cennini.

Recette de la peinture *a tempera*

« *Deux sortes de* tempera *sont bonnes pour toi... Pour la première, prends le jaune et le blanc de l'œuf ; mets dedans quelques taillures de branches de figuier coupées et bats bien le tout ensemble, verse dans des vases de cette* tempera, *ni trop ni trop peu comme serait un vin à demi trempé d'eau… La seconde* tempera *se compose du seul jaune d'œuf. Sache qu'elle est universelle* ».

« *… cette première couche sur des visages jeunes qui ont la carnation fraîche doit être encollée avec des jaunes d'œufs pondus en ville, parce qu'ils sont plus blancs que ceux que font les poules à la campagne ou dans les villas. Ces derniers, par leur couleur, sont bons à tempérer les carnations des vieillards et d'hommes bruns* »[2]

Les Très Riches Heures du duc de Berry : janvier. Musée Condé, Chantilly, ms.65, f.1v; vers 1411-1416

1. À Bruxelles, l'Académie royale des beaux-arts de Bruxelles/École supérieure des arts (Pôle universitaire Wallonie-Bruxelles) offre, depuis septembre 2012, un *Executive Master en food design* où l'aliment est source de recherches, d'expérimentations, de création (http://food-design.arba-esa.be/fr/).
Le *Homard-courgette* illustré *supra* en est l'emblème.
2. C. Cennini, *Le livre de l'art (Traité de la peinture)* - trad. Colette Déroche, Beyer-Leveault, 1991 (La plus ancienne copie conservée date de 1437, 3e partie, LXXII – Comment on colore sur un mur à sec et ses *tempere* et 6e partie, CXLVII – Comment on colore les visages, les mains, les pieds et toutes les chairs)

CENTRE DE RECHERCHES ET D'ÉTUDES TECHNOLOGIQUES DES ARTS PLASTIQUES (CREA-PATRIMOINE)

MACRO ET MICROPHOTOGRAPHIE AU SERVICE DE L'ANALYSE DES ŒUVRES D'ART

Au cours de ses aventures, Alice, grande ou petite, découvre le monde avec une vision nouvelle.
Il en va de même avec les œuvres d'art, qui se révèlent sous un jour nouveau depuis le recours à différentes méthodes d'investigation scientifiques.

L'examen scientifique d'un tableau ou d'une œuvre d'art est primordial pour tout chercheur qui souhaite dépasser le cap des hypothèses formulées sur base, le plus souvent, de l'analyse de style. En effet, il permet de confronter le style à la technique, deux données intimement liées dans la création artistique, l'une étant le support matériel de l'autre.

Les documents de laboratoire fournissent ainsi des renseignements sur :
- l'état de conservation de l'œuvre,
- ses phases d'élaboration,
- sa technique d'exécution,
- son histoire matérielle.

Comme Alice, envisageons deux techniques liées aux visions rapprochées ou éloignées des œuvres : la macrophotographie et la microphotographie. La première est dite à lumière visible, la seconde à lumière invisible.

La **macrophotographie** permet, en agrandissant des détails choisis qu'elle isole, d'intensifier la perception de l'écriture et de saisir ainsi de plus près le lien image - technique.
Cette méthode permet aussi de distinguer les parties originales des parties restaurées.

Petrus Christus, *Portrait d'une jeune femme*, Berlin-Dalhem, Staatliche Museen Preussischer Kulturbesitz © CReA-Patrimoine - Centre de recherches et d'études technologiques des arts plastiques

La macrophotographie fait apparaître ici un réseau sain de craquelures d'âge en forme de mailles, caractéristique de la peinture flamande.

À gauche : Réseau naturel de craquelures d'âge (en mailles) - Conséquence du vieillissement naturel de la couche picturale
À droite : Fausses craquelures peintes (restauration du XIXe s.) conservées car bien intégrées à la composition

D. Bouts, *La Cène*, détails © CReA-Patrimoine - Centre de recherches et d'études technologiques des arts plastiques

Fig. 3 & 4
Popularization panels
Art & Cooking = 1.
Painting recipe. 2012
- Museums of the ULB

Macro- and microphotography help analyze works of art. 2013 ©
Network of Museums of the ULB

the excavation, methodologies and techniques used by modern scientists. From there on, the visitor enters in the time machine, which brings him/her towards the cosmic and chemical evolution since the Big bang on a journey through the history of earth and the evolution of life until he/she discovers the Neanderthal men in a reconstructed hyper realistic cave. There he/she is introduced to their metaphysical world, their life and behaviour. This trip ends with a last room filled with replicas and photographs of different periods and civilisations up to present time. On leaving the museum, one reaches the place where the first remains of Neanderthal men were found.
The museum website ends this tour by questioning the visitor: "What has this unique museological experience of travelling back to ancient history meant for you?"
My answer is clearly negative: by wanting to tackle too many issues, the purpose of the museum is lost for the public, at least it was for me as following questions and remarks may explain: is concrete the best material to evoke Prehistoric men habitat, both outside and inside the museum? What about the large front wall made of glass reflecting the forest absent in Prehistoric times? For the designers this reflection "dematerialises the glass wall, and visitors, just like Alice in Wonderland, pass through the mirror and enter a different reality"! Once inside the welcome hall supposed to imitate a prehistoric cave in smoothed concrete (!), the glass wall becomes a giant movie screen! Quite impressed and moved though by the introductory film and the reconstructed street in Krapina, the eager to learn and curious visitor I was lost its confidence in the history room. Nowadays technology should allow for higher quality reproductions of works of art. I wonder if the designers have ever seen the Brancacci chapel and if they know its walls are fresco painted and not a canvas painting as the baroque frame in the room may suggest. Are there no better means than cotton sculptures and led lamps to evoke clouds and rain? And copper for bone replica? Why illustrate the use of the hand to explain men's evolution and discoveries with a bad reproduction of a detail of Adam's hand in Michelangelo's *Creation* at the Sistine Chapel? The huge diorama setting the life of 19 hyper realistic Neanderthal men and women sculpted by Elisabeth Daynes specialised in dermoplastics, the museum so-called 'clou' would have gained in more explanations on the technique used and the process followed by this French artist.
Too many discourses at a time, too many media, the constant mixture of real objects, replica and reproductions make the entire museum more confusing than educational and fail to correctly popularize any scientific knowledge about Prehistoric men and their evolution. No photographs are allowed, one wonders why in a museum showing mainly replicas. This does not prevent visitors to take pictures and post them on the web!
Positive though, the link between emotions and rational thought through the use of words, movements, touch, sounds, rhythms and images, which following Damasio (2006, quoted in UNESCO's *Map Road for Art Education*) form the "basic elements of communication allowing people to share and communicate their answers to their quest for meaning". Concerning periods for which many unanswered questions remain, one should insist on the importance of publicly admitting that one does so far not always know the answer. The only way to avoid some people to be definitely lost to Science. Building up a history is like building up science knowledge; it is an ongoing process.

2. Distance

A popularized discourse is to be seen as a linguistic transformation or translation to which a social distance must be added (Jeanneret 1994, 332). Both the text and the person the text is aimed at are of equal importance. The problem is one cannot reach everybody and writing for an average unknown visitor is a difficult task. The resulting difficulty explains why some scientists are still reluctant to explain to the public the purpose of their research. They need to find correct wording together with adapting to somebody else's mind generally speaking less literate hence familiar with the topic to be popularized.

3. *Examples of scientific popularization at the Université libre de Bruxelles*

At the Centre de recherches et d'études technologiques des arts plastiques (Centre for the research and study of visual arts) nowadays attached to the research centre CReA-Patrimoine (Research centre in archaeology and cultural heritage) at the Université libre de Bruxelles following examples show the ongoing process of building up science knowledge. All scientific publications are written in such a way as to be understandable: short sentences, unfamiliar words explained in a lively manner associating them when necessary with metaphors and/or visual images.

The text written by all academic partners of the European programmes *Training of Guides* and *Let us Protect Our Heritage Together* conducted between 1996 and1998 has been adapted i.e. popularized for younger visitors (Périer-D'Ieteren 1999, 13-15; Gesché-Koning 2008, 309-310). The original version may be considered as a popularized text aimed at an average public visiting museums and archaeological sites. It addresses the audience in a direct way to gain its attention and engage people in protecting our common heritage. Carefully thought and composed, it nevertheless lacks explanations and some paragraphs remain too complicated, which could frighten those reading it. If some words are explained ('vulnerable', 'fragile', 'ephemeral'), the paragraph dealing with the various meanings and vision about cultural heritage lacks further explanation when speaking of 'need to be reinvented', 'vision of today'). Surveys conducted in the different partner institutions revealed that the public appreciates to be addressed directly and feels proud to be asked to give the whole text a thought (Périer-D'Ieteren 1999, 24). As to the youth version, some sentences remain too close to the adult version and too philosophical if no further explanation is given ('vulnérabilité', 'altérations', 'scrupuleuses', 'éphémère'. These texts have lately been published in travel guides. Following the inserts by the World Wide Fund on raising awareness about the protection of animals and the environment, the International Centre for the Study of the Preservation and Restoration of Cultural Property in Rome (ICCROM) has launched an interesting partnership with editors of travel guides about the role of tourism guidebooks in raising public awareness. Tourists usually think that having survived for centuries, heritage sites, monuments and museum objects will still last forever. The *Responsible tourism guidelines* published now in many guidebooks show how a scholarly text has evolved in the hands of editors used to address tourists: each idea of the original text has been respected but the phrasing and wording suit here best the potential traveler, a good example of scientific popularization for which scientists have shared their views with specialists in communication:

> "*Every element of cultural heritage is particular and irreplaceable*.
>
> Productions of the past are not subject to renewal: they are not part of an inexhaustible resource. Our heritage has the right to be passed on to future generations and, at the same time it should grow richer through the creations and testimonies of our own time.
> *Every element of cultural heritage is vulnerable and fragile*. It can deteriorate both slowly and rapidly due to human and natural phenomena. Although this damage cannot be stopped completely, *your behavior* can help to delay this process. Neglect, inappropriate treatments, or simply time affecting a material, may have rendered it fragile, and altered it to the point of making a conservation intervention necessary for its survival.
> *Every element of cultural heritage has one or several messages*. Multiples layers of history and time have created our heritage, thus respect for this evolution is necessary for its conservation. Meanings are waiting to be rediscovered or reinvented.
> Each visitor should contribute to the preservation of heritage for future generations by:
> *Accepting restrictions*: Willingly accept certain bans (do not touch, do not photograph, do not run) or restrictions.
> *Avoiding touching*: Remember that every touch, and even the most innocent tiny shake becomes harmful when repeated by 1.000, 10.000, 100.000 people".

In order to accept restrictions and bans, people must know the reasons why. Therefore some explanations make the visitor feel more comfortable. Yet, museums bearing this basic communication rule in mind are so rare that we quote here one excellent example from the Biodome in Montreal combining rationale thinking and emotion:
"*Visitors who love too much hurt the butterflies. We know it's very tempting to touch the butterflies, but please don't! Stroking or handling them causes their wings to lose their scales or even break. What's worse, the repeated contact stresses them - they stop eating, weaken and die sooner. So please, help us protect the butterflies…*".

The ULB Centre also participates in the popularization activities of the Network of museums of the ULB: in the exhibition on comics, the cartoon about the story of the angel (fig.1) does not need any wording, is understandable and will touch people more than the didactic panel spread by ICCROM (fig.2) on the causes of heritage deterioration more suitable for heritage specialists. A same idea may thus use different levels and means of communication. Lately the Centre conceived didactic panels about painting techniques to be linked to the theme art and food chosen for all museums of the network which includes very diverse museums, ranging from medicine, anatomy, botanical plants, contemporary art to physics and technology. How to raise interest for painting techniques in an exhibition about food? By finding in Cennini's *Le livre de l'art (Traité de la peinture)*, 3rd Part, Book LXXII, about the tempera technique, advice for painters on which eggs to use (provided by hen living in cities or in the countryside) in rendering various carnations (fig.3). During the last *Universeum* European University Heritage Day *Down the rabbit hole - Backstage of knowledge production*, I explained how macro- and microphotography help art historians in detecting changes and alterations in art works (fig.4). The number of visitors interested in the explanations show that what seems sometimes difficult to explain reaches broad audiences by just finding the right example, illustration or metaphor.
A last example of popularizing scientific knowledge concerns the publication of ICOM Europe (2010, 54) *Reflecting Europe in Its Museum Objects* in which I managed to integrate within 30 European objects in the section on technical innovations, a piece kept in the ULB collections: Zenobe Gramme's dynamo. I had to answer the question "Why this object is relevant for the comprehension of Europe's diversity, its transnational relationships, its common experiences and future perspectives" in maximum 800 signs:
"After Ampère's and Faraday's discoveries of electro dynamics (1821) and electromagnetic induction (1831), Zenobe Gramme's dynamo featuring a wound ring armature is the first modern electrical generator used industrially on a commercial scale: electricity could now be used to transmit power. Gramme's dynamos were presented at the International Exhibition in Vienna capital of the Austro-Hungarian Empire in 1873 and in 1876 at the Centennial Exhibition in Philadelphia. Published in 1885 in *Die Elektrizität im Dienste der Menschheit*, dynamos were used for electric lighting, electro-plating, the marine industry, etc. They may be considered as one of the most decisive technical inventions of the 19th C. Gramme's statue stands in the courtyard of the Museum of Arts and Industry in Paris".
A challenge appreciated by the editor, though I feel uncomfortable about the lack of explanations regarding Ampère, Faraday, induction, generator and at the same time proud to have managed to include a piece from our collections in a popularization work.

Conclusion

Finding the words which will be understood, choosing the right idea, looking for the best support (text, image), analyzing how to spread the information (traditional article, book, didactic panel or web, social media) are demanding tasks which benefit from pluridisciplinary discussions and approaches. This means for scientists to sit back and start summarizing their work in a few keywords. From this starting point, a discourse can be elaborated, which needs constant adaptation to meet the spirit of unknown potential audiences and keep to the point. To conclude let me quote famous science popularizer Carl Sagan (1934-1996) who claimed (1990): "if science is a topic of general interest and concern — if both its delights and its social consequences are discussed regularly and competently in the schools, the press, and at the dinner table — we have greatly improved our prospects for learning how the world really is and for improving both it and us" (Sagan 1990).

Literature Cited

Campion, B. 2012. Discours narratif, récit non linéaire et communication des connaissances. Louvain-la-Neuve: Presses universitaires.

Collin, F. & Véra M. (2013). Le Musée-Médiateur du Préhistosite de Ramioul au Préhisto-museum, reformulation d'un projet muséal à Flémalle (Liège, Belgique). *Treballs d'Arqueologia* 19: 69-80. http://ddd.uab.cat/record/113371?ln=en (accessed April 29, 2016).

Cornelis, G.C. (ed.). 1996. Popularization of science. The democratization of knowledge in perspective. *Communication and Cognition* 29, 2: 149-152.

Davallon, J. 2004. La médiation: la communication en procès ? *MEI Médiation et information* 19 (*Médiations & médiateurs*), 37-59.

Deltour-Levie, C. 2009. *Le monde en vues d'optiques: XVIII^e^-XIX^e^ siècles*. Brussels: Musées royaux d'Art et d'Histoire.

Dicke, W. 1996. Carl Sagan, an astronomer who excelled at popularizing science, is dead at 62. *New York Times*, 21/12/1996. www.nytimes.com/learning/general/onthisday/bday/1109.html (accessed April 29, 2016).

Gattone, A. 2007. Divulgación cientifica y technologica, un ejemplo. Ciencia Hoy, 18 October 2007. www.ciencianet.com.ar/169/divulgaci-n-cient-fica-y-tecnol-gica-un-ejemplo (accessed April 29, 2016).

Gesché-Koning, N. 2008a. Outils d'aides à la visite publiés par les services éducatifs des musées. Des 'images d'art' aux dévédéroms. *L'invitation au musée* 21:14-19.

Gesché-Koning, N. 2008b. Let us protect our heritage together. In: *Heritage learning matters. Museums and universal heritage*, ed. H. Kraütler (Vienna: Schlebrugge), 309-310.

ICOM Europe (ed.) 2010. *Reflecting Europe in its museum objects*. Berlin.

Jacobi, D. & B. Schiele 1990. La vulgarisation scientifique et l'éducation non formelle. *Revue française de pédagogie* 91: 81-111.

Jeanneret, Y. 1994. *Ecrire la science. Formes et enjeux de la vulgarisation.* Paris: PUF.

Jensen, P. & Y. Croissant 2007. Activité de vulgarisation des chercheurs CNRS: un état des lieux. *Journal of Science Communication* (JCOM) 6, 3: 1824-2049. http://jcom.sissa.it/sites/default/files/documents/Jcom0603(2007)A01_fr.pdf (accessed February 20, 2014).

Mairesse, F. (ed.). 2003. *L'extraordinaire jardin de la mémoire*. Mariemont: Musée royal de Mariemont.

Massarani, L. & I. de Castro Moreira 2004. Popularisation of science: Historical perspectives and permanent dilemmas. *Quark* 32, 75-79: 79. http://www.raco.cat/index.php/quark/article/viewFile/55039/63356 (accessed February 17, 2014).

Myers, G. 1996. Out of the laboratory and down to the bay: Writing in science and technology studies. *Written Communication* 13,1: 5–43.

Périer-D'Ieteren, C. 1999. *Public et sauvegarde du patrimoine. Cahier de sensibilisation à l'intention des guides*. Brussels: Université libre de Bruxelles.

Quiccheberg, S. [1565]. M.A. Meadow & B. Robertson 2013. *The First Treatise on Museums. Samuel Quiccheberg's Inscriptiones 1565*. Los Angeles: Getty Research Institute, Texts & Documents.

Ravelli, L. 2006. *Museum texts: Communication frameworks*. Oxon: Routledge.

Roberts, C., H. Bhola, K. Pehl & K.M. Cheng 1989. Conference Report. In: *Popularization of science and technology. What informal and nonformal education can do?*, eds. C.K. Ming & L.K. Fong (Paris: UNESCO), 4-9.

Sagan, C. 1990. Why we need to understand science. *Skeptical Enquirer* 14.3. www.csicop.org/si/show/why_we_need_to_understand_science (accessed April 29, 2016).

Serrell, B. 1996. *Exhibit labels: An interpretive approach*. Walnut Creek: Altamira Press.

Thomas, F. 1999. Dispositif narratif et argumentatif : quel intérêt pour la médiation des savoirs ? *Hermès* 25, 219: 232.

unesco (ed.) 2006. *Road maps for art education. The World Conference on Arts Education: Building Creative Capacities for the 21^st^ Century*. Lisbon, 6-9 March 2006. www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/CLT/pdf/Arts_Edu_RoadMap_fr.pdf. (accessed April 29, 2016).

Vilatte, J.-Ch. 2007. *Le texte au musée*. Formation « Evaluation », 23-25 May. Castres: Laboratoire Culture & Communication. Université d'Avignon.

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Keywords

Communication – Science – Technology

Quality management for cultural heritage organizations from a European perspective. The case of Flanders

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Abstract

In this paper we focus on total quality management in cultural heritage organizations with public collections in some European countries and in Flanders. Although there is a lot of difference between the legal form and the function of university collections, the principles on total quality management can be very useful for the (further) professionalization of the management of those collections. During our research we focused on three main topics: (1) quality management and the relation with accreditation systems for heritage organizations in different European countries (2) quality indicators provided in the sector (3) a case study of Flanders where we investigated the familiarity of and willingness to apply quality instruments. We conclude that heritage and management are more and more related to each other. Applying the principles of total quality management on the other hand is less common. Several governments in Europe have set out minimum quality standards for museums, linked to an accreditation label. Even then the heritage sector is not (always) using quality management instruments to improve their own working processes. In comparison to other European countries, the heritage sector in Flanders is less evolved in using quality management principles. Our general conclusion is that the knowledge about quality management in Europe is much dispersed and that European countries are using different criteria to evaluate the activities of the cultural heritage organizations.

Introduction

The concept of 'quality' is a key criterion in pursuing cultural policy. It is a multi-layered concept that can be used in different ways. Also in the sector of cultural heritage it is a guiding principle. For heritage organizations with collections of their own (such as museums, heritage libraries, archives or universities), it is not only the quality of their collections that is important, but also the quality of their management; it is crucial to examine *how* such cultural heritage organizations 'acquire, conserve, research, communicate and exhibit their collections for the purposes of participation, education, study and enjoyment' (ICOM definition). In Europe many museums are part of the public sector. The government (on different levels: local, regional and national) has founded them or is still strongly involved and responsible for the working of their museums. First, we want to outline how a number of European governments approach the concept of quality control in the sector of cultural heritage.

Which criteria do they use for their accreditation systems? Second, we investigate which measuring instruments are used and applied in the cultural heritage sector in Europe. A selection of three European measuring instruments will be discussed. Third, we will have a deeper look at the situation in Flanders: How does the Flemish government deal with quality control and how the Flemish heritage sector approaches the concept of quality management. Some recommendations are made on how the Flemish heritage sector and the international field might learn from each other.

Methodology

For this paper a literature study and a document analysis was carried out in order to gain an understanding of key theories in the field of quality control and management. Through close readings of policy documents, primary and secondary literature on quality control, user guides with national and international accreditation labels and quality models, we compared the models for quality control used in different countries and the various measuring instruments used by the heritage organizations. Key insights into the Flemish case were obtained by using qualitative research methods, like semi-structured interviews and focus groups.

Cultural heritage and management: how do they fit?

In this paper we only focus on public heritage organizations that have a proper collection (museums, archives and libraries). According to ICOM, a museum is a 'non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment' (ICOM).This definition is also applicable for archives and libraries with a heritage collection or university collections. From this definition ICOM postulates three main functions: *preservation* (which includes the acquisition, conservation and management of collections), *research* and *communication* (which includes education and exhibition) (Desvallées & Mairesse 2009). It is also pointed out that one of the major differences between earlier museum work and today is the growth of the importance attached to notions of *management* and that the management should be treated as a true museum function (Desvallées & Mairesse, 2009).

One of the main reasons for this growing attention for management is the changing role of museums in society and in cities in particular (Schramme & Rombouts 2010). Because of the globalisation, society is faced with enormous challenges, not only in terms of economy and town planning, but also with respect to the mentality, behaviour and culture that this process implies. A large number of museums all over the world is of course considerably influenced by these processes. It is therefore inevitable that the role of museums, and particularly of city museums, which historically gave rise to urban culture, is being reconsidered at the moment, both in terms of strict museological elements (the display of collections, the relation of events, etc.) and in terms of managerial elements (relationships with the community and with stakeholders, and so on).

According to Negri, an 'old' museology, in which objects were preserved for their intrinsic historic and aesthetic values, is replaced by a 'new' museology, which puts forward the dissemination of values and meanings of heritage for society. Museums now assume various responsibilities that change them into important partners in local development (Negri 2008). Museums can satisfy the

needs of the local population and communities and still respond to the needs of tourists.
To manage all these museum functions becomes therefore more and more a challenge. Using total quality management models can be very useful in this process.

Total quality management: what's in a name?
Total quality management as a concept and working method began to occur during the late eighties.
Total quality systems originate from the fifties and the sixties when dr. Edwards Deming was send to Japan to help rebuild the Japanese economy after World War II. His production and management techniques gained success in the U.S. and Europe from the eighties onwards. As a result quality models like the Malcolm-Bridge model (U.S.) and the EFQM model (Europe) occurred. From then on variants showed up.
According to Joseph Juran quality control exists of three components: quality planning, quality control and quality improvement. This has become the so called *Juran triology* (Juran & De Feo 2010).
To manage the quality of different processes in an organization, different quality systems can be used. Some of those systems (like ISO, BSC, EFQM, CAF, PROZA, TRIS, PQASSO, Kwalidroom, SAE, UMAC and Universeum)[5] work according to the principles of *total quality control* (TQC).
Total quality control is based on five basic principles:
1. A total improvement approach
2. Initiated from the management
3. Focused on output and organization
4. Involvement with the whole organization and
5. Focused on internal and external customer satisfaction (Caals 2012).

The total improvement approach is based on the *"Deming-cyclus" (Plan-Do-Check-Act)*. Each process needs to fulfill the four phases of the ongoing improvement process. The main emphasis of this circle is the constantly improvement in all the organizational areas. To be able to measure improvement a sufficient measuring instrument is needed. Most quality systems have a self-evaluation method, where the weaker and stronger links of the organization are scrutinized. Each process within the quality system needs to be executed according to these principles (Caals 2003).
TQC is a formal responsibility of the management. They need to mobilize people, have resources available, work systematical, raise efficiency, etc. Furthermore it is necessary to look further than the results. TQC emphasizes that monitoring the process is even important as monitoring the outputs.
For example when the achieved results are undermining the atmosphere on the work floor, this negative atmosphere will have consequences on future results (Caals 2003).
According to the TQC principles the involvement of the entire organization in the process is important.
Finally TQC focuses on the needs of the client. The client is the key player of the entire quality movement. TQC makes a distinction between the external and internal client: the 'external client' judges the core processes (communication, preservation, research, management) and the 'internal client' or 'employee' evaluates the supporting processes (design, renew, amelioration).
This holistic approach, namely the strive for constantly improvement of the quality on all levels and for all involved parties/stakeholders, is what total quality control stands for (Hupko 2001).
The EFQM model is the best known and most used quality model that is working according to the principles of integral quality control.
EFQM stands for European Foundation for Quality Management. The model divides an organization into functional fields, through which all activities of the organization can perceived (Caals 2003). This allows transparency of the structure. The model has nine functional fields. Five of them are set in the organizational area; four of them are result-oriented. Policy and strategy, leadership, resources, people and processes determine employee and customer satisfaction and appreciation of the environment. This is visually represented in the figure below.

5 ISO is used in the profit sector and admits basic quality. Balanced Scorecard is a management tool. Mission and strategy are converted to concrete indicators. EFQM and his variants (CAF: for public services, PROZA: for education sector, TRIS: for public libraries, PQASSO: for organizations who works with volunteers, Kwalidroom and Kwaliscoop: for the social-cultural sector) are excellent models. The excellence of the process is important not a minimum standard.

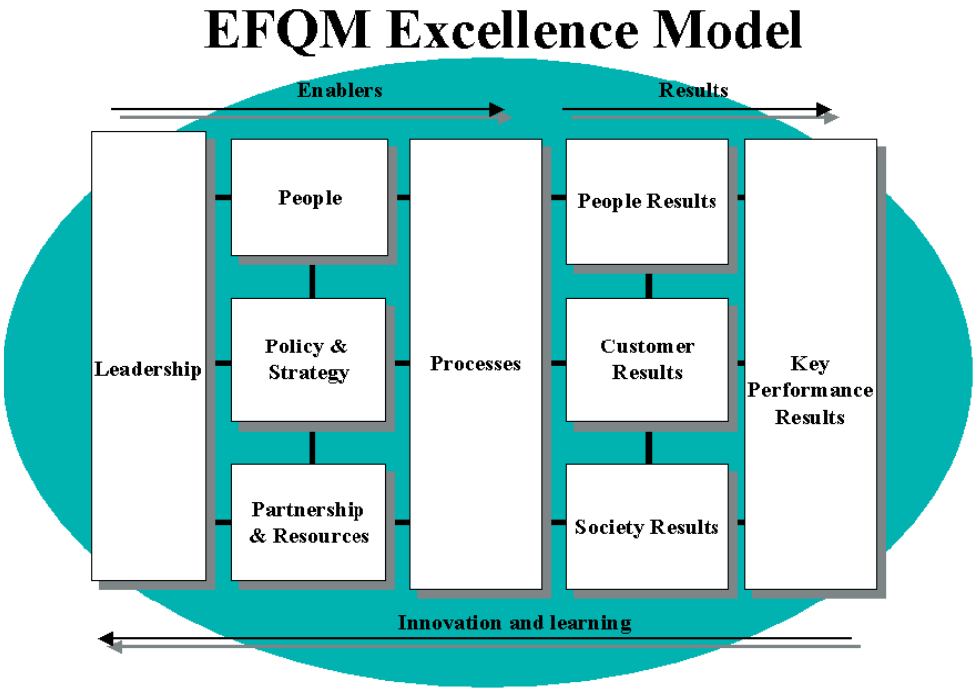

Fig.1
EFQM Excellence Model

EFQM assumes a six step improvement process: 1. choosing a frame of reference (formulate the goals/grade of excellence), 2. collecting information (which is possible through different methods, e.g. questionnaires), 3. criticizing information (which is possible through different methods, e.g. to give scores), 4. composing a plan of action 5. accomplishing the plan of action, 6. follow up and adjustment of the plan of action (Caals, 2003).
EFQM is an excellence model, which means the excellence of the processes are important, rather than considering minimum standards.
Before examining if total quality management is applied within the sector of cultural heritage we are looking at the quality standards that are used by governments.

Cultural heritage and accreditation labels

Internationally, the 'ICOM Code of Ethics for museums' is established and recognized as a reference for minimum standards in the museum sector.
Besides this Code of Ethics, which are only general guidelines, in some countries, minimum standards are defined by law or government regulation. In others, guidance on and assessment of minimum professional standards may be available in the form of 'accreditation' labels', registration' systems or similar evaluative schemes.
Based on literature about accreditation labels and governmental documents we compared the framework of accreditation labels of six different countries (Belgium/Flanders), The Netherlands, U.K., Ireland, Finland and United States of America[6]. We chose two Anglo-Saxon countries, two Central European countries and one Northern European country to compare with the U.S. because culturally and geographically they were interesting to compare.
1. First of all, only Flanders, the region in the North of Belgium, is providing one and the same label for museums, archives and libraries. Moreover, the four functions defined by ICOM are used as basic principles for these *three* sectors (Agentschap Kunsten en Erfgoed, s.d.(d)).
2. Secondly, we pointed out that the different dimensions which are evaluated to receive an accreditation label are more or less the same for the six countries. These aspects (see scheme below) refer to the four basic functions, defined by ICOM, but as pointed out above, the fulfillment and execution of these functions and what is to be expected, is very different. The British accreditation manual provides a clear overview of principal criteria and sub criteria which are much more demanding than these of the Flemish sector. For example in U.K. and Ireland the use of public surveys to measure the customer satisfaction is mandatory, in Flanders it isn't.
3. Thirdly the motivations for accreditation standards in the United States differ from the researched European countries. In these European countries, accreditation standards are minimal basic stand-

6 From now on U.S.

ards, while organizations in the U.S. are accredited only on an excellent level, to the standards of TQM (AAM, a,b,d). Museums have to reach high level standards by running through an internal and external evaluation process based on the principle of TQM. In 2011 the Dutch government has reformed their accreditation system, the so called 'Museumregister'. They found inspiration in the American system since the use of a quality system (see further) is mandatory for registration. Nevertheless the museums in the Netherlands are not obliged to achieve the excellence level of a certain standard. In this way the starting point of the accreditation system in the United States differs from the European vision. So, apart from the multiple definition of 'basic quality' in different European countries, the level and the intensity for accreditation differs worldwide.

Table 1
Overview accreditation in six countries

Aspects of accreditation	Functions	Countries					
		Flanders	United Kingdom	Ireland	The Netherlands	Finland	United States of America
Governance and management (finance, vision, mission, staff, strategy, planning,...)	Management	■	■	■	■	■	■
User services (information on location, opening hours, access by a broad range of users, consultation with users, interpretation of collections in ways which support users' learning and enjoyment, collections and associated information available to users)	Communication	■	■	■	■	■	■
Visitor facilities (public facilities, orientation and signage arrangements, visitor care, formal arrangements for the maintenance of areas used by visitors)		■	■	■	■	■	■
Collection management	Preservation	■	■	■	■	■	■
Research	Research	■			■		
Cooperation with other heritage organizations		■					
Communications management	Communication	■					
Education				■			■
Training				■			

Quality indicators

The questions now are: Do accreditation standards used by governments meet our quality expectation for managing a cultural heritage organization?" and "In what way do these labels differ from instruments based on quality management principles?

First we want to clear out that there is a difference between the concepts of 'accreditation labels' and 'quality instruments' (Sani 2009). First, they have a different approach. Accreditation systems used by governments evaluate mostly minimum criteria (top down), while quality models are mentioned to ameliorate the management of the institution (bottom up). Moreover the implementation of these models is not commanded by the government. Organisations can make use of these models on a voluntary base for the improvement of the management.

Moreover, accreditation standards are not considered as a measurement of the process of quality management of the organization (an exception could be made for the American accreditation system). These standards are only measuring the quality at a certain moment and are not taking into account the evolution or the stage of the life cycle of the organization in their visitation report (Sani 2009). They are only reflecting a static and not a dynamic view on the organization.

Quality systems on the other hand give insight in the dynamics of planning, implementing, controlling, and improving. Quality systems request *proof* of leadership, employee and customer satisfaction.

Unfortunately most quality systems are general management instruments mentioned to use in different sectors and therefore they do not take into account the four basic functions of the collection managing heritage organizations, while accreditation programmes do so.

We researched twelve different measure instruments[7], mostly self-evaluation systems, which we could detect through government websites and publications. We don't claim to provide an exhaustive overview of all the tools available. We wanted to search for a mix of instruments for all the institutions managing a collection (archives, libraries and museums). Some instruments are focused on one aspect of the whole organization (collection care, services), other instruments evaluates all working processes of an organization.

The first table gives an overview of the researched instruments for each sector. We investigated three British, three American, two Dutch, two Finnish, one Belgian and one Irish instrument. On the one hand we selected these instruments due to the geographical dispersal. On the other hand we choose to research countries with a long tradition in accreditation standards.

Table 2
Overview Quality Systems in six countries

Sector	U.K.			U.S.			The Netherlands		Finland		Belgium (Flanders)	Ireland
	Self assessment archives	SPECTRUM	Benchmarks collections care in	Libqual	Archival metrics	MAP	MUSAVE	Quality monitor archives	Finnish model	PCI	Cerize	Vistor survey museums
Archives	■		■		■			■				
Museums		■	■			■	■		■	■	■	■
Heritage			■	■	■							
libraries			■	■	■							

This table *(above)* shows that eight of the twelve researched instruments are provided for museums. Furthermore we discovered that only one instrument is designed for museums, archives and libraries. We indicated *Archival Metrics* at libraries, because this instrument is also made for university libraries with special collections.

The second table *(under)* gives an overview of the different aspects of how the heritage organizations work. We distinguished those instruments that work on services, the instruments that focus on collection management, the instruments that work on institutional working and those that focus on policy in different categories. Besides that we distinguish instruments that work according to the principles of TQM. When more quadrangles are indicated this means that within the instrument different aspects are applied. However, this does not mean that for example collection management is always defined in the same way. It merely indicates that for that specific instrument, different elements are considered equally important for the collection.

7 From now on 'instrument'.

Table 3
Domains of Quality indicators in six countries

Domains	U.K.			U.S.			The Netherlands		Finland		Belgium	Ireland
	Self assessment archives	SPECTRUM	Benchmarks in collections care	Libqual	Archival metrics	MAP	MUSAVE	Quality monitor archives	Finnish model	PCI	Cerize	Vistor museums survey
Public services/public survey	■			■	■	■		■	■		■	■
Collection management	■	■	■			■			■	■	■	
Research									■		■	
Institutional (administration, finance, …)	■					■	■		■		■	
Policy/management (mission, vision, HRM, strategic management and planning)	■					■	■		■		■	
Developed by EFQM and variants*		■					■		■		■	

We see that a lot of the tools are used for the evaluation of *the public functions* of the organizations (services or costumers satisfaction). These tools are mostly participation surveys. In eight of the twelve instruments the public function is present. This outcome seems logical since internal and external costumers satisfaction are some of the basic principles of quality control. We also detect that in different countries measuring instruments for *collection management* are developed in different ways.

Scientific research, as one of the basic functions of a heritage organization with a collection, is the least represented in our research. Only the Finnish model has integrated scientific research in their quality instrument.

We also determined that less than half of the instruments have some focus on strategy and planning, processing and HRM.

Of all the integral quality control systems we researched (MUSAVE, SPECTRUM, Cerize, and Finnish model) the Finnish model and the model from Flanders 'Cerize' takes into account the evaluation of the whole organization, the strategy, policy and corresponding processes as well as the core processes of the collection managing institutions. Other instruments only focus on one or maybe some aspects of the organization. MUSAVE tests the quality of the security care in museums, SPECTRUM focuses on the collection and how this collection needs to be managed.

Comparison of the instruments

After a comparison of the different instruments we can conclude that three countries have done a real effort to create an integral quality model. Finland and Flanders have a model for museums, the U.K. has a system of self-evaluation for its archives. We will continue this article with a deeper analysis of the three systems.

1. The Finnish Model

In 2005 an instrument to professionalize the museum sector in Finland was created on the advocacy of the Ministry of Education and the National Board of Antiquities (NBA, b). A self-evaluation instrument is made, based on the quality model of CAF. (The instrument is available for free on the following website: www.museoarviointi.fi[8]) This is an instrument that supervises the whole operation of the museum. It wants to evaluate the management, the administration and the corresponding processes. The other part of the questionnaire enquires the core business of the museum (preservation, research and communication) and the social outcomes. In total more than 200 criteria are checked by this self-evaluation system (NBA, a). The results can be printed in the form of a report.

Dependent on the size of the museum the evaluation takes 1 to 3 days. It is advised to evaluate once each two years. Thanks to different evaluations over a longer period in time it is possible to benchmark results. The results are for the use of the museum only, though it can be benchmarked anonymously with other institutions.

Besides the evaluation, museums can choose a peer evaluation. On the basis of the results of the self-evaluation, a group of external experts visit the organization and take a look, have a talk with the personnel and inspect the building. Furthermore they give information on the strengths and how improvement can be made concretely. Also they discuss how the museum is perceived by others. The peer reviewers are coordinated by 'The Development Unit of the National Board of Antiquities', who is charged to provide the final report. On a yearly basis ten extern evaluations are made. There is a network of volunteers available to the National Board, people with experience in the sector. This method is based on the non-financial advantages of being a peer reviewer. The experts travel around different museums and get new ideas for their own institution. Evaluating and being evaluated as a learning method (Kukko 2009).

2. Cerize (Flanders)

Cerize stands for Cultural Heritage Reflection Instrument for Self-evaluation and is recently (May 2013) designed by FARO, a governmental institution for support to the heritage sector. The tool gives a museum the chance to evaluate the current situation of the working processes and reveals where improvement actions have to be made. Cerize foresees a quick scan for the working processes of the museum and a detailed instrument for a deeper analysis. The two parts of Cerize consists of several questions which are categorized under twelve domains. The domains contains all aspects of the museum: policy and strategy (domain1), management and control (domain 2), board and staff (domain 3), internal and external communication (domain4), professional and voluntary employees (domain 5), competence management (domain 6), financial policy (domain 7), management of resources (domain 8), information management (domain 9), organization of work (domain 10), collaboration of partners (domain 11) and network of expertise (domain 12).

This 12 domains are based on the domains of the EFQM model. Interesting on this tool is that every question is indicating a gap between the desirable situation and the current situation. Priority for improvement actions have to be given to the domains where the GAP between the current situation and the desirable situation is the widest. A manual about the steps to be taken, the questions, more information about the tools and the reasons for implementing a quality system are provided (Caals 2013). Last but not least the improvement actions have to be set up.

8 The instrument is applied for professional museums, not for privately-owned museums.

3. Self-evaluation Archives (U.K.)

In 2007 the National Archives of Great Britain developed a program to measure the activity and quality of the local archives. They made a self-evaluation instrument, not only to evaluate the organization but also to collect data. An online questionnaire document (109 questions) can be used to evaluate five different aspects of the organization, namely: policy, employees and resources (part 1) the acquisition of collections (part 2), the services (part 3), conservation and management (part 4), building, safety and social implications (part 5). An independent panel scores each section of the questionnaire and gives a total. This way 'stars' are distributed among the archives. In 2008, 2009 and 2010 new questionnaires were drawn up. On the one hand to integrate the feedback of the archives, on the other hand to add more questions. Participation to the questionnaire happens on a voluntary basis. The questionnaire and its evaluation is available online, so institutions can use the manual and questionnaire for self-evaluation. In the manual all questions and the scoring system are clarified clearly (The national archives s.d.).

It is interesting to compare the weaknesses and strengths of the instruments. All these instruments make use of a self-evaluation system. They want to improve the organization through evaluation according to internal quality principles (the Plan Do Check Act-principle) and take into account the management, the core processes and the social effects. Furthermore the three instruments give clear guidance (through their manuals and criteria). The strength of the questionnaires is that they are very detailed, so a clear overview can be provided. On the other side this kind of evaluation takes a lot of time (one to three days). The results give a clear view how an organization scores on a specific aspect and which element needs improvement. The instruments also allow organizations to benchmark in time (compare with former results). The Finnish and Flemish assessment tool even allow to benchmark with other organizations (anonymous) who did the same exercise. Last but not least the three tools are accessible for free.

Even though they are alike they differ on certain other points. The Finnish and Flemish models are computerized systems, while the British system works with queries which are not automatically processed by a digital evaluation tool. The Flemish model is designed for internal use in the first place, whereas the Finnish museums can chose to be evaluated by their peers and the British model is centrally coded and steered (the central government decides on the score, since there are open questions in the query). The Finnish and British council use the information to produce and analyze information regarding to their heritage, the Flemish doesn't use this tool in this way.

It is clear that the three instruments give a great attention to integral evaluation, as a result we can evaluate the extensiveness of the questionnaires both as a weakness and as a strength. But it is commonly known that measuring quality is not effortless and that time and strains are necessary.

These three instruments demonstrate that this kind of intensive exercises are being provided by governments and supporting institutions.

Is there a basis for Total Quality Management in the cultural heritage sector of Flanders?

The question now is if the heritage sector in Flanders uses this kind of management applications? And is this sector aware of the relevance of this kind of instruments concerning the effects to quality? This were the key questions for our qualitative research in the Flemish heritage sector that we carried out in 2011. Because the percentage of the response was low our findings can only give an indication of the way the sector engages with the idea of a total quality model. We find out the cultural heritage sector shows little interest in the monitoring of quality. Quality management or total quality control does not ring a bell among the sector. They are not convinced of the importance and the usefulness of a monitor or model since many respondents indicated that the accreditation label is a good evaluation system. They did not know the difference between minimum standards, which evaluates the organization on a basic level, and quality models (like EFQM), which strives to excellence level in different parts of the organization. Furthermore the sector perceives initiatives from the government to improve self-evaluation among the sector, as a way to gain control over the sector. However, receiving subsidies is not depending on the quality control or accreditation, most of the organizations are afraid to lose money if the results of the self-evaluation are not good enough. Although the results of our survey were not satisfactory, the government institution, FARO, introduced Cerize in May 2013. And from all the interviews and focus groups we did, the museums were least willing to implement a quality instrument or model in comparison to the heritage libraries and archives. The future will show us if Cerize will be caught up by the sector. To stimulate this instrument we think courses about quality management are needed first. Creating awareness about the effectiveness of using a quality instrument is important. As pointed out for the Flemish cultural heritage sector quality control and quality management instruments are slightly known. This fact could be the result of three causes. First of all policy planning is a young practice, the related man-

agement thinking is therefore not common thinking yet. Secondly most heritage workers do not have an education in management, since most of them are historian, art historian, archeologist, etc. Thirdly, proposals to change or renew procedures is mostly welcomed with suspicion.

Conclusion

In this paper we focused on total quality management in cultural heritage organizations with public collections in some European countries and in Flanders. The importance of a professional management strategy for the cultural heritage sector cannot be underestimated in a complex society which is constantly changing. Embracing a quality system to measure the different processes of collection-managing organizations can help to improve the quality of these organizations on different levels.

During our research we focused on three main topics: (1) the specificities of the cultural heritage sector according to quality management and the accreditation labels used by several European countries; (2) quality indicators provided in the sector; (3) a case study of Flanders where we investigated the familiarity of and willingness to apply quality instruments.

We can conclude that heritage and management are indeed more and more related to each other. Applying the principles of total quality management on the other hand is less common. Several governments in Europe have set out minimum quality standards for museums, linked to an accreditation label. Quality management, however, uses a different approach. Processes have to be mapped in order to know on which aspects improvement can be made. In the cultural heritage sector different kinds of measurement instruments are provided. We discussed three good examples out of twelve researched instruments in six countries. These three self-evaluation systems are remarkable because they use an integral way to measure different processes in the organization (focus on the basic functions/processes of collecting heritage organizations and focus on management, resources, employees and customers). The other instruments focused merely on one aspect of evaluation, for example customer satisfaction by using public surveys.

Providing quality instruments for organizations without any incentive or even obligation (for example to make it one of the key criteria to be accredited) doesn't assure these instruments will be effectively used in the sector. Especially in Flanders we see that the conditions for an organization in order to obtain an accreditation label are rather weak in comparison to other European countries or regions (for example in comparison with Great Britain, the Netherlands and Finland). Using a public survey to know visitor satisfaction is for example not mandatory in Flanders. Only SPECTRUM, the quality instrument for collection management, is obliged as a quality indicator. Moreover the conditions to be accredited are much more basic.

Our general conclusion is that the knowledge about quality management differs a lot between the European countries and even worldwide. For this reason, it would be useful to cluster knowledge beyond boundaries and to look if it is desirable to conceive an integral quality model for the European heritage sector as a whole. Is there a basis for an integral European heritage quality model among European representatives? The EFQM model, the Finnish, British and Flemish self-evaluation systems can be used as an inspiration or starting point for the design of such a European heritage model. This could be linked to a common European accreditation system and European heritage label.

With this contribution we want to draw attention on the importance of integral quality control and quality management in the European sector of cultural heritage. Quality does not generate itself. It requires a continuous attention and diligence of all persons concerned and systematic working methods. Striving to quality improvement for all aspects of the organization demands a change in attitude. This cannot be taken for granted because it takes time too. Only when policy makers and the sector itself are convinced of the importance of integral quality control, it can lead to real change.

Literatured cited

Agentschap Kunsten en Erfgoed s.d. (a). *Cultureel-erfgoeddecreet*. http://www.kunstenenerfgoed.be/ake/view/nl/1386538-Cultureel-erfgoeddecreet.html (accessed February 21, 2010).

Agentschap Kunsten en Erfgoed s.d. (b). *Handleiding bij het Cultureel-erfgoeddecreet. Het kwaliteitslabel*. http://www.kunstenenerfgoed.be/ake/view/nl/1579617-Handleiding+Cultureelerfgoeddecree.html (accessed May 3, 2010).

Agentschap Kunsten en Erfgoed s.d. (c). *Leidraad voor de aanvraag van het kwaliteitslabel*. http://www.kunstenenerfgoed.be/ake/view/nl/1504110-Formulieren.html (accessed May 20, 2010).

Albrechts, J. & A. Dewaele 2003-2009. *Kwaliteitszorg in cultuur*. Brussels: Politeia.

American Association of Museums (AAM) s.d.(a). *About preparation and application*. http://www.aam-us.org/resources/assessment-programs/accreditation/about-applying (accessed May 14, 2010).

AAM s.d.(b). *About the accreditation process*. http://www.aam-us.org/resources/assessment-pro-

grams/accreditation/process-and-timeline (accessed May 14, 2010).
AAM s.d. (c). *Costs of accreditation*. http://www.aam-us.org/resources/assessment-programs/accreditation/cost (accessed May 14, 2010).
AAM s.d. (d). *Museum Assessment Program*. http://www.aam-us.org/resources/assessment-programs/MAP (accessed May 18, 2010).
AAM s.d. (e). *FAQ*. http://www.aam-us.org/museumresources/map/help.cfm (accessed May 18, 2010).
AAM 2005a. *The two core questions*. http://www.aam-us.org/resources/assessment-programs/core-documents (accessed May 14, 2010).
AAM 2005b. *Characteristics of an accreditable museum*. http://www.aam-us.org/museumresources/accred/upload/Characteristics%20of%20an%20Accreditable%20Museum%201-1-05.pdf (accessed May 14, 2010).
Bertorelli, G. et al. 2001. *Guida all'interpretazion e all 'utilizzo del modello per la gestione totale della qualita' nei musei. Guida all'autovalutazione.* http://online.ibc.regione.emilia-romagna.it/l/libri/pdf/museo_cultura/guida.pdf (accessed May 14, 2010).
Caals, A. 2003. *Zelfkennis…het begin van wijsheid. Een handleiding voor zelfevaluatie in het sociaal-cultureel werk*. Brussels: Kwasimodo vzw.
Caals, A. 2012. *Cerize. Voor een b(l)oeiend museum*. Brussels: FARO.
Desvallées, A. & F. Mairesse (eds.) 2010. *Key concepts of museology*. Paris: Armand Colin.
Deutscher Museumbund 2006. *Ethik & Standard*. http://www.museumsbund.de/de/das_museum/ethik_standards/standards_fuer_museen/ (accessed May 13, 2010).
Elias, W. et al. 2002. *Criteria herbekeken! Onderzoek naar de mogelijkheid tot standaardisering en objectivering van de criteria voor erkenning en indeling van erkende musea Brussel*. Brussels: Ministerie van de Vlaamse Gemeenschap.
Erfgoed Nederland s.d. (a). *Handvest dienstverlening archieven 2006*. http://qualitycircle.nl/producten/prod_01.htm (accessed May 17, 2010).
Erfgoed Nederland s.d. (b). *Handvest dienstverlening voor archieven*. http://www.erfgoednederland.nl/projecten/handvest-dienstverlening-voor-archieven (accessed May 17, 2010).
Hupko, M. 2001. *Verklarende woordenlijst kwaliteitszorg. Gebruik van IKZ-terminologie in het sociaal-cultureel werk*. Brussels: Kwasimodo vzw.
Juran, J.M. & J.A. De Feo 2010. *Juran's quality handbook: The complete guide to performance excellence*. New York: McGraw Hill.
Kukko, E. & U. Teras 2008. *Developing quality in Finnish museums-Assessment model in use*. http://www.musis.at/shop/data/datei/1212609360.pdf (accessed May 15, 2010).
Lebeer, G. 2008. *SPECTRUM-N: standaard voor collectiemanagement in musea. Versie 1.0*. Brussels: FARO.
Library Assessment Conference 2008. *Building effective, sustainable, practical assessment*. http://libraryassessment.org/bm~doc/full_program_final.pdf (accessed May 17, 2010).
Museums Libraries Archives 2004. *The accreditation scheme for museums in the United Kingdom. Accreditation Standard*. http://www.mla.gov.uk/what/raising_standards/accreditation/~/media/Files/pdf/2008/Accreditation_Standard.ashx (accessed May 13, 2010).
MLA 2010. *How do I apply*. http://www.mla.gov.uk/what/raising_standards/accreditation/accreditation_application (accessed May 13, 2010).
MLA 2002. *Benchmarks in collections care*. http://www.mla.gov.uk/what/raising_standards/accreditation/~/media/Files/pdf/2002/2002_Benchmarks_in_Collections_Care_Resource.ashx (accessed May 18, 2010).
National Board of Antiquities (NBA) s.d.(a). *Museum self-assessment model*. http://www.nba.fi/en/development/museum_assessment/self_assessment (accessed May 18, 2010).
NBA s.d. (b). *Background to the Museum Assessment Framework*. http://www.nba.fi/en/development/museum_assessment/background (accessed May 18, 2010).
NBA s.d. (c). *External assessment*. http://www.nba.fi/en/development/museum_assessment/external_assessment (accessed May 18, 2010).
Negri, M., F. Niccoluci & M. Sani 2009. *Quality in museums*. Budapest: Archaelingua/EPOCH.
Negri, M. 2008. *The future of city museums in Europe: Experience and perspectives*. Bologna: Bologna University.
Putt, N. & H. Häyhä 2001. ICCROM Preventive Conservation Indicators. In: *European Preventive Conservation Strategy Project*, eds. N. Putt & H. Häyhä (Vantaa-Finland: EVTEK Institute of Art and Design), 228-233.
Schauvliege, J. 2009. *Beleidsnota Cultuur 2009-2014*. http://www.kunstenenerfgoed.be/ake/view/nl/471178-Beleidsnota+Minister.html (accessed July 7, 2013).
Schramme, A. & J. Rombouts 2010. The relations between museums and municipalities: The case of Antwerp. In: *The relations between museums and municipalities in Europe*, eds. A. Krebbs et al. (Brussels: ENCATC).

Stichting Het Nederlands Museumregister 2008. *Reglement museumregistratie*. http://www.museumvereniging.nl/files/Reglement_wijzigingen_nov_2008.pdf (accessed May 14, 2010).
The Collection Link 2006. *Benchmarks in collections care: A guide to using the database version*. http://www.collectionstrust.org.uk/2015-05-13-11-17-40/2015-05-13-11-21-07/using-benchmarks-to-sustain-collections (accessed May 18, 2010).
The Heritage Council s.d. *The Museum Standard Program*. http://www.heritagecouncil.ie/museums-archive/heritage-council-initiatives/museums-standards-programme-for-ireland/ (accessed May 14, 2010).
The Heritage Council s.d.(b). *Visitor survey and evaluation of exhibitions*. http://www.heritagecouncil.ie/fileadmin/user_upload/MSPI/MSPI_Revisions/32._5.3_Visitor_Survey___Evaluation_of_Exhibitions__Full_.pdf (accessed May 18, 2010).
The National Archives s.d. *Self-assessment*. http://www.nationalarchives.gov.uk/archives/self-assessment.htm (accessed May 17, 2010).

Websites

http\\icom-oesterreich.at
www.libqual.org
www.archivalmetrics.org
www.iccrom.org
www.museoarviointi.fi
http://users.telenet.be/dirk.van.aerschot/vlaamsbrabant/files/leiderschap/modellen/leid_modellen.html (Fig. 1)

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Keywords

Total quality management – Cultural heritage – Quality systems

The renovation of the Royal Museum for Central Africa

Guido Gryseels

Preamble

The Royal Museum for Central Africa (RMCA) in Tervuren, Belgium, is a federal scientific institute and one of the most important reference institutes in the world on Central Africa. It is sometimes referred to as one of the last colonial museums in Europe, and is currently being renovated. This paper provides an overview of the various steps taken in its transformation process into a modern and dynamic reference institute on contemporary Africa, while remaining a 'lieu de mémoire'. This has involved a major shift in vision and a move towards dialogue and transparency of the institute, which is at the same time a museum, a research institute and a centre for information dissemination and raising public awareness on Africa. In this process, close collaboration with the African diaspora and well-focused sensitisation activities play a major role.

History

The Royal Museum for Central Africa (RMCA) was founded in 1898 at the initiative of King Leopold II as the 'Musée du Congo'. It originated from a very successful temporary exhibition (more than 1.2 million visitors) organized at his initiative and presented in 1897 as the Colonial Section of the Brussels World Fair.

The exhibition's aims were as much propagandist as they were commercial: the Belgians were to be convinced of the economic potential of the Congo and of the good to be done in civilizing and developing this region. The effect of this exhibition, which displayed the most investment-attracting export products surrounded by an array of ethnographic objects and animals prepared by taxidermists, in addition to the reconstituted Congolese villages, with real Congolese villagers on site, in the surrounding park area, was that scientific interest in the region was greatly aroused. It was thus that the dual function of the museum was established: an exhibition and research institute, one of the many legacies that have remained until today (Gryseels, Landry & Claessens 2005).

As the research interest increased, the collections grew rapidly. Soon it became clear that the exhibition halls would be too small for the collections and research. Consequently King Leopold II decided to construct a new building to house them. Construction works started in 1904 and the new museum, 'Musée du Congo belge', opened in 1910. It is located midst beautiful landscaped gardens. In 1908, Congo had become formally a Belgian colony. The RMCA was put under the auspices of the Ministry of Colonies and served as a promotional tool for Belgian colonial activities. The rapidly growing collections served as a basis for multidisciplinary scientific research. In 1960, Congo became independent and the museum changed his name to 'Royal Museum for Central Africa'.

While the RMCA since the nineties regularly organized temporary exhibits on contemporary themes, the permanent exhibition of the museum remained mostly unchanged from the late fifties until today. As a result, the permanent exhibition of the RMCA is often referred to as reflecting the colonial vision the Belgians had of Central Africa of before 1960, the year of the independence of the RDCongo and many other African countries. Since 2002, the RMCA has launched an ambitious project of renovation to transform the formerly colonial museum into a museum on contemporary Africa that disposes of modern facilities. An initial 'intention plan' was developed in 2003 and further developed into technically detailed programs that were approved by the Federal Government in 2006. Architectural plans were prepared subsequently including a major master plan for the entire site and construction works will be conducted from 2013-2017. The renovated museum will be open to the public in 2017. The renovation entails major changes in the infrastructure and facilities of the museum, in the museography and in the contents of its exhibitions and displays.

RMCA today

The Royal Museum for Central Africa (RMCA), established in 1898, is a Belgian Federal Scientific Institute and operates under the auspices of the Federal Minister for Science Policy. Its mission is to serve as a world centre in research and knowledge dissemination on past and present societies and natural environments of Africa, in particular Central Africa, to foster – to the public at large and the scientific community – a better understanding and interest in this area and, through partnerships, to substantially contribute to its sustainable development. It has a triple function as a museum, as a research institute and as a centre for information dissemination and for raising public awareness about Africa. The RMCA's principal activities are in the fields of collection management, research and scientific services, dissemination of knowledge and organisation of exhibitions, sensitisation and strengthening of national institutions in Africa. Its collections, exhibitions, archives, data bases and scientific expertise are internationally renowned. Less than 1% of its collections are on display in the museum, the remainder is carefully conserved in reserves.

RMCA's research is multidisciplinary and covers both the human and the natural sciences. Its major scientific disciplines are cultural anthropology, history, earth sciences and biology. In the field of anthropology its major domains are ethnography, linguistics and ethnomusicology and archaeology. In the field of Earth Sciences, its domains are geology, natural risks, geodynamics and environmental variability. History research covers both colonial and contemporary history of Central Africa. And in biology, taxonomy of zoological specimen and wood biology are the major themes. It also hosts scientific support services such as a library and 12 specialized documentation centres, on-line information services and 9 laboratories.

The RMCA has approximately 300 staff members of which 90 are scientists at Ph.D. level. RMCA scientists participate in a large number of national and international scientific networks. The RMCA works in close collaboration with universities and other scientific institutes, government agencies and museums in well over 20 African countries.

Over the years the RMCA has gained an international reputation in its different research domains.

The RMCA houses the largest collections in the world with respect to Central Africa, with among others 150.000 ethnographic objects, 10 million zoological specimens, 3 km historical and geological archives, 56.000 tropical wood samples and 15.000 minerals, 1 million photographs and 3.000 films.
Its vast and rich collections are currently being digitalized and are gradually more easily accessible through websites.

The RMCA is a public sector institute and about 60% of its funding is provided by the Federal Belgian government, the remainder from competitive research grants, own income and European Union grants for research activities. The RMCA is active in development cooperation and has partnerships in 22 African countries. The RMCA also contributes every year to the training of average 150 students and scientists, most of whom are Africans or of African origin.

The RMCA has public oriented services on education and culture, museology, publications and communication.
While the museum welcomes every year an average of 180.000 visitors to its exhibitions, it also hosts every year between 30.000 and 40.000 children to participate in workshops or other educational activities. For the majority of Belgian children, their first encounter with Africa is through a school or family visit to the museum. It is very important that a positive and constructive view on Africa is provided during this first encounter. For this purpose, a wide range of activities is organized for all age ranges from 4 to 17 and with a broad variety of themes such as music, agriculture, ethnography, history etc. Special workshops are offered to blind or visually impaired and children with a handicap. Cultural events are also organized frequently, usually in collaboration with the African diaspora.

Process of transformation

The RMCA has a triple function as a museum, as a research institute, and as a centre for information, dissemination and raising public awareness about Africa. It was clear that its unique combination of disciplines, expertise, collections, partnerships, would be maintained and accentuated in the vision for the future, giving the RMCA the potential to become *the* reference institute for past and present societies and cultures and natural environments of Africa, and Central Africa in particular.
Since 2002, important steps have been taken, to transform the museum from a colonial instrument into a modern reference institute and Africa-museum. This also included the participatory development of a mission statement, the development of a set of institutional policies and a new logo.

1. Renovation of the Museum

The renovation of the RMCA implies, as already discussed, a reform of the institute and a renovation of its museum. The museum needs a renovation to transform its colonial nature into a modern museum with a focus on contemporary Africa, to improve its museology and to modernise its infrastructure to allow for meeting rooms, polyvalent and acclimatised galleries, a shop and a restaurant.

The objective of the renovation is for the museum to become a dynamic museum equipped with all modern facilities. It encourages the interdisciplinary knowledge of people, cultures, societies, history and natural resources in Africa as well as the sustainable development in the region.

The museum aims to raise its average numbers of visitors from 160 000 to 200 000 annually.

2. New role for colonial museums in a multicultural society

In a post-colonial museum the heritage and collections it manages, is considered a shared heritage with the countries of origin. This implies the involvement of Africans in museum activities through partnerships.
The renovation process implied a redefinition of the new role of the museum in a multicultural society. It was defined as:
- The RMCA remains the most important 'lieu de mémoire' for the Belgian colonial past
- The RMCA must become a window on contemporary Africa and its history
- The RMCA must become a meeting place for Belgians and members of the 'source communities' whose heritage is being held in the RMCA

One of the RMCA's aims is to encourage the general public to take a greater interest in Africa and in the diversity of its people, societies, cultures and environments. In doing so, the Museum plays its own unique role in combating racism and cultural intolerance.
The Museum is also a meeting place where people share experiences, intercultural dialogue is promoted, children of various cultural origins can find the tools to construct their own identity and

people in general are stimulated to come to terms with the past and to become responsible civilians in a globalized world.
In order to take on fully this societal role of the museum and to become a forum for dialogue, a place of contact between peoples and cultures especially for African communities to voice themselves, several initiatives were taken. A working group was set up with representatives of many of the African associations in Belgium. This group, after a first phase of dialogue, developed into a smaller advisory committee by the name of 'COMRAF'[5], whereby the nominated representatives meet regularly with representatives of the public services and research sections of the museum.
In this same spirit of dialogue, educational programmes are developed in close collaboration with partners from Belgium's African communities and what has become an annual 'Africa<>Tervuren' event aims at bringing the African communities to the museum and raising awareness about Africa amongst the public at large.

3. Revisiting our origin: 'Exit Congo', 'The Memory of Congo. The colonial era', 'Congo: Nature and Culture' and 'Independence' exhibitions

The RMCA is today still seen as one of the most powerful symbols of the colonial past of Belgium. The architecture of the building and many displays in the permanent exhibition still refer to its colonial past. The museum is still often associated with the Belgian view on colonial Africa of before 1960, when DR Congo gained independence.
In order to transform into a modern and dynamic museum for Africa, it was necessary to first deal with its own history of a colonial institution. This meant organizing a series of exhibitions on the origin of RMCA's collections, on Belgium's colonial past and on the Congo.

3.1. 'Exit Congo' (2000-2001)

The first exhibit in the context of the renovation of the museum was 'Exit Congo', which told the story of the origin of the RMCA's ethnographic collections. Some were brought by missionaries, by administrators, by military and by scientific collection missions. The exhibit also confronted historic collections with contemporary art of both Congolese and Belgian artists. It also told the story of the repatriation of nearly 120 objects of the museum to the Institut National des Musées du Congo (IMNC) in Kinshasa, during the seventies.

3.2. 'Congo: Nature and Culture' (2004)

To further fulfil the sustainable development aspect of the mission statement, the RMCA accepted an invitation from UNESCO and its World Heritage Centre to organize an exhibition on the natural and cultural diversity of the Democratic Republic of Congo and the relationship between man and his natural environment in this country. This was to support the occasion of an international donor conference organised at UNESCO in 2004 for the preservation of national parks in the DRC. The exhibition, 'Congo: Nature and Culture' gave the museum the opportunity to conduct a 'trial run' of sorts on interdisciplinary research and exhibitions. After Paris the exhibition was installed in the RMCA for a year and it is currently on display at the Museum of Lubumbashi, DRC and the National Museum of Congo in Kinshasa, where this exhibit also provides the basis for educational activities.

3.3. 'Memory of Congo. The colonial era' (2005)

The exhibition 'The memory of Congo' took place from February to October 2005 and was an enormous success. More than 140.000 people visited the exhibition which was accompanied by a large number of other activities such as debates, seminars, film projections and special educational activities both for adults and for young people. A scientific colloquium on colonial violence was organised also. Most importantly, the exhibition led to widespread attention and debates within the Belgian society with hundreds of press articles and media broadcasts. During the period of the exhibition no single day went by without a radio or television program, or a newspaper article to highlight one or other issue of Congo's colonial past and the role of Belgium in it. The impact of the exhibition was very profound. At society level it led to a process of soul-searching and reflection. This was very remarkable, especially if one realizes that most Belgians grew up with a very favourable image of the Belgian colonization of Congo.
The exhibition also illustrated the different perceptions of Belgians and Africans. While Belgians focused their critical reflection on the colonial violence at the end of the 19th century in association with rubber production, Congolese or Belgians of Congolese origin could not understand why the public gave so much attention to these historical events while so little was done to stop the violence suffered today by RDC citizens of war that exists today, especially in Eastern Congo.
After this exhibition, the history and art galleries of the museum were profoundly renovated and modernised.

5 COMRAF = Comité de concertation MRAC – associations africaines.

3.4. 'Independence' (2010)
In 2010, on the occasion of the 50th anniversary of independence of DR Congo, an exhibition was organised: 'Independence. Congolese stories about 50 years of Independence'. The exhibition provided information about the independence of Congo, using information provided by Congolese. With nearly 60 000 visitors, the exhibition was a major success.

4. Role of Diaspora
Throughout the renovation process and discussions on the new museum exhibition, continuous dialogue was assured with African diaspora through the COMRAF-mechanism. RMCA also coordinated efforts of the READ-ME project (Réseau européen des Associations de Diaspora et Musées d'Ethnographie) that aimed at a closer association of diaspora with ethnographical museums through projects, colloquia and joint exhibitions.
RMCA also pursued a major research program on African diaspora particularly with respect to the social identity, social capital and social memory about the colonial period.

5. Towards a new reference exhibition
In developing a new exhibition that considers the African heritage as a shared heritage with the source communities, the RMCA[6] considers the following elements as drivers of change:

Colonial museums	Post-colonial museums
Contrast between European 'civilization' and African 'primitiveness'	Principle: African cultures and age-long history of cultural influence
Juxtaposition of timeless nature and culture	Africa has a long, dynamic history
Emphasis on specimen and objects	(African) men and women are at the centre
Colonial societies presented as if colonization never took place	Inclusion of 'popular' culture created as a result of colonization
Organization of ethnographic objects on the basis of material and esthetic criteria	Ethnographic objects tell the story of their history, origin, use and meaning
Africans represented by Europeans	Africans represent themselves

Source: Bambi Ceuppens, personnal communication

Renovation plan

1. Architectural plans
A renovated museum is needed not only for reasons of content, but also of museography (use of multimedia) and infrastructure (modern facilities such as conference rooms, multifunctional auditoria, etc.). The museum first developed a general plan which was subsequently refined in a detailed analysis of needs.
The museum building is a protected monument and a balance needs to be found between its historical values and perspectives and modern infrastructural needs.
However, the renovation of the museum building has to be seen in a broader holistic plan that includes the renovation of the entire RMCA site with its 7 buildings and a 4 hectare park.
The formal proposal for the renovation of the museum site and building was approved by the Belgian federal government in 2006. The contract was assigned to a consortium led by architect Stéphane Beel. In a first step, he made a master plan for the entire site, which was based on centralisation of functions.
In a second step, he developed detailed architectural plans for the renovated museum. A new building was to be constructed that would house reception facilities, a shop, a restaurant/cafeteria and meeting facilities. This new building was to be connected with the museum building through an underground gallery. In that gallery, a multifunctional space as well as acclimatised temporary exhibition spaces are foreseen.

6 Based on a personal communication by Bambi Ceuppens (Anthropologist RMCA), and subsequent discussions with museum staff and COMRAF.

2. The new reference exhibition

For the new permanent exhibition in the renovated museum the following guidelines are used:
People are at the center
Permanent exhibition concentrates on Central-Africa, with extension to other regions of Africa, where relevant
Permanent exhibition starts from own collections and own expertise
Permanent exhibition starts from the present and goes back in time
Interdisciplinary approaches where it constitutes an added value
Continuous participation of the African community

The old permanent exhibition had its galleries primarily organized by discipline. The new permanent exhibit will have 4 major themes: Central Africa Society, Landscapes and Biodiversity, Resources, and Arts, Expressions and Representations. This new permanent exhibition will be developed from a contemporary and thematic perspective and with a focus on Central Africa. Continuous dialogue with African communities and diaspora are an important part of the process.

The total cost of the renovation program is around 75 million Euros mostly to be funded by the Belgian Federal Government.

Timing

Renovation works have started on October 16, 2013 and are expected to finalize at the end of 2016. About 6 months will then be needed to install the new permanent exhibit. It is expected that the new renovated museum will open its doors in October 2017.

During the closure of the museum, the public oriented activities of the RMCA will continue to function through hired exhibition spaces in Brussels and collaborative international agreements with other museums worldwide. Research and collection management activities will continue in the other buildings of the RMCA in Tervuren.

The museum has became a 'pop-up' museum and appears with its collections, exhibitions and activities at other locations both in Belgium and abroad.

Conclusion

This paper has provided an overview of the most important steps the museum has taken in its transformation process from a colonial museum to an internationally recognized reference centre for Central Africa.
Over the coming years the RMCA will renovate its facilities, museography and permanent exhibition, strengthen its role in society by stimulating intercultural dialogue, promoting a positive image of multicultural societies and intensifying its collaboration with the source communities. The number of visitors is expected to increase to an average of 200.000 every year. New publics will be attracted through targeting efforts and a much wider range of cultural and educational activities and of scientific services will be offered.
All this will consolidate the museum's reputation as a curator of world heritage and a leading scientific and information dissemination institute on Central Africa. It will also enhance its reputation as the world reference centre of knowledge on Central Africa.
The museum will have changed from a colonial museum into a 21th century institution. It will then be a meeting place where people share experiences, where intercultural dialogue is promoted, where children of mixed cultural origins can find the tools to construct their own identity and where people in general are stimulated to come to terms with the past and to become responsible citizens of a globalized world.

Literatured cited

Gryseels G., G. Landry & K. Claessens 2005. Integrating the past: Transformation and renovation of the Royal Museum for Central Africa, Tervuren. *European Review* 13, 4: 637-647.

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Keywords

Renovation – Reference exhibition – Africa museum

Museum Boerhaave, Society and the Real Thing

Dirk van Delft

Abstract

Museum Boerhaave, the Dutch national museum for the history of science and medicine, displays over five centuries of inventions and discoveries in science and medicine. With its permanent collection and temporary exhibitions, Museum Boerhaave aims to attract, interest and entertain a wide audience. Showing authentic objects, the Real Thing, the museum presents a narrative of five centuries of innovation, addressing topical issues when possible and contributing to the current debate taking place in society at large. Education is one of the main tools in this endeavor.

Collection

I will start with two objects from the Museum Boerhaave collection. First is the copper miniGRAIL from the University of Leiden. GRAIL stands for Gravitational Radiation Antenna in Leiden. It is a sphere 40 cm in diameter which, cooled to just above absolute zero (-273 degrees Celsius) in order to eliminate any interference, collects gravity waves. These are miniscule ripples in space-time that originate in deep space when for example two black holes collide. Albert Einstein predicted these gravity waves in 1915 in his Theory of General Relativity, which was written using a Waterman fountain pen that now belongs to the Museum Boerhaave collection. In short, together these two objects, the copper sphere and fountain pen, tell a fascinating story of how science works. The story of people with a passion.

Museum Boerhaave is the Dutch National Museum for the History of Science and Medicine, located in Leiden (Van Delft 2010). It was founded in 1928. Its aim, according to the deed of foundation at the time, was:

To collect instruments, machines, specimens, documents and other objects that are important for the history of the natural sciences, to look after these objects, describe them scientifically and to store them at a museum in Leiden where they would be accessible to everyone. (Van Delft 2013)

And now, 85 years later, in a political climate where museums are assessed according to how well they are embedded in society, their collaboration with external parties, cultural entrepreneurship, education and reaching new public, it is good to consider for a moment how a museum starts: a collection that matters.
But simply having a collection that matters is not enough in this day and age. What is important is what you do with it. The current mission statement therefore sets out:

Based on its unique, magnificent collection, Museum Boerhaave aspires to appeal to a rich and varied audience, to excite and educate them, in a way that is fun for them. In this regard, the museum's constant aim is to dovetail with current events, never losing sight of the goal of creating support for science in society.

All this is based on a collection comprising of some 100,000 objects: instruments, objects of scientific research, books, paintings, manuscripts, archives, and so on. From this vast collection some 2000 objects are displayed in the 'permanent presentation' in the halls. The rest are kept in the depot, or can be admired on loan at other locations at home and abroad.

Museum Boerhaave shows five centuries of primarily Dutch innovations in the area of the natural sciences and medicine (Maas & Huisman, 2012). Some prize exhibits include the microscopes of Antoni van Leeuwenhoek, the pendulum clock of Christiaan Huygens, the Leiden Cabinet of Physics of Jacob Willem's Gravesande, the first *anaesthetic mask* for dentists, the artificial kidney developed by Kolff, the equipment that Kamerlingh Onnes used to liquefy helium and discover superconductivity, and the roll of sticky tape with which Andre Geim produced graphene. And recently Museum Boerhaave acquired the first burger made from lab-grown meat from the University of Maastricht researcher Mark Post.

The fact that the Museum Boerhaave collection matters can also be seen from its inclusion in the list of the '50 best museums of the world', which British newspaper *The Times* published in its 'Saturday Review' of 11 May 2013. The only Dutch museum included, Museum Boerhaave was honoured with 37th place on the list. The reason given for its inclusion: "Named after the Leiden physician Herman Boerhaave, who received, among others, Peter the Great, Linnaeus and Voltaire as students, this is one of the most important scientific and medical history collections in the world. It includes a reconstructed anatomical theatre as well as the planetarium and telescope belonging to Christiaan Huygens. Don't miss the Albinus brothers' gruesome collection of anatomical samples and medical instruments." (Worsley, Beard etc. 2013)

Society

As our mission statement indicates, Museum Boerhaave looks to keep in touch with current events, with subjects that are considered important in society at that moment. An example is the exhibition 'Pills and powders: blessing or curse?' which was on show at the museum in 2013. This involved a collaboration on the occasion of the 50th anniversary of the Medicines Evaluation Board, which assesses and monitors the efficacy, risks and quality of medicines in the Netherlands. The exhibition looks at medicines throughout the centuries and shines the spotlight on interesting pieces of infor-

mation regarding, for example, packaging, safety, numbers and the associated changes throughout the years. A programme with lectures running alongside it takes a closer look at the various relevant issues.

A real eye-catcher at the exhibition is the artwork *Van Wieg tot Graf* (From Cradle to Grave). This is an 8-metre-long table displaying all the medication an average person is prescribed over the course of a lifetime. The medicines are accompanied by family photos and objects. They bear witness to vitality and decline, to the moments of joy and concern that everyone has to deal with. From the Cradle to the Grave evokes a mixture of amazement and fascination, but also raises critical questions about the use of medicine and views on health and care. The arrangement has been designed by artist Susie Freeman, media artist David Critchley and general practitioner Dr Liz Lee. A previous, British variant of this table was a major crowd puller at the British Museum in London.

Museum Boerhaave keeps in touch with current events in society also through special events. In collaboration with the British Council, for example, the museum in 2011 organised a 'Meat & Eat', whereby light was shed on world food issues in an interactive ambience by presenting innovative solutions, such as eating insects or developing lab-grown meat.

Museum Boerhaave is able to put this social involvement, with its own collection as a starting point, into practice as it receives basic funding from the Ministry of Education, Cultural Affairs and Science. For the period 2013 to 2016 this amounts to approximately €19 million. Almost 40% of this amount goes towards the rent of the museum building and the depots.

In 2011 this government financing hung in the balance when halfway through the year former State Secretary for Culture Zijlstra introduced the requirement that the income generated by museums as of 2010 would have to be at least 17.5% of the state contribution if they are to be eligible for state subsidy. This amounted to a retrospective modification of the regulations: Zijlstra's predecessor had used 2012 as base year. In practice this meant that Museum Boerhaave would have to generate over €700,000 extra income in the second half of the year in order to protect the museum from closure. It succeeded in doing so through various activities and promotions – adopt an instrument, expansion of the number of Friends of the Museum, funds and sponsors contributing to projects and, to top it all, a major fundraising dinner with an auction in the Leiden Pieterskerk. The grand total of the 'Save Boerhaave' campaign brought in over 1 million euros. In retrospect, it can be concluded that the museum was played a dirty trick, which it managed to turn into its advantage.

There was, however, nothing wrong with the criteria with which Zijlstra wanted to assess museums. It all, after all, boils down to visitor numbers, cultural entrepreneurship, education, the significance of the collection, distribution across the country and innovative capabilities. Museum Boerhaave endorses every one of these criteria, whereby we manage to meet the criterion of 'distribution across the country' by having our collection on display as much as possible outside our museum as well. We do this by loaning hundreds of objects to other museums at home and abroad and through special displays, for example at the Science Centre NEMO in Amsterdam, the sound equipment company Merford in Gorkum, 'Boerhaave aan de Vecht' at Buitenplaats Zuylenburgh or 'Boerhaave aan Zee' at the Palace Hotel in Noordwijk.

Stakeholders

Museum Boerhaave puts the embedding in society into practice in a number of ways whereby it is careful to look after its stakeholders. Firstly, there are its 'ambassadors', people in influential positions such as Hans Galjaard (medicine), Henk van Houten (director of Philips Research), Jeroen van der Veer (former president of Shell), Rick van der Ploeg (Economist, former State Secretary of Culture), Ewine van Dishoeck (astronomer) and Gerard 't Hooft (Nobel Prize winner for physics).

In addition, Museum Boerhaave has a large circle of more than 1500 Friends, united within the Caecilia Foundation. The museum uses their financial contributions to help finance special purchases or updating the displays.

Boerhaave is a museum for the natural sciences and medicine. In 2011 in the exhibition 'Nobel.NL' the museum presented all nineteen Nobel Prize winners that the Netherlands has produced to the present day. We, of course, greatly value good contacts with bodies in the area of the natural sciences and medicine, such as the NWO (Dutch Organisation for Scientific Research), the KNAW (Royal Netherlands Academy of Sciences), the KNCV (Royal Netherlands Chemical Society), the LUMC (Leiden University Medical Centre) and the University of Leiden.

Cultural funds play an essential role in financing exhibition projects or updating permanent displays. Such funds include the BankGiro Loterij, the Prins Bernhard Cultuurfonds, Fonds 1818, SNS Reaal, the VSB Fonds, the Stichting Doen, the Mondriaan Stichting, the Stichting AMMODO, the Noaber Foundation, and so on. The European Union also finances various museum projects. One such EU project is 'Amazing Models', in which Museum Boerhaave works in partnership with the Josephinum from the University of Vienna and the anatomical museum of the University of Bologna (Grob, Leonardi & Horn 2013).

Science and medicine can also be seen in business. Museum Boerhaave therefore also looks for its stakeholders there: Shell, Philips, Unilever, DSM, ASML, Leica, Zorg en Zekerheid, Bio Science Park Leiden, and so on. With Shell, Museum Boerhaave participates in 'Energy Future' through an outdoor photo exhibition and a supplement in the *NRC Handelsblad* newspaper, and in the Shell Eco-marathon at Ahoy in Rotterdam.

The last group of stakeholders I will mention are politicians – politicians at a local level but also those in The Hague operating at a national level. At the auction held during the Fundraising Dinner in December 2011, Alexander Pechtold, D66 party leader, skilfully took on the role of auctioneer. That can produce a long-term relationship that can certainly do no harm. We regularly invite cultural spokespersons for a working visit.

Renewal permanent display

In the meantime, a great challenge that lies ahead of Museum Boerhaave for the coming years is the updating of its permanent displays. These date back to when the current museum building was completed at the end of the 1980s, and have not changed essentially in the last quarter of a century. We are planning two major changes. The first is that the chronological arrangement will be replaced by a thematic one. At present many visitors do not want to follow the museum routes; those who follow the route of the Golden Age and the Enlightenment, followed by the 18th and 19th century collections, lose interest by the time they reach the Second Golden Age. It is simply too much. That is why Museum Boerhaave has opted for a handful of themes, each of which will have their own unique set up. These are 'The Golden Age', 'Illness and Health', 'Technology' and 'Modern Science'. A second change is the addition of 'Flesh and Blood'. The current permanent display of Museum Boerhaave is characterised by an 'unapproachable aesthetic', whereby the instruments provide the uninformed visitor with too little information and narratives, and provide limited cultural historical context. Innovative display techniques can make a major difference here.

The entrance to the museum, the Anatomical Theatre, will also receive attention in this new approach. Showcases will be placed around the entrance displaying a sample card from our collection. After this initial introduction to Museum Boerhaave, the visitor in the theatre is given an eight-minute introduction to the museum, a theatre spectacle with wow factor, projections on the ceiling, *video mapping* on a plaster corpse laid out on the dissecting table – everything with a *voice over* from Menno Bentveld, a well-known presenter in the Netherlands of science and nature programmes. What's more, the theatre remains suitable for small receptions, education programmes and events such as book presentations.

With a theme such as 'Body & Soul' / Illness and Health the current object-focused approach, with devices that do not mean much to the novice and which are not particularly attractive, will be replaced by a display in which the patient will play a prominent role.

The new Museum Boerhaave outlined:
The collection, the original object, *the real thing*, forms the backbone
Nothing can compete with the historical sensation
Don't worship instruments in isolation, but incorporate them into fascinating stories
Don't focus on technical explanations, but offer cultural historical contexts

Not only objects will be used to carry the story. Photos, films, archive material, interactive displays, augmented reality, models, games, apps, etc., will also be used.

Museum Boerhaave has already experimented in this area over the last couple of years. There was for example the *Het gewichtige lichaam* exhibition for which a photo exhibition was organised, and 'Augmented Bodies', a project that was carried out in collaboration with the Piet Zwart Institute in Rotterdam. Through an app an iPhone was able to recognise photos on the museum wall which would initiate a video on the iPhone with the relevant photo as starting point.

Education

A quarter of the visitors to Museum Boerhaave are connected with schools. Education is therefore one of the priorities of the museum. In 2012 we opened the 'Boerhaave Treasure Island', an interactive hands-on exhibition full of surprising adventures. The young visitors climb onboard and set sail to the furthest corners of the world. While onboard he or she gets to find out about the world of the surgeon, the captain who has to set the course and of the explorer who ends up on a previously undiscovered island. Fun for (grand) parents with children, but it also serves as an educational programme for primary school children. In the programme 'Captain May' they have to do carry out various tasks that lead them to the key of the treasure chest. These tasks also take them around the museum.

Located in Museum Boerhaave is the Technolab Foundation. This provides workshops in the area of technology and life science, which are given by students from intermediate and higher vocational education. This is a sort of hands-on learning factory where children can stimulate and develop their talents in technology and research. As primary schools do not provide much education in the area of technology, in part because many teachers do not have an affinity with the subject, the Technolab caters for a social need: The Netherlands as a technologically advanced country (*Nederland Kennisland*) cannot do without children wanting to pursue careers in technology. Some of the Technolab workshops are carried out as tasks at the museum.

The courtyard of Museum Boerhaave can also be put to an educational use. This is the domain of Waterland Boerhaave, a scientific playground in the historical courtyard of the museum. A lively place in the historical heart of Leiden, where children can experience what is necessary to keep our feet dry in this country of ours. In Waterland Boerhaave children aged 4 to 12 can pump dry a polder, unload ships in the harbour and operate a weather station. Children can also roll up their sleeves and discover the properties of water. All the play elements of the waterway influence one another. To create polders you have to work together! In a playful manner the children also become familiar with the principles of science and technology. How do water wheels work and how do you 'screw' water upwards? At weekends and on holidays, like Treasure Island, for (grand) parents with children, and during the week a place for educational programmes, in which the collection in the museum also plays a role. The Rijnland Polder District, represented in the Museum Boerhaave collection and partner in Waterland Boerhaave, has been around for centuries, and for very good reason.

In the area of mathematics education, Museum Boerhaave offers a 'mathematical tour', where the young visitor using a suitcase full of tools carries out mathematical experiments in the museum. A classical variant under the name of *Vaar je rijk* (Sail to riches) is currently being developed.

Scholarship

In the current Museum Boerhaave, a project involves more than just a temporary exhibition (Huisman 2011). 'Newton in the Netherlands' from 2009 is an example. It was an exhibition that illustrated how Newton's theories became widespread in the Netherlands, with a leading role for the textbook and accompanying demonstration equipment of Jacob Willem's Gravesande, the Leiden Cabinet of Physics and one of the museums top collections.

But parallel to this display of scholarship in the living room of the 18th century, an old-fashioned play room was set up in one of the Boerhaave halls of the museum: NewtonMania. Here (young) visitors aged 8 to 88 could put the laws of Newton to the test, using rolling balls, pulleys, stacked blocks and swings of various lengths. There were no transistors, let alone games.

There was also an interesting scientific historical perspective. Using a replica of one of 's Gravesande's machines an important experiment involving heavy balls falling into a container with clay was demonstrated to the public (also at scientific historical conferences) showing the same result of one of Newton's predictions being falsified by 's Gravesande.

Two publications appeared in association with 'Newton in the Netherlands'. One of these was the *proceedings* of a scientific historical conference on the reception of Newton in the Netherlands that Museum Boerhaave organised in collaboration with the University of Leiden (Jorink & Maas 2012). Museum Boerhaave also published, in collaboration with Epsilon, a comic book for both young and old about Gravesande's motives for praising Newton so much, whereby Newton was deployed as an antidote against the pernicious and ungodly Spinozism. Fun and educational! (FitzVerploegh, Bergmans & Maas 2009).

Museum Boerhaave is involved in the international project 'Inventing Europe', a collaboration of technology historians and European heritage institutions that wish to present European history from a technological perspective. European stories about infrastructure or daily life can be presented more efficiently by using the collections of 10 museums spread across Europe and other heritage institutions, such as *Beeld en Geluid* (Netherlands Institute for Sound and Vision) in Hilversum. For 'Inventing Europe' Museum Boerhaave developed a tour about tuberculosis. Relevant objects from our collection used for this are an electron microscope and a 'TB house' for tuberculosis patients.

But also photos from the Zeehospitium, a sanatorium by the sea in Katwijk for children suffering from TB. International partnership provides dynamism, leads to new ideas and increases the expertise.

Latest exhibitions

Museum Boerhaave showcases five centuries of innovation in the area of the natural sciences and medicine. The 100th anniversary of the renowned NatLab of Philips, these days Philips Research, is therefore an exhibition theme that fits in with us perfectly. '100 years of discoveries, made by Philips Research' puts a spotlight on both the discoverers and their products. Innovation for the future is also represented, through a large interactive LED panel and a pilot with smart light that controls *tablets* (Van Delft & Maas 2013).

Past and present come together in this exhibition. Pioneering days of television from the 1950s, and the ambilight TV of today.

Or the very first Philips x-ray tubes from the First World War alongside the modern MRI scanner.

Moreover, the first director of the NatLab, Gilles Holst, came from the Physics Laboratory in Leiden. The collection in question is around the corner from the Philips exhibition.

I would like to conclude by stressing the importance of good PR. It doesn't matter how important you are, you still have to make sure that you get people's attention. For the exhibition 'Amazing Models', which examines human anatomy, we were assisted by actress Georgina Verbaan, who was willing to pose as anatomical model for the exhibition poster. I can assure you: a picture like that helps.

Literature cited

FitzVerploegh, P., R. Bergmans & A. Maas 2009. *Newton in Nederland*. Utrecht: Epsilon.
Grob, B., L. Leonardi & S. Horn 2012. *Amazing models: Anatomy in 3D models from the 18th-20th centuries*. Leiden: Museum Boerhaave.
Huisman, T. 2011. 'Layers of meaning; from scientific instrument to exhibition at the Museum Boerhaave'. In: *Centres and cycles of accumulation in and around the Netherlands during the early modern period*, ed. L. Roberts (Wenen: Lit Verlag), 231-254.
Jorink, E. & A. Maas (eds.) 2012. *Newton in the Netherlands. How Isaac Newton was Fashioned in the Dutch Republic*. Leiden: Leiden University Press.
Maas, A. & T. Huisman 2012. *Knappe koppen. Geschiedenis van de Wetenschap in Nederland*. Zwolle: WBooks
Van Delft, D. 2010. 'Museum Boerhaave'. *Eurphycicsnews* 45 (5): 34-35.
Van Delft, D. 2013. 'Museum Boerhaave en het primaat van de collectie'. In: *'Wonderen zijn verricht door de geestdrift van de stichters'. Impressies van een eeuw wetenschaps- en universiteitsgeschiedenis in de Lage Landen*, eds. D. Baneke, A. Fintelman & H. Zuidervaart (=*Studium* 6, (3/4), 215-223.
Van Delft, D. & A. Maas 2013. *Philips Research. 100 years of innovations that matter*. Zwolle: WBooks.
Worsley, L., M. Beard, S. Bayley, D. Snow & R. Holmes 2013. 'The 50 best museums in the world'. *The Times,* Saturday Review, 11 May 2013, 4-7.

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Keywords

Collections - Society - Exhibitions

Conclusion of the Parallel Discussion Groups Recommendations for the future of university museums and collections in the 21st Century

Neil Curtis, Willem Dedobbeleer, Nicole Gesché-Koning, Richard Kremer, Myriam Springuel

Introduction

Nicole Gesché-Koning

During the two and a half days of the conference, university museums and collections were considered through four complementary points of view each relevant for their future and their integration in the society of the 21st Century.

After having heard the different communications, some of which overlapped the category in which they were presented, the purpose of this workshop was to discuss in four parallel discussion groups some issues tackled during each session in a too limited time.

Chairpersons were appointed to lead these parallel discussion groups around suggested questions or any other they thought would be more appropriate. The purpose was to come up at the end of the session with five keywords and/or sentences to be put in the proceedings of the colloquium as recommendations for the future of university museums and collections in the 21st Century.

Here were some of the suggested discussion questions which were not all tackled during the session:
Group 1: Linking university collections, research, teaching and public service -
- The nature of collections - Model for classification (type, origin, legal status)
- Their location in the university
- Relevance of bringing them together in one building?

Group 2: Science Popularization and Communication
- Popularization and research: which balance?
- Criteria to be met when popularizing science and research?
- Time allocated to popularization within research

Group 3: Relevance to Society
- Collections in a new building turned towards the city: which are the challenges?
- Who will be the partners?
- Synergy with other institutions (cultural, social, economic…)

Group 4: Museum Management
- University museums and collections: Whose management?
- Finances: university, funding, crowd-sourcing, alumni?
- Visibility?

Each group came up with a conclusion written by each appointed chairperson whom I warmly thank for their contribution to the success of this workshop session.

Discussion Group 1: Linking university collections, research, teaching and public service – Academic collections and heritage: How to bring university collections together?

Chair: Neil Curtis

Complexity and convergence

The discussion group considered this is at two scales: that of the collections within an institution and that of national and international collaboration. Some key issues emerged, the most important of which was the importance of understanding the complexity of museums and collections.

The identity of collections, museums, staff and visitors were therefore noted. Academic heritage is the result of powerful senses of identity that cannot simply be ignored, but that are important aspects of their value in the present and future. The risks of doing this had been seen in the development of disciplinary collections in the nineteenth century, which resulted in previously acquired material not fitting within these new categories being lost. Today, the development of new disciplines and inter-disciplinary working means that keeping collections separated in their previous disciplinary structures now severely limits their potential, so there is great value in converged working that enable a variety of research, teaching and public engagement work to have easy access to relevant material. The 'fourth mission' (the corporate marketing of universities, alongside teaching, research and public engagement), was also recognized as a very significant factor for the identity of museums and for any developments and improvements.

The group therefore felt that it was essential that there be multiple gateways to collections that recognized the plurality of uses and stakeholders. These could include physical exhibitions drawing on all the collections of a university as is being developed in Gent, outreach projects and online resources and activities. The group also noted that, while it was easy to identify university museums as being museums housed within universities, their differences were also profound, with some universal museums large enough to have an institutional identity (e.g. the Ashmolean), a growing number of converging museum services that are operating as an element of the corporate university (e.g. Gent, Aberdeen, Amsterdam and Göttingen), but there are still many smaller, discipline-specific collections which are managed within academic sections rather than centrally.

The impact of such changes in the management of collections in the last generation was discussed, particularly the move towards professionally curated converged collections and away from disciplinary collections in the care of academic staff. One result was the increasing importance of national and international museum networks that bring together professional museum staff, but at the same time the links between collections, curators and specific academic disciplines had become weaker. As well as having an effect in individual institutions, this change had also been seen in international groups such as UMAC and Universeum as well as in Flanders, Germany, England, Scotland, Netherlands and Italy.

There were clear opportunities for deeper collaboration between members, such as the creation of shared information about similar objects in collection (notably models, engravings and other widely

disseminated materials), which could offer cataloguing information that would sit alongside local item-specific information. Collaborative projects that offered an international perspective on local stories (examples included the First World War, the European Wars of Religion, the Enlightenment University, European Colonialism and the impact of the Humboldtian ideal on universities), which could attract international funding. It was also important that we developed comparative studies and evaluations from some of the local stories that had been described at the Colloquium to enable other museums to understand the strengths and weaknesses of approaches taken in other museums and to consider which approaches were most relevant in different contexts.

Keywords
Complexity – Convergence – Multiple gateways – Collaboration

Discussion Group 2: Choosing the right collections for the right public: Possible narratives/ message to the public?

Chair: Richard Kremer

Publics rather than 'the public'

Our group agreed that university museums, like all museums, should always seek to serve "the public". Yet that public generally includes quite different groups, ranging from school children to university students, alumni and administrators, to local families, outside tourists and cultural elites, to professional, trade or business groups. Communicating effectively with such diverse groups requires specific museum strategies aimed at each group; one size usually does not fit all. In designing the presentation of a collection, an exhibit, or any particular program, museum staff should consider a set of criteria aimed at a given targeted group (TG), such as:
What ideas, objects or questions will initially attract attention of the TG?
What types of narratives (historical, scientific, cultural) will the TG find relevant?
What media can best communicate the curated content to the TG?
What interactive experiences can the museum provide so that TG visitors can contribute to, as well as consume, museum content?

Serving multiple publics rather than 'the public' requires university museums to think flexibly and dynamically about designing exhibits and programs. Rather than creating permanent exhibits in the "one size fits all" mode, some gallery space should be reserved for short-term or more experimental exhibits for particular TGs, perhaps even co-curated with members of that TG.

Communication rather than popularization

Our group had a quite heated discussion about popularization. Some felt that many scientists do not respect popularization that over-simplifies scientific research, reduces the tentativeness of scientific theories to "hard facts", or seeks to recruit young people into scientific careers by over-glamorizing the "fun" of science. Museums with collections related to the natural sciences should therefore seek to communicate rather than to popularize those sciences. To communicate, we felt, means to emphasize processes rather than results, to present images of natural science as particular methods of investigation, as critical and creative thinking, as risk and error as well as triumph and success. Museum narratives should focus on how natural science and scientists work (and have worked in the past) and not merely on popularizing or "translating" their results into simple statements for the various TGs.

Wonder and research

In addition to communicating about science, we concluded, museums should also offer their visitors experiences of wonder, viz., encounters with objects, ideas, or individuals that produce powerful feelings of astonishment, admiration, amazement, even awe. Wonder can be provoked in many ways, by scale (the very large or the very small), by form (the very complex or the very simple), by the unexpected (how is this possible?), by sheer beauty (wow). These moments, more emotional than conceptual, can help motivate visitors to engage with the communication about science offered by the museum.

Finally, our group emphasized that museums must be places not only for communication and wonder but also for research. Especially university museums, situated within institutions of research, must build into their programs opportunities for visitors from the various TGs, for university students, and for established scholars to work with their collections and archives to produce new knowledge. Whenever possible, these research activities should be made visible to visitors. Visitors should experience university museums as venues that not only collect, preserve and communicate but also generate by research new understandings about the world, its cultures and its sciences.

Keywords:
Flexibility – Target groups – Communication – Wonder – Research

Discussion Group 3: Relevance to society

Chair: Willem Dedobbeleer

University museums and their collections have an important relevance to the society. They should, above all, well consider their mission statement and strive to implement it. Focus, challenges, partners and synergies all result from this mission statement. University museums should, however, focus on bringing 'enjoyment' rather than 'fun', as the latter lacks depth.

Following persons participated in the session:
- Nathalie Nyst (Réseau des Musées de l'Université libre de Bruxelles)
- Sibylla Goegebuer (Musea Brugge/Hospitaalmuseum)
- Danny Segers (Ghent University Museums)
- Jean Paul Van Bendegem (Vrije Universiteit Brussel).

Following suggested questions have been addressed:
- Collections in a new building turned towards the city: which are the challenges?
- Who will be the partners?
- Synergy with other institutions (cultural, social, economic, etc.)?

From the questions that were addressed, the discussion group assumed that the focus on the topic 'relevance to society' was only about university museums. Collections or decentralized museums that are spread throughout the university, either managed or not by a central structure have therefore not been debated.

Question 1: Collections in a new building turned towards the city: which are the challenges?
Many challenges were detected during the discussion. The central point is that the challenges vary from one (university) museum to another, as they are related to the particular context the museum is established in. Understanding the context is crucial in order to be able to face the challenges addressed.
In fact, the challenges can be synthesized as one major challenge, which is positioning the (university) museum in its particular context. Or, in other words, how will the museum sell itself? And, more important, what is its mission? Why does it exist? The participants agreed that defining the mission statement is the most important answer to face any challenge for any (university) museum.

Important contextual factors can be:
- Is the (university) museum going to be installed in a city with the university as main driver or in a city with a broader cultural offer?

• Which museums are you competing with? The question was raised if museums are competitors or partners. The participants agreed that there perhaps is no hard competition among museums, at least in Western Europe, but that a certain level of competition nevertheless exists.
• The political situation can be a contextual factor as well.
• The location of the city within the country or region matters.
• The same applies for the history of the town or city.
• It was also highlighted that the culture of a city and its inhabitants is of big importance.
• The touristic appeal of the city plays a role as well.
…

Question 2 and 3: Who will be the partners? Synergy with other institutions (cultural, social, economic…)?
The discussion group opted to analyze the other two questions together, as the answers are very similar.

This discussion resulted in the following, bare list:
• The local authorities;
• National and regional authorities;
• Politicians;
• Useful infrastructure of the city, like public transport;
• Tourist services;
• Alumni of the university;
• Sponsors;
• Friends of the Museum, for financial and logistic support;
• Media and other factors of visibility;
• Other museums;
…

Synergies can be developed, among others, with:
• Organizations caring for people with a disability or other minorities;
• Other museums, with a more distributing function within the city;
• Cultural centers within the city, perhaps by means of a common event. One member gave the example of a theatre show where science and art meet.

Broader questions about the relevance to the society
In the discussion group, two other questions were addressed.

The first question to be discussed was to know if a university should establish a museum from the point of view of the society. A member of the group countered this question immediately and somewhat provocatively with the rhetorical question if there is any need for an art museum. Science and university are as relevant for the society of nowadays as any other topic that is often treated in public museums. Science is of course relevant in itself, as it is so closely linked with the day-to-day life in our society. University collections illustrate that science grows; they have the other advantage that the university opens its doors to the society, which is funding the research and teaching activities of the university, through the university museum. A nice synthesis of the answer on this question is perhaps the following slogan: "It is not because you have a historical collection, that you can't be actual."

A second point of discussion grabbed to a debate that could be heard throughout the duration of the colloquium, namely the idea that a (university) museum about science should in all regards reflect the idea that science is fun, or that an even deeper approach is desirable. The group concluded that a museum should provoke a kind of 'enjoyment', rather than 'fun', as this implies a richer experience and goes broader than, somewhat provocatively stated, only pushing buttons. What is understood under 'enjoyment' is of course a highly personal issue, but all members agreed that fun should not be the main focus of a university museum about science. On the other hand it is important to present objects, ideas and trends in an attractive way, also regarding more difficult topics. It is up to each (university) museum, and moreover, its mission, to define when 'enjoyment', in whatever sense it can be interpreted, is becoming 'fun' and is not desirable any more.

Acknowledgements
I would like to thank the organizers of the colloquium, the contributors to the discussion groups and the chairs of the concluding session(s).

Keywords: Society – University Museum – Relevance – Location

Discussion Group 4: Museum Management

Chair: Myriam Springuel

Participants in the Discussion:
Jacqueline Van Leeuwen – FARO Flemish Interface Centre for Cultural Heritage
Hugues Dreyssé – UMAC Chair and VP of Human Resources
Joost Vander Auwera – Curator Brussels Museum
Paulina van der Zee – University of Ghent

Group discussion yielded five important themes to consider in managing university museums.
1.) Management is serious business and should be taken seriously. It is important for the museum's senior staff member to 2.) determine who will decide the mission; 3.) understand where their budget comes from and who controls it; 4.) understand who the museum reports to within the university system and why; and 5.) gain as much visibility as possible. Participants also stressed the importance of sharing information and learning from each other.

Discussion summary

The group chose to address the questions holistically and to look at university museum management broadly. Everyone stressed the value of conferences such as this and how important it is we learn from each other – and create systems to encourage learning from each other. Even though each country has a different financing system there is much we could share. However, it is important to not compare widely disparate university museums such as the Ashmolean with a collection with a staff of one.

The discussion used the term management of museums, but it was understood that our discussion applied equally to university museums and collections. For ease of reading, the term museum also applies to collections in this summary. Five over-arching conclusions emerged not listed in any order with the exception of the first one. Consensus is that the first one is paramount.

Management is serious business and must be taken seriously. In university museums, management of the museum is often seen as a lesser or side-activity. In effect, the management of the museum and of the collections determines everything that will happen around that museum or collection.
Management is responsible for mission, vision, and strategy. Understand what you need, say it clearly.
Link your mission, vision, and strategy to the university's mission, vision and strategy
Link your mission, vision, and strategy with others in the university
It is a management responsibility to think both long and short-term.
It is a management responsibility to identify the museum's optimum position and to justify the resources needed for that position. The justification should include why not more and why not less.

Determine who decides your mission

Discussants wrestled with the question of whether the university should set your mission based on the university's priorities, or whether it should be a bottom-up exercise, where the museum tells the university what its mission should be. There was disagreement about the two options and we did not have time to discuss the many nuances between the two extremes.

Understand who controls your budget

Understand where your money is going, including where staff spends time. In particular, if you operate within someone else's budget, understand how much you have access to, how to spend it, how to advocate for more or less in areas where more or less is needed. Be proactive.

Understand who you report to and why

Discussants agreed that the museum's reporting authority should be as high as possible within the university system.
It is critical to consider where the museum resides within the university hierarchy. Are you part of the university management system? If yes, then understand how it works, particularly budgeting, and use it to your advantage. How are you perceived inside and outside the university? Understand

your position within the university and the many communities in which you operate. What do you need? Identify the tools, resources, and skills needed to manage the museum – and then advocate for them.
In addition, the museum should consider if it would benefit from outside support groups (to whom it would then also report for certain things). Discussants agreed that the model is different in each country but using support organizations modeled on friends and/or ambassador groups should be considered whenever possible.

Gain as much visibility as possible

Agreement was that it may be easier to achieve visibility within the society or community than within the university
To achieve visibility within the university, it is critical to search for common ground with faculty and staff. Those conversations must begin around the collections. Examples of tools for finding common ground include:
Professional and personal links
Co-creation of exhibitions
Open nights
Announcements of new collections
Announcements of changes in staff
Contextualizing museum-based scholarship for a broader audience
Linking to larger campus or community events
The example of welcoming remarks for this conference which included the mayor was cited as a particularly powerful example of visibility
Visibility attracts visibility. Build a track record of successes, make successes known, and continue the cycle helping the university and communities see and understand your value to the university's mission and to society.

Key words

Management matters – Determine mission – Understand budget – Reporting authority – Visibility

Conclusion

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From the above discussions, some key issues for the future of university museums and collections are:
- Understanding the complexity of museums and collections.
- Defining a clear mission statement (this idea to be found in the conclusions of groups 1 and 4).
- Establishing multiple gateways to collections.
- Encouraging collaborative projects that offer an international perspective on local stories.
- Serving multiple publics rather than 'the public' requires university museums to think flexibly and dynamically about designing exhibits and programs.
- Visitors should experience university museums as venues that not only collect, preserve and communicate but also generate by research new understandings about the world, its cultures and its sciences.
- According to the location of the museum clearly defining the challenges facing its relevance to society.
- Analyzing if it is thought from the point of view of the society or rather from inside the university.
- Management is a key issue to be taken seriously.
- This includes a clear understanding of financial matters and knowing who to report to.

All the above recommendations should lead to a greater visibility within the society of university museums and collections, "visibility attracting visibility".

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