foresight

Museums in the Digital Age

ARUP

This report is a product of Arup Foresight + Research + Innovation. The Arup F+R+I team identifies and monitors the trends and issues likely to have a significant impact upon the built environment and society at large. We research and raise awareness about the major challenges affecting the built environment and their implications. We help clients think more creatively about the long-term future and manage risk and uncertainty more effectively.

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Introduction

"I think the future of museums will be a lot more personalised than the current one-fits-all visitor experience, with technology allowing people with different interests to each have a tailored experience."

—JIM RICHARDSON, FOUNDER OF MUSEUM NEXT AND SUMO DESIGN

As we live increasingly mobile, digital and virtual lives — with personalised user-experiences and services at our fingertips — museums will have to find new ways to tell stories and engage their audiences. As digital experiences and physical spaces merge, who will be the audience and who the curator? Will museums function exclusively in the cultural sector or continue to expand into other markets? How and where will content be exhibited and delivered?

Over the past 20 years, changes in society and technology have reshaped how museums function, how they deliver experiences and how their spaces are designed. Over the coming decades, securing access to funding, attracting broader audiences and serving alternative forms of culture will all place pressure on museums to innovate and adapt to changing user needs and economic realities.

In the future, museums will continue to be shaped by a wide variety of trends and drivers. New technologies like augmented reality are changing how and where we can have museum-like experiences. Social and cultural shifts are influencing what type of experiences people will expect, while restrictions to funding will continue to put pressure on some museums to be both profitable and more inclusive at the same time.

This report highlights a number of key trends that will continue to have a significant impact on the user experience and design of future museums. It explores the implications of pervasive virtual life and shifting demographics, with the aim of progressing strategic ideas and design concepts that can be shared and codeveloped further.

As part of the process, Arup Foresight + Research + Innovation mentored a module about the museum of the future with students from Central Saint Martins College of Art and Design (CSM) in London. Students were asked to describe different museums in the year 2040 by exploring the future museum-visitor's experience, the design of the museum space and the museum's position as an institution spanning various commercial sectors.

Museum Trends

Trend research takes a holistic view of the world, covering medium- to long-term developments within society, technology, economics, environment and politics. Trends can be used to develop corporate strategies, identify emerging risks, discover new growth fields and explore opportunities for disruptive innovation. The trends identified for this publication included the following:

1. Content diversification
2. Immersive experiences
3. Sustainable and open spaces


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Content Diversification

As people become accustomed to having unlimited access to information, how can museums present their content in a manner that is appealing to different groups within society? Today we find an ageing population in the midst of a growing number of Millennials[1] and members of Generation Twitter. Museums will have to accommodate the needs of those who expect digital interfaces as part of their user experience and those who may prefer a more traditional experience.

Collaborative curation

The move towards digital also has significant implications on how content is sourced, displayed and explored. Many museums already make use of technologies such as tablets and social media. However, amongst a net-native demographic, this no longer illustrates innovative practice but simply meets basic expectations. As people become more accustomed to the freedoms and empowerment of digital technologies, museums will be encouraged to invent new ways to tell stories, engaging visitors themselves in the creation and curation of content. Just as current consumer trends shift towards collaborative consumption, in the future museums may employ new patterns of collaborative curation, allowing for individually curated experiences and giving the public greater control over both content and experience. Increased visitor participation will allow people themselves to reinvent the museum experience, enabling content that can adapt to the preferences of users in real time.

Museums must invent new ways to tell stories, engaging visitors themselves in the creation and curation of content.

Shifting cultural expectations

As audiences become increasingly diverse, museums will consider if the social and cultural issues they address are still relevant. In a contemporary context, we look to the past to learn how we must address situations in the future. In the future, museums might have to think about whether past events will even hold the same significance or convey similar implications. Will museum-goers be interested in seeing original artefacts from a forgotten war? Changing attitudes from one generation to the next may mean that old divisions are destined to fade in the face of new realities. It is imperative to consider and address these new realities and continuously rethink the focus of their experience.

Maker movement

Advances in modelling, 3-D printing and rapid prototyping give conservationists the ability to accurately depict and build high-resolution reproductions of rare, damaged or previously unavailable objects. In the future, 3-D printing capabilities offer the option for visitors to take a piece of the “original” object home or create their own objects on-site. Additionally, as museums become increasingly connected on an international level, many of the objects kept in flagship institutions will become more mobile with easier return to institutions closer to their places of origin. Highly accurate reproductions of artefacts will ensure that museums can continue to make artefacts available to their audiences in reproduced form with less emphasis placed on the display of originals.

3-D printing capabilities may even mean that visitors can take a piece of the “original” object.

Beyond objects

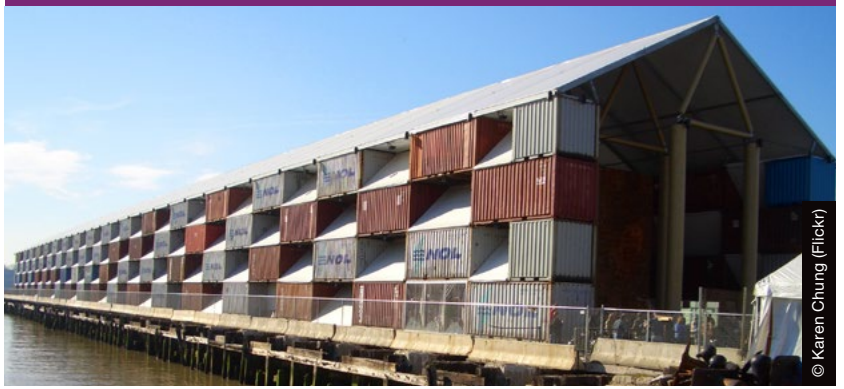
As audiences become increasingly accustomed to experiences that entice all the senses, the role museums play as curators of experiences, as educators, as platforms for cultural exploration outside a given exhibition will develop further. Opportunities for brand extension also become fundamentally dependent on the extracurricular interactions, the dining experience, the tea or coffee break, and the ease of navigating through the space.

CASE STUDY: OLAFUR ELIASSON, LITTLE SUN

"As part of *Olafur Eliasson: Little Sun* at Tate Modern, visitors explored works of art in the dark using only the light of Eliasson's Little Sun solar-powered lamps. The artist has developed the Little Sun solar-powered lamp with the engineer Frederik Ottesen to focus attention on the power of solar light to improve lives. Around 1.6 billion people worldwide live without access to mains electricity. Many of them rely on kerosene lanterns for lighting, which is both expensive and a health hazard. Little Sun brings light to people in off-grid locations, enabling them to work, reduce household expenses and improve the quality of life."

—TATE MODERN

CASE STUDY: NOMADIC MUSEUM



"The Nomadic Museum is a temporary structure used to house the *Ashes and Snow* photography and film exhibition. The Nomadic Museum will be redesigned and adapted to each new location. Originally made of shipping containers, the architectural design evolves as it travels."

—CHECK ON SITE: A WORLD GUIDE FOR ARCHITECTURE AND TRAVEL

CASE STUDY: ALTER BAHNHOF VIDEO WALK

"The Alter Bahnhof Video Walk was designed for the old train station in Kassel, Germany as part of dOCUMENTA (13). Participants are able to borrow an iPod and headphones from a check-out booth. They are then directed by Cardiff and Miller through the station. An alternate world opens up where reality and fiction meld in a disturbing and uncanny way that has been referred to as 'physical cinema'. The participants watch things unfold on the small screen but feel the presence of those events deeply because of being situated in the exact location where the footage was shot."

—CARDIFFMILLER.COM

Immersive Experiences

The growth of digital services is not only transforming our interaction with the digital world but increasingly shaping our understanding of how we design and experience physical spaces. This includes our homes as well as places such as the workplace, retail environments and cultural centres. We are increasingly shifting to hybrid environments where digital technologies are used to enhance and enliven the physical experiences and offer new immersive experiences.

Increasingly, users have become accustomed to interacting with a screen, rather than engaging directly with the people around them. As we continue to become even more reliant on digital technology, museums will be challenged to create experiences which will be considered novel and valuable, social rather than antisocial, by the ever more techno-savvy audiences of the future within the museum. With the prevalence of smartphones, contact-less technology, augmented reality and even face-recognition software, museums will also further cultivate experiences that extend beyond the walls of the museum, both virtually and in terms of new types of physical spaces.

Museums must invent new ways to tell stories, engaging visitors themselves in the creation and curation of content.

Experience integration

As boundaries between different cultural, social and entertainment institutions continue to blur, labels will become increasing less significant. Places of interest such as art fairs, museums, libraries, shops, restaurants and galleries can commonly be found strung together, to provide a single but highly diversified user experience. Within this contemporary framework, museums must consider what they can provide besides content and what their distinctive roles will be. A major critique of the pervasiveness of virtual life is that it encourages antisocial behaviour, as people communicate through screens at the expense of direct, in-person engagement. In the future, will people still want a shared physical experience? As our world continues to shift towards digital interfaces, will increased reliance on technology mean that we feel more comfortable interacting through digital interfaces rather than personal contact?

In the future, will people still want a shared physical experience?

Smart environments

As part of the diffusion of mobile devices and sensors, museums can also use data generated by visitors to continue to improve and enhance their immersive experiences, exhibitions and auxiliary programs. In the museum of the future, data collection and analytics coupled with automation will provide a way for museums to deliver highly compelling, individually curated experiences, where users, exhibits, light, sound and space interact to create a seamless environment. This will enable a more dynamic synergy between digital and analogue, and help create more immersive experiences.

Museums can use data generated by visitors to continue to improve and enhance their immersive experiences, exhibitions and auxiliary programs.

Mobile, temporary and transient

Museums and the content they display no longer need to be fixed to a certain point in space and time. Mobile exhibitions coupled with temporary and modular architecture can enhance and enliven museums, providing an experience that extends beyond museum walls. In the future, mobile museums will reach a wider demographic in a more diverse range of spaces and regions. This — combined with digital access to collections — has the potential to completely shift the notion of where and how museums can exist in the future.

CASE STUDY: WALL COLLECTION AT CLEVELAND MUSEUM OF ART

© Clevand Museum of Art

"Local Projects' recent work for the Cleveland Museum of Art directly connects viewers to the museum's content using technology. However, the technology isn't there for novelty. It fosters new interactions between visitors and the works that the museum collects. For example, the in-museum interfaces allows you to make a face or pose and matches it to the work in the museum."

—CLIFF KUANG, *FAST COMPANY*

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"A constant in the future is a continued need for real people on the gallery floor, someone who can convey passion."

—TIM MOLLOY, CREATIVE DIRECTOR AT SCIENCE MUSEUM

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Sustainable and Open Spaces

As cities become increasingly dense and public space becomes more valuable, museums must consider the significance of their role in place-making. How will museums provide public spaces for their audiences? How can museums encourage cultural exchange amongst users, who vary greatly in age, skills, and social and economic backgrounds? Moving forward, environmental conditions, security and access will also have a significant impact on the design of the museum and the public space and services they provide.

Climate-ready design

To respond to emerging environmental shifts, museums will continue to embrace more authentically green design. This will be reflected in more holistic and efficient systems for anything from lighting and acoustics to energy and waste. Over the coming decades, climate change will affect not only the design of the museum but also the type of content that is delivered within. In addition to the preservation of inanimate artefacts, museums may shift towards the preservation and archiving of living elements threatened by the growing physical impacts of climate change. For example, faced with the impending risk of food shortages, institutions may look to integrate alternative food cultivation systems such as hydroponic farms. In the future, the research and development divisions of museums may also build upon their outward-facing role, as a conservation and preservation space and a living archive of solutions.

Museums may shift towards the preservation and archival of living elements threatened by the growing physical impacts of climate change.

Positive impacts of design

Driven by regulation and the rising cost of energy, many museums will be under greater pressure to increase the resource efficiency of their operations. On a practical level, standards for elements such as lighting and air conditioning will have to be modified to attain the necessary levels of efficiency and control. Through sensors and smart controls, water, heating and cooling systems can be monitored and managed more efficiently. Other measures include new systems to capture and store energy, integrated green spaces that help foster biodiversity, passive design methods and even emerging techniques such as nanoparticle surface treatments for the neutralisation of airborne pollutants.

Community integration

Historically, new technologies and variations on the museum typology were developed in moments of great expansion. As patterns of urban migration are projected to increase, it is imperative to address the needs and interests of greater densities of people in increasingly globalised communities. In this new context, how can the museum position itself as an important centre of cultural discourse? Museums will look to make content accessible to an even wider demographic and develop a nuanced understanding of local community and surrounding influences. At the same time, a museum's architecture should take the notion of public space further, and in doing so, enable moments of intersection between varying cultural and socioeconomic divisions.

As patterns of urban migration are projected to increase, it is imperative to address the needs and interests of greater densities of people.

CASE STUDY: MOMA PS1


© Jessica Sheridan (Flickr)

"*Wendy* is an experiment that tests how far the boundaries of architecture can expand to create ecological and social effect. *Wendy* is composed of nylon fabric treated with a ground breaking titania nanoparticle spray to neutralize airborne pollutants. During the summer of 2012, Wendy will clean the air to an equivalent of taking 260 cars off the road."

—MoMA PS1


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"The museum experience is becoming increasingly collaborative. Museums are becoming more comfortable with letting audiences have a say, and again technology can facilitate this."

—JIM RICHARDSON, FOUNDER OF MUSEUM NEXT AND SUMO DESIGN

Future Visitor Profiles

An increasingly globalised society will give rise to more culturally and demographically diverse audiences. In an effort to expand their reach, museums will venture outside conventional community boundaries to engage with people beyond their core demographic.

1. Expanding global middle class
2. Generation Twitter
3. Ageing populations
4. Lifestyles of health and sustainability
5. Expanding target group


© Marino Miculan (Flickr)

Expanding global middle class

According to the UN, the global middle class will expand to 3 billion people by the year 2020.[2] Most of this growth will happen in developing economies. To serve this emerging demographic, the role and presence of museums will inevitably have to change. This is already evident in places like China, where decades of economic growth have given rise to a mass cultural boom[3], demand for unique cultural events and consumers who seek to explore new products, services and experiences. What can museums do to attract this new and growing pool of potential visitors? How will museums in emerging economies differ from their established counterparts?


© Garry Knight (Flickr)

Generation Twitter

The digital realm poses a grey area, with contradictions between public versus private, virtual versus real and active versus passive engagement. Today's digital-native generation consumes such large quantities of media that people are constantly torn between simultaneously texting, posting information on social media networks or watching video clips online. With shorter attention spans and a growing tendency to be distracted by the thousands of 140-character news snippets, how will museums provide novel experiences to Generation Twitter? How can museums actively engage the user and effectively communicate content in a coherent and clear manner?

© Ryan Wilson (Flickr)

Ageing populations

According to the UN, the number of older persons has tripled over the past 50 years and will more than triple again over the next 50.[4] In Europe, an increase in life expectancy and low birth rates will continue to push the population cohort toward a larger proportion of older people: by 2025, 30% of the EU population will be 65 years or older[5] — the largest proportion of old people in the world. In the context of global ageing, it will be essential for museums to consider implications on museum design and experience. Elements such as lighting, interfaces and space may have to be modified to accommodate audiences with varying degrees of mobility and technological know-how. On a more practical level, what types of concessions and experiences should museums offer specific to elderly visitors? In rushing ahead to integrate more personal and digitally connected experiences, we risk neglecting those who do not own a mobile or wireless device. In the future, museums will have to consider in greater depth the implications of digital versus analogue experiences to determine what solutions best serve each user group.


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© Noah Sheldon / Arup

Lifestyles of health and sustainability

The growing self-quantification of anything from eating to exercise patterns highlights an increased consumer focus on personal health and sustainability. Just as museums have been focusing on cultural, entertainment and education sectors, in the future they will be creating more spaces and experiences that are environmentally conscious and that place emphasis on visitor wellbeing. Supporting sustainable lifestyles will also become more important, for example by encouraging green forms of mobility or by educating visitors about environmentally friendly practices.

Expanding target group

As museums develop opportunities that extend beyond their walls and core business, targeting new customer groups will play a significant role in widening the scope of the institution as a brand and realising opportunities for museums to provide a richer range of services and products. Targeting demographics such as working professionals — who often do not leave the office before the museum has already closed — will not only increase footfall and sales, but also have a positive effect on how the wider public perceives museums as a whole. The opening of venues like Tate and the V&A Museum for live events during late night and after-work hours has already led to museums becoming entertainment hot spots. The expansion of such initiatives encourages new revenue streams and reaches new demographics.


© Knight Foundation

Future Scenarios

As part of our exploration into museums in the digital age, Arup Foresight + Research + Innovation mentored a module investigating the museum of the future with students from the Narrative Environments course at Central Saint Martins College of Art and Design in London. Students were asked to envision scenarios for the year 2040 and conceive the future museum visitor's experience, the design of the museum space and the museum's position as an institution across various sectors. Additionally, the students considered key future drivers and applied them within the context of museum case studies.

Living history and super plants

Kew Gardens

This scenario proposes a rather bleak future, in which inhabitants of the megacity will have disoriented and desensitised senses. As a result, people become increasingly isolated from one another. Big data and self-monitoring mechanisms do, however, provide resources to personalise and curate individual experiences. This becomes a means for positive emotional engagement and contrasts with the environmental challenges of the megacity. In this way, museums will continue to be experience-driven.

Ultimately, this scenario describes a future in which the museum functions as a temporary retreat from certain undesirable conditions brought on by the future megacity. With the effects of greenhouse gases, rising temperatures and toxic fumes polluting the cities, plants in the museum realm take on an alternative role to monitor and regulate healthy carbon dioxide and air quality conditions. To establish and preserve these living artefacts, museums engage in research and development activities with an added scope of preservation. This demonstrates the museum's role as an agent of biodiversity in a future context — a potential safe haven and conservation platform for flora and fauna as well as for the populace sheltering them from environmental catastrophes like natural disasters, disease or war. A worst-case scenario would be if the museum's resources became fully privatised. With this in mind, museums will need to consider the implications of a private versus public agenda.

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The design of interiors in the future may integrate more "green" elements, such as plant walls and functional vegetation that helps to regulate environmental toxins.

The museum's digital interface aids in curating individual experiences for the user, keeping logs of past visits, in addition to monitoring and sending alerts to regulate carbon emissions per household.

Imagine a world defined by extreme weather and dramatic climate change. In this future, Kew Gardens with its dual role as research centre and visitor attraction, will be a driving force in the development of functional plants.

Nomad Havens

Victoria & Albert Museum

This proposal illustrates the significance of the museum's role within the larger urban and global context. As focus shifts to increasingly connected networks, museums extend their future user-journeys far beyond the museum walls, to the countries where artefacts originated. Plugging into mass transit systems, the scheme presents the museum with an alternate business model, as a travel and tourism guide and international affairs ambassador.

The scenario investigates the role of the museum beyond the preservation of artefacts. In an increasingly globalised community, a move to deliver artefacts back to their country of origin exemplifies cultural awareness. With heightened political uncertainties, this gesture can ease political tensions. It also provides an opportunity for museums to develop their role as agents nurturing diplomatic and cultural relations. What happens to the museum space, however, when all the objects are returned? When 3-D printing becomes affordable and ubiquitous, how does the value placed on original objects change? Museums will need to consider the temporary and permanent aspects in their exhibitions, reexamining the value that can be brought to the business. The scenario envisions a train journey across the Middle East, where its occupants view exhibits while on the train, in addition to enjoying authentic experiences curated by associated institutions in the origin countries. It uses the local transport infrastructure to move artefacts around. In the future museums may need to consider their expertise and how they can diversify their revenue streams.

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Nomad Havens would be transient a museum experience where people would visit the origins of the museum artefacts.

A transient museum experience might showcase objects as they are returned to their country of origin.

The museum might collaborate with local cultural institutions to curate tours and exhibitions along the train journey.

New collectors

The Wallace Collection

In a future with increased reliance on technology, the line between physical and virtual diminishes. In this proposal, there is a stark contrast between generations. Men are hugely outnumbered by women, social interactions favour online and virtual presences, and the digital world is generally preferred to a physical one. Against this backdrop, positive museum experiences in the physical realm are reinforced through immersive technologies that extend beyond the walls of the museum.

This scenario comments on our obsession with being online. While an emerging generation of Millennials have grown up as net-native users, the rush to integrate more personal and digitally connected experiences in museums may alienate those who do not own mobile or wireless devices. The most fulfilling museum experiences will be those that provide the right balance between the digital and analogue. Within the discourse of emerging technologies and the widespread use of digital fabrication methods, the role of tangible original artefacts in a museum is one that will inevitably be reevaluated.

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An increased reliance on technology has drastically changed the urban landscape. The city is composed of images and advertisements. Digital interfaces overtake physical infrastructure.

To appeal to users who favour online social interactions, the museum explores activities extending beyond the museum walls, using primarily digital interfaces and projections.

Immersive experiences that are created around the individual visitor help to pull people into the more traditional exhibition spaces.

The listeners

Freud Museum

This future scenario depicts the museum experience which extends beyond the museum walls. The museum's role is altered, providing mental retreat and therapy as a way to cope with everyday pressures. The proposal envisions a world with access to infinite content and constant stimulations (text, video, voice) by external environmental sources, which will ultimately lead to severe symptoms of information overload. Conditions such as stress and anxiety become the norm, and the museum provides an escape from urban context for the mind to disconnect and reengage with the tactile human experience.

In this story, the protagonist goes to a gallery space, a node of the main museum. She enters a "listening pod" and falls into a blissful state of contemplation. Here, highly immersive user interfaces start the museum experience by easing participants into a passive state. Then the artwork begins to respond to the protagonist, and she gradually gains control and becomes an active participant who interacts with the exhibit. In the future, museums will need to consider the distribution of power and control in interactive experiences. The interaction will become more fluid and responsive, and at the same time, deliver individually tailored messages. Another example is when the protagonist is shown into a room with walls of screens virtually displaying peaceful outdoor scenery. The intrusive sound of an alarm clock ensues. This startling contrast between nature and technology suggests the importance of empathetic environments and of human wellbeing.

The story also briefly demonstrates the severe impact of urbanisation when the protagonist travels from the gallery space to the main museum. Climate change has affected urban life with extreme wind, rain and perpetual darkness. Technology is used to assist in navigating a treacherous urban environment. Can the museum have an active role in mitigating climate change? Against this backdrop, how are artefacts and conventional museum services affected?

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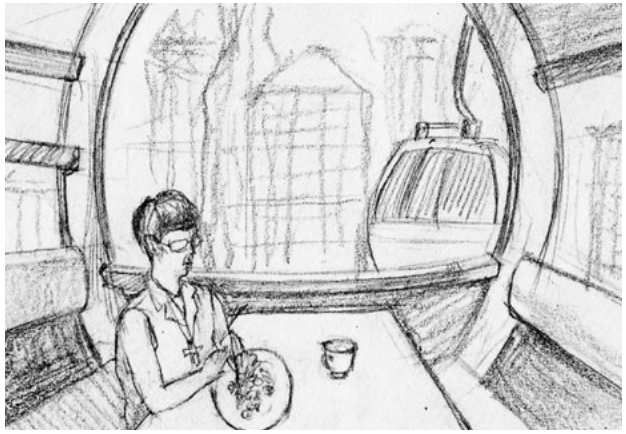
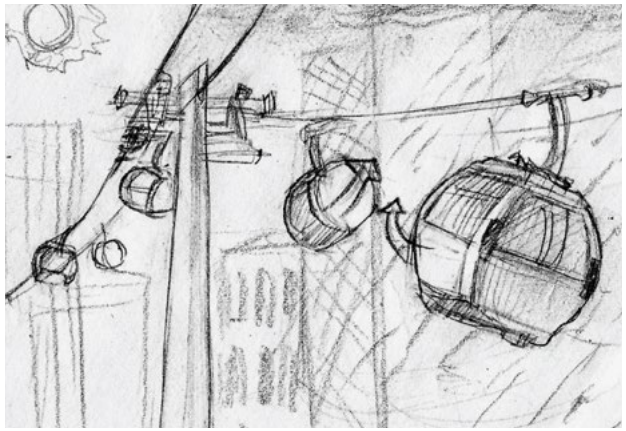


The museum visitor enters a "listening pod" to escape the external distractions of the urban environment.



In response to an increasingly unstable climate, the museum and "listening pod" will provide a sense of calm and order.

The museum of the future will offer perceptual and sensual experiences that are becoming rare because of pervasive technology.

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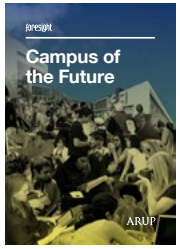
Future of... Series

The Future of Retail explores how drivers of change are shaping the future of retail. It reveals important trends shaping new consumer behaviours and looks at some of the likely impacts that these will have on future retail environments and services.

Living Workplace focuses on the future of the workplace. It investigates the impact of growing cultural and generational diversity, the role of new technologies and working patterns and the importance of creativity and collaboration for organisational success.



Campus of the Future highlights Arup Foresight + Research + Innovation group's opinion on the future of the campus. It summarises some of the key Drivers of Change and gives examples of innovative campus environments, both physical and digital, that are leading the way around the world.

The ideas being developed in *Cities Alive* seek to capture not only the beauty of nature but also the sustainability of balanced ecosystems. These are challenges for landscape designers creating new cities that meet our increased expectations for access to clean water, cheap and plentiful supply of food, and fast and effective transport systems, with the need to reduce the impact on natural resources.

The Future of Rail 2050 focuses on the passenger experience and sets out a forward-looking, inspiring vision for rail. The user journeys imagined here are intended to generate a conversation about the future and provide the big-picture context for future planning and decision making by governments and the rail industry.

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We live in an increasingly mobile, digital and virtual world built of personalised user experiences and services at our fingertips. Museums must find new ways to tell stories and engage their audiences. As digital experiences and physical spaces merge, who will be the audience and who the curator? Will museums function exclusively in the cultural sector or continue to expand into other markets? How and where will content be exhibited and delivered?

Museums in the Digital Age explores the implications of pervasive virtual life and shifting demographics, with the aim of progressing strategic ideas and design concepts that can be shared and codeveloped further.

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