

# The Museum Outside the Museum. Designing Science Exhibitions for Cultural Inclusion

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## Abstract

Science museums have the important cultural mission of mentoring society in scientific and technological progress. To pursue this objective, many resources have been invested in digital communication and marketing, but this is not sufficient to reach audiences that are not engaged with scientific culture.

To overcome the challenge of attracting uninterested visitors, some museums have chosen to extend their outreach beyond their physical walls, occupying highly frequented public spaces. This approach aims to capture the attention of citizens through exhibits and environments that encourage curiosity, entertainment, exploration, creativity, and social connection.

By reviewing the international literature and project examples in this field, the paper proposes new audience development strategies for science museums to rethink the relationship between museums and society through a 'museum outside the walls' inclusive perspective.

## Keywords

Outside museum  
Exhibition design  
Scientific museum  
Audience development  
Design for science  
communication

This paper analyses museum exhibitions that are positioned in public places, located outside the museum building, in order to identify audience development design strategies that are beneficial to science and technology museums<sup>1</sup>. These strategies help redefine the relationship between museums and society by enabling the dissemination of scientific and technological culture to new audiences in an inclusive perspective. The expansion of museum institutions beyond their physical boundaries reflects the contemporary trend in many scientific and cultural institutions to cross spatial and disciplinary lines.

The research is based on a review of scientific literature and a revision of case studies, with the aim of exploring museum practices outside traditional buildings. Building on the contextualisation of the current role of the scientific museum in society, in which various approaches to the mediation between museum and audience are discussed, the literature on museum exhibitions held outside traditional museum spaces is examined. In order to understand the phenomenon, different terms used to describe the phenomenon are identified, highlighting the absence of an established theoretical framework within the design context. On this basis, 31 MOM projects realised between 1991 and 2021, involving science and technology museums, civic museums and art museums, are reviewed. These cases are analysed according to three main criteria: the exhibition methods (unchanging, reinterpreted, generative), the relationship between space and passers-by (crossing, stopping, gathering) and the mediation strategies (audience development, placemaking, data collection). They are critically analysed to identify successful models and recurring problems. The study relates MOM practices to public needs, the urban context and engagement strategies, highlighting how the role of design remains poorly defined. The main objective is to stimulate an academic debate on the role of design in expanding museum practices beyond their traditional boundaries, identifying effective design strategies to engage new audiences and empower the link between museums, science and society.

At present, the museum is undergoing a transformation in which its role, its function in society and the conditions that are contributing to making its structure progressively more complex and stratified are changing. For this reason, there is an urgent need to consider and analyse these practices with the aim of focusing on the museum's primary function, which consists in exhibiting values and concepts.

## Design for Scientific Citizenship

In recent years, the steady growth of society's interest in the dissemination of science and technology has put a focus on the question of exhibition design in museums, and exhibitions on these topics. The various panoramas of dissemination and exhibition models that typify contemporary science museums is the result of a complex process of evolution<sup>2</sup> arising from the need to adapt exhibitions to the increasingly rapid pace of scientific and technological progress, to the audience's desire to experience concrete scientific objects and phenomena, and to the need to offer engaging and participative experiences.

1  
In this paper the abbreviation science museums will be used. The 1984 UNESCO classification of museums (UNESCO/STC/Q/853), defines science and technology museums as museums that "are devoted to one or several exact sciences or technologies such as astronomy, mathematics, physics, chemistry, medical science, construction and building industries, manufactured objects, etc.; also included in this category are planetaria and science centres".

2  
For a review of the evolution of science museum practices see Basso Peressut (1997), Schiele (2021).

The mediation and user paradigm of science museums has always been influenced by the relationship between science and society. Therefore, in order to define the goals and strategies of these institutions, the analysis of the changes that scientific-technological development causes in society is crucial. Today, the intent of scientific literacy — as a model of top-down knowledge transmission — is obsolete and a new scope for social discussions and evaluations has opened up. Designers of new science exhibitions cannot merely present a field of knowledge but — as Cameron advocated as early as 1971 — must find a way to engage the audience in a debate. The first step towards this paradigm shift was to make the phenomena more accessible, in order to facilitate knowledge appropriation through hands-on exhibits and interactivity. These approaches were initiated in the second half of the last century: they invite the visitors to physically interact with the exhibit in order to get a response to their actions and increase their mental engagement (Caulton, 2006). In the same years, science museums became aware that they had to present scientific research in its constantly developing state and no longer as objectively determined and finite knowledge. This facilitates the discussion between researchers and audiences with regard to the scientific debate, different point of views on a specific topic and the impact of technological progress on society.

Visitors' engagement with controversial topics related to the social, political and ethical implications of scientific and technological issues is changing these institutions' scenarios. The boundaries between the museum and the social living space thus become blurred (Cameron, 2010), and as a result, mediation strategies are adapted for dialogue and exchange. According to Greco (2007), the goal of science museums should be to construct scientific citizenship in every dimension: cultural, social, political and economic. The role of science exhibition design could therefore be to help people understand the complexity of progress, to select and manage information correctly and to make informed and responsible decisions (Pedretti & Iannini, 2020).

Subsequently, science museums began to prefer temporary and ephemeral events — including talks and conferences — to engage users (Yaneva et al., 2009; Sotério et al., 2023). They used technological devices and social networks that dematerialised the lines between museum and society, as well as physically removing these lines to motivate the visitors to take part personally and observe for themselves, sometimes even contributing to the research work. Citizen Science involves voluntary citizens as partners in the full scientific process, including the definition of research topics, questions, methodologies and the dissemination of results. Many museums are relying on this approach because directly engaging people in collections and research increases the public's reach and trust (Sforzi et al., 2018).

However, the open source distribution of resources — such as the digitalisation and on-line networking of content and collections — does not always successfully reach distant and uninterested audiences, in particular the young people generally targeted by science communication. So, the question arises, how can science museums open up to society and reach the widest possible audience through exhibition design?

The spread of new promotional and communication activities can benefit from the expansion into alternative spaces other than the museum building, becoming intense personal experiences which extend the action of cultural institutions over a wider area, and create new relationships between museum, city and citizens. Occupying the city in this way is an opportunity to identify new ways of conceiving exhibition design and expositions with a view to inclusion and the creation of new relationships with users and other institutions.

The Museum outside Museum (MOM) is not a replacement for traditional exhibitions offered inside museum spaces, rather it adds to them and increases the tools of culture dissemination. New exhibition practices outside the museum innovate the display, communication and testing mode through new kinds of relationships with cities, contexts and visitors. These approaches involve different types of museums and have previously been pioneered by public art practices. They suggest a new cultural experience and give museums the opportunity to promote themselves as a means for urban cultural entertainment and multi-point engagement thanks to casual encounters with fortuitous visitors.

In consideration of the emerging attention to these practices, which have yet to be sufficiently analysed by design culture, this paper reviews the literature and some examples in order to stimulate discussion about a topic which is highly relevant for exhibition design.

### **The Museum Outside Museum: Evolving Practices**

In recent decades, the museum has redefined its function within the city, and as a consequence undergone a progressive expansion of its tangible and intangible dimensions. The first concrete attempts at recruiting potential visitors involved opening up to the surrounding urban fabric in search of an opportunity to interact with the community.

In the sector of science museums, at the Nemo Science Museum in Amsterdam, a square on the roof of the building offers an urban space in which the *Energetica* exhibition is on display, and may be visited for free. The same is true of the exhibit at the museum entrance. *Fig. 1* In both cases, passers-by have the opportunity to learn about the principles of sustainable energy through inclusive experiences.

The attempts by MOMs have unfolded over time, not only through activities held in rather close proximity to the building, but also in more structured narrative episodes more distant from the museum.

In this sense, the work conducted by the interdisciplinary team Studio for Public Spaces at the Exploratorium in San Francisco is emblematic. It was founded with the *Outdoor Exploratorium* project and operates in public spaces, both in the city centre and in the suburbs, to create exhibitions and spaces that encourage exploration and social connection.

*Outdoor Exploratorium* was created with the aim of developing new approaches to exhibitions, to promote the observation of natural phenomena by providing an easily accessible space where visitors can personally test scientific knowledge in this field.

With this initiative, designers were also motivated by the intention to contribute to pedagogical research on learning, by creating the requirements for observing how visitors understand subtle phenomena and how they make connections between the exhibits displayed outdoors and the natural and artificial external environment (Exploratorium, 2010).

The Muse science museum in Trento also moved out of its building for the temporary exhibition *Lupi in città* (*Wolves in the City*), held from December 2017 to January 2018. The exhibition was developed as a part of the European *Life Wolfalps* project and was organised in eight stages located in various venues in town. It took the naturalistic topic of the relationship between wolves and humans outside using the language of contemporary art.

A reflection about the relational potentials of MOM activities is suggested by *Mobile City Lab* by the Frankfurt Museum as part of the *City Lab* project. Its aim is to bring some museum content to socio-culturally significant abandoned places in the city through bottom-up participatory experiences. The exhibition *East End // East Beginning: A District in Transition* — on show from spring to summer 2011 — featured a mobile office installed in a caravan in Osthafen Square and asked passers-by for stories about the development process of the district. In this way, citizens personally contributed to the content of the exhibition as experts of the city with empirical knowledge acquired through everyday experience (Jannelli & Thiel, 2014; Bassanelli & Postiglione, 2015).

Exhibitions beyond the walls of buildings have therefore been common practice for several decades now, but even so, there are no academic reflections in the field of design that are critical and shared by the scientific community, especially with regard to the definition of good design practices. These experiences are perceived as a spontaneous symptom of an inclusive trend in museum institutions, but the proposed project solutions are not always successful in terms of audience development and cultural impact, even though they appear as new and interesting potential project scenarios to be explored.

An analysis of the international scientific literature covering the topic — mostly in the field of museography — shows that MOM exhibitions are often never mentioned at all, and when they are, different names are given to phenomena that overlap in whole or in part. Examples are “Museum outside the museum” (Costanzo, 2007; Bassanelli & Postiglione, 2015), “Museum outside itself” (Rapisarda, 2006; 2013), “Museum to the Streets” (CFM, 2012), “Museum beyond its walls” (Carlini & Pretto, 2013), “Museum as outer dispositif” (Bassanelli & Postiglione, 2015), “Reach-out museum” (Bassanelli & Postiglione, 2015), “Museum moving out” (Rectanus, 2020). This vagueness may also be observed in the way museums communicate their ‘outside’ activities, using different keywords to define them, such as: in the City, in the street/into the street, pop-up museum, public space, escape from the museum, museum beyond the museum.

This is due to the fact that design has yet to take on a clearly defined role and become fully aware of its potential. The absence of design leads, in some cases, to a lower aesthetic, ergonomic and experiential quality of these exhibitions. Rapisarda (2013) highlights — eleven years after her initial study on this topic in her doctoral thesis — that even today there is still no opportune discussion of these

strategies, which continue to be implemented by museums without a fully or even partially structured approach in terms of design.

The definitions found in the literature often describe the same practices, although they focus on different aspects. In the case of the work *Il museo fuori di sè* (The Museum Outside of Itself) (Rapisarda, 2006; 2013) the author specifies precisely which activities can be defined as 'outside' and which cannot — in musicographic terms — and proposes a classification in relation to their proximity to the museum building. Specifically, the author excludes from her study:

those forms of museums, which by their specific nature are set in contexts other than the classical galleries, such as, for example, the conservation and enhancement of parts of the territory [...]; or the so-called open air museums, understood in their various forms such as ecomuseums or artworks displayed outdoors in parks and gardens; or even the restoration of buildings of architectural significance [...]; activities that the museum organises inside or outside its walls to disseminate and communicate its collections or the realities offered by new information technologies [...]; or the increasingly intense relations established between museums involving the reciprocal loan of pieces transferred from one institution to another in order to create temporary exhibitions (Rapisarda, 2013, p. 72).

On the contrary, in the text describing the European project *Adriamuse* — created within the framework of the *IPA Adriatic cross-border cooperation programme 2007–2013* — the definition of 'museum beyond its walls' includes:

all the activities that the museum organises outside its venue to involve wider audiences: festivals, historical commemorations, travelling exhibitions, installations in the city, flash mobs, workshops, educational activities, lectures, animated readings, showings, tastings, guided tours outside the museum, augmented reality, mobile apps [...] (Carlini & Preto, 2013, p. 8).

Other contributions emphasise the relationships between institutions, the city and passers-by, as in the case of Rectanus (2020) who examines how museums, artists, curators and the public are blurring the boundaries between 'inside' and 'outside' the museum by rethinking these institutions in terms of relational flows instead of static and confined spaces.

Bassanelli and Postiglione (2015) define outside interventions as a museum's 'prosthesis'. In particular — in the context of the European *Mela project* — the idea emerged of the museum as an 'outer dispositif'. With this expression, the authors identify MOM practices as a tool and strategy to occupy abandoned areas of the city in which new behaviours might be shaped by the exhibition. They define Reach-out Museums as new communication tools that look like outdoor workspaces, mobile museums, pop up museums, mobile laboratories and outdoor exhibits.

In actual fact, all authors consider these “to the streets” practices (CFM, 2012) as a way for museum institutions to innovate and test new approaches that personally involve local communities in order to position themselves as places of exchange between people and participation in culture.



Fig. 1  
Nemo Science Museum.  
Exhibit at entrance.  
(Source: Author).

### Case Studies Review

With the aim of analysing the design possibilities of such interventions in relation to the background, 31 MOM projects were analysed. The selection criteria follow Rapisarda's (2013) classification, but in addition exclude exhibitions that are ancillary to events and festivals or promote them, even if they are museum-initiated. The assembled sample includes projects realized from 1991 to 2021 by science and technology museums (numbering 14), city museums (numbering 4) and art museums (numbering 13) both temporary and permanent. Three characteristics related to the practice of MOM were analyzed and each defined based on three indexes: display methods — unchanging, rethinking, generating; space/passers-by interactions — moving, stopping, aggregation; mediation strategy — audience development, place-making, data collecting Fig. 2.

With regard to display methods, it was found that in some cases there was no experimentation and, therefore, there was no difference in any way compared to those inside the museum. One such example is the Glasgow Science Centre's Outer Space area, in which the museum offers interactive hands-on exhibits about various physical phenomena to passersby and the surrounding natural landscape Fig. 3. In other cases, some typical or otherwise pre-existing elements of the city are reworked so that they can serve as display items. This was the case for example of the *Science City* exhibition — from 1991 to 1995 — by the New York Hall of Science (NYHS), which reconsidered manhole covers and street signs to serve as supports for artworks, graphics and posters. Finally, there are cases in which an attempt to generate new practices emerges by merging display techniques and new urban elements. This is the case of *Chime-Way* by Exploratorium in San Francisco — on display temporarily in 2016 — in which two sets of chimes created a social and visual center. Benches served as a scientific exhibit for soundscape exploration by inviting people to sit, watch and listen, or by playing the chimes overhead to contribute to the soundscape to be explored Fig. 4.

With regard to the relationship between spaces and passers-by, there is a distinction to be made based on whether exhibits are located in spaces that users are passing through, or pausing in, or in spaces created to foster aggregation.

With respect to mediation strategies, three main trends are emerging: audience development, with the museum reaching out to meet the non-visitor and attract them inside to explore themes and collections, as in the case of the exhibition interventions by the Museum of Scales and Balances in Campogalliano, which alternate between spaces for transit and spaces to pause in the city, to arouse the curiosity of citizens about pieces on display and induce them to visit the museum; placemaking, in which urban spaces are redeveloped or new ways of experiencing those same spaces are created, as in the case of *Chime Way* which generated a new space for the city in which to pause and gather; and finally, data collecting. This is the case with the installation *Wall*, by the Museum of Copenhagen, which was set up as a traveling urban exhibition, an installation displayed for 4 years in different parts of the city starting in April 2010, with the purpose of making the museum's historical archive accessible and collecting material on the contemporary city Fig. 5. At the end of 2009, the museum began archaeological excavations for subway construction and used that opportunity to refocus its activities to be more present for the citizens and tourists. In this respect, the *Wall* was intended as an open-air interactive interface, which functioned as both a promotional tool for the museum and an experiment in interaction with the city and its inhabitants. The exhibition system allowed users to explore the museum's collection, download content and, most importantly, upload new content — mainly images and videos taken or recorded on site — to contribute to the narrative and representation of the contemporary city (Sandahl et al., 2011).

It may be observed that the parameters outlined here are not all specifically related to the exhibition being outside the museum, but all contribute to the definition of the exhibition space and intervention strategy. It may also be seen that these qualities are more related to museological than to design aspects.

			display methods		space/passers-by relation			mediation strategy			
			D.N.C.RE	GEN	MOV	STOP	AGG	A.D.	P.M.	D.C.	
science museum	2021	UK	<i>Outer spaces</i>	█		█	█		█		
	2016	NL	<i>Energetica</i>	█			█	█		█	
	1999	IT	<i>Feralp. Rail Transport Museum</i>		█		█	█		█	
	1991-95	USA	<i>Science City</i>		█		█	█		█	
	2018	IT	<i>Lupi in Città</i>	█			█	█		█	
	2004	IT	<i>Campogalliano: the Museum beyond the Museum</i>	█	█		█	█		█	
	2019-20	USA	<i>Middle Ground</i>		█		█	█		█	█
	2016	USA	<i>Chime Way</i>		█			█	█		█
	2016-18	USA	<i>"Sound Commons: a Living Innovation Zone"</i>	█			█	█		█	
	2015-18	USA	<i>Ciencia Pública: Agua</i>		█			█	█		█
	2015-18	USA	<i>Ciencia Pública: Skateboarding</i>	█			█	█		█	
	2013-15	USA	<i>Pause: a Living Innovation Zone</i>	█			█	█		█	
2009-15	USA	<i>Fort Mason</i>		█		█	█		█		
2012	USA	<i>Your Body Your Air</i>				█	█		█		
art	2010-13	FR	<i>Pompidou Mobile</i>	█			█		█		
	1994	FR	<i>Stazione di Arts et Métiers</i>		█		█	█		█	
	2002	USA	<i>The Chihuly Bridge of Glass</i>	█			█	█		█	
	2021	IT	<i>Bootlicker Suite</i>	█			█	█		█	
	2020	IT	<i>Tracce / Traces</i>		█		█	█		█	
	2020	IT	<i>Fuga dal Museo</i>	█			█	█		█	
	2017	IT	<i>Archeologic Airport</i>	█			█	█		█	
	2015	IT	<i>Ercole Farnese</i>	█			█	█		█	
	2021	ES	<i>A la vuelta de la esquina</i>	█			█	█		█	
	2021	USA	<i>Inside/out</i>	█			█	█		█	
	2001	IT	<i>Cubo Garutti</i>	█			█	█		█	
	2014-15	IT	<i>Musei in strada. L'arte va in città</i>	█			█	█		█	
	2001	AT	<i>Flucht</i>		█		█	█		█	
urban sp	2011	DE	<i>East End // East Beginning: A District in Transition</i>	█			█			█	
	2010-15	DK	<i>The Wall/VÆGGEN</i>	█			█		█	█	
	2006-08	DE	<i>Speaking Germany</i>	█			█		█	█	
	2014	DE	<i>Park in progress</i>	█			█	█		█	

Fig. 2  
Projects reviewed: overview of characteristics and evaluation criteria (Source: Author, 2023).



Fig. 3  
Glasgow Science Centre. Outer Space (Source: Author).



Fig. 4  
Exploratorium. *Chime-Way*. (Source: Exploratorium).



Fig. 5  
Museum of Copenhagen. *Wall*. (Source: Archives & Museum Informatics).

## Conclusion

Considerations of design aspects related to contextual change emerge from the analysis of the reported examples and the related literature. On the technical side, questions arise about administrative practices, systems and environmental conditions (Cole & Cutting, 1996). There are issues concerning the relationship between museums and other institutions that contribute to creating these spaces. The dialogue with museum institutions, in fact, highlights a great need to open up to the outside world. It is important now to connect with the scientific community, territories and companies in order to obtain funds, involve the public, create new content and conduct research. Local communities are involved in citizen science activities, in the co-design of exhibits, in exhibition and communication activities beyond the museum confines (Nichilò, 2024). There is a need to attract new audiences, in addition to schools and families, and to find ways to motivate people to return to the museum. The expansion of museum activities outside traditional outreach bound-

aries opens the way to new opportunities for dissemination and engagement with society. Older formats, such as science boxes, can be reinterpreted in a contemporary way, by using informal and temporary spaces or taking advantage of new communication approaches such as citizen science. But a careful balance is required to avoid the decontextualisation of the content when the encounter with the passer-by is casual. In fact, this is very different from the visitor who chooses to go to the museum, so the problems related to the flow of people are no less important (Bollati & Morea, 2019). To ensure an effective transmission of the scientific message, it is essential to strike a balance between the causality of encountering an exhibit in public spaces and the contextualisation of the information. The hybridisation of exhibition design with the public space therefore calls for rethinking the nature and experience of exhibits. It is necessary to consider the possibility of designing itinerant and modular exhibits, as well as the implementation of new technologies to develop hybrid exhibition formats that combine physical presence with digital tools to expand the audience experience.

In conclusion, the phenomenon of MOM expands exhibiting lines and delineates new project areas for museum disciplines. Science museums can rise to this challenge by proposing exploratory audience development and citizen science activities, and by collaborating with research institutions and artists to stimulate reflection on controversial topics in order to pursue the goal of citizen involvement in scientific research processes. It is essential to stimulate the cultural debate within the design sector, enabling designers to become strategic players in the design of the cultural experience and focus on new design approaches to exhibition systems that can adapt to the changing context. In this way, the museum can position itself as an institution that fosters public empowerment and engagement in science.

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