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A CASE STUDY OF COMMUNITY VIRTUAL MUSEUMS IN THE AGE OF CRISIS

Designing a Virtual Museum of Caribbean Migration and Memory

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The Virtual Museum of Caribbean Migration and Memory (VMCMM) tells stories of migration from a Caribbean perspective and is focused on the experience and impact of the Windrush generation. The VMCMM was created in part to commemorate the 70th anniversary of the HMT *Empire Windrush*'s landing in the United Kingdom, carrying approximately 600 migrants from the Caribbean.

This chapter places the VMCMM within a wider context of future capacity and challenges for virtual museums in the Caribbean by reporting and reflecting on the round table held at the MAC Annual Conference in 2018. The panel included the University of West Indies (UWI) Museum, the Barbados Museum & Historical Society (BMHS), the Museums Association of the Caribbean, the Universidad Austral de Chile and the University of St Andrews. We discuss our experiences in developing digital architecture to support workshops held in communities and museums in Jamaica, Trinidad and Tobago and Barbados. These were organised through the EU-LAC Museums project and involved hundreds of participants, including school students, museum volunteers and professionals. The workshops streamlined and simplified photogrammetry for community museums to create, archive and curate representations of heritage using 3D and 360-degree media.

In the discussion that follows, we detail the design and architecture of the VMCMM, a virtual museum, based on experience of working with community museums. At its core is the open-source Omeka archive and exhibition-building content management system framework for museums and collections. The virtual museum framework supports interactive mapping, digital galleries, timelines and digital panels that can be integrated into web narratives. The framework connects with Social Archive sites, the World Wide Web and mobile applications. It makes use of open standards and provides powerful but simple metadata and archives. Our design philosophy sees virtual museums as an active resource, supporting

content generation as well as enabling content to be deployed in multiple exhibition contexts.

The chapter discusses how the virtual museum architecture was developed and combined with content to create the VMCMM. The mapping capabilities of the VMCMM enabled spatial visualisation of migrations, showing the scale of departure, movement and final terminus. Spatial context visualisations help viewers to understand the significance of a people in transition and the effects that migration has on society and culture. The combination of virtual maps, historical narratives, first-person accounts and digital heritage generates an understanding and appreciation of humanity during major events. In addition, its integration of emergent media, such as 3D models, 360-degree images and virtual reality (VR), adds depth and authenticity. The VMCMM infrastructure connects interactive mapping with media through a content management system to achieve synthesis between the two.

The VMCMM was unveiled as part of *The Enigma of Arrival* exhibition at the Museums Association of the Caribbean's 2018 conference and continued as a touring exhibition across the Caribbean. *The Enigma of Arrival: The Politics and Poetics of Caribbean Migration to Britain* mixed physical exhibits with projections of historical audio-visual recordings, digitised 3D objects and interactive panels with embedded associated media. It created an immersive space that allowed visitors to experience Caribbean perspectives on migration. The virtual museum, available online as well as within the exhibition site, further became an active platform where users can upload personal migration stories, adding to the breadth of co-curated content and known cultural narratives. The online element of the exhibition supported the transition to strictly virtual content during the COVID-19 pandemic and has bolstered the digital content and resources on this topic that are available to a global audience.

The Virtual Museum of Caribbean Migration and Memory

When the HMT *Empire Windrush* docked in the Port of Tilbury outside London in June 1948, it carried one of the largest groups of West Indian migrants to the United Kingdom. Its journey has become an iconic symbol of Caribbean post-war migration to Britain. The impact of West Indian migration was transformational for British society, touching all aspects of life, including work, culture, politics and sport. The following case study examines the practice of designing a virtual museum to capture and communicate the Windrush migration experience from a Caribbean perspective.

The design for the VMCMM began in 2017 as part of the EU-LAC Museums Horizon 2020 project. Three motivations were key in its development:

- The topic of migration goes to the heart of cultural and political issues around the globe. The Caribbean experience, from the Panama Canal, through the Windrush generation to today, provides a complete insight into both the long-term

benefits to the receiving localities and the challenges posed to communities left behind.

- There are abundant museums, archives and resources relevant to migration and gender but are often difficult to locate, presenting a challenge to gaining an overall sense of the resources available. A virtual museum on the topic offers a single destination and framework for those interested in the subject.
- New methods of presentation and associating data are regularly emerging, which herald the potential of a qualitative enhancement of virtual museum experiences. Through 3D digitisation processes, digital artefacts produced preserve and enhance the original physical media. Digital objects can fill a digital gallery, replicating a physical gallery, with associated interpretation and meta-data to provide dissemination. They can be placed into scenes that situate the artefacts within real or virtual representations of their original context.

The virtual museum was paired with a complementary physical exhibition designed by the BMHS and the UWI. The exhibition travelled to key locations on main Caribbean migration routes, as well as prominent final ports of call, in order to encompass the totality of the migration experience, obtain stories from those affected and show connections with modern immigration topics.

The virtual museum combines physical and digital exhibits, offering greater audience accessibility and participation in order to develop a collection of previously undocumented individual stories. It uses an archiving system designed specifically for the project, which aligns with open heritage aggregators and schema. It also supports the creation of new media, such as video entries, photogrammetry for the preservation of tangible heritage and virtual tours of locations associated with stories. A focus on telling individual stories of the Windrush generation using images, text and video allows previously unheard voices to contribute to a significant historical moment. Collected stories, associated media and resources and featured individuals are accessed by search, galleries and an interactive mapping interface, displaying the virtual museum's collection in a comprehensive design.

As access to digital technologies and growth of digital literacies progress, experimentation to discover novel ways to preserve and record history is paramount for heritage organisations, and within reach (Cassidy et al., 2018). The VMCMM models an innovative approach to collecting memory while disseminating academic research and narratives and offers support for further media creation to enhance the overall understanding of Caribbean migration. The VMCMM provides a rich framework for exploring the lack of representation of the past and present diaspora. It does so by curating migration narratives, reclaiming diasporic community experiences and illuminating the social and cultural dynamics of retelling national stories. In the COVID-19 era, it became the only means to access the exhibition *The Enigma of Arrival*, while the physical exhibition was no longer available. The global switch to digital media that occurred during the pandemic led to the VMCMM's expansion through additional content as well as redesigned infrastructures.

This shift in focus enabled the virtual museum to become the principal resource highlighting individual stories from the Windrush generation during the project.

The Enigma of Arrival: The Politics and Poetics of Caribbean Migration to Britain

With its arrival from Jamaica to London in 1948, the *HMT Empire Windrush* brought one of the first large groups of post-war West Indian immigrants to the United Kingdom—approximately 600 of the 1,027 total passengers. Post-emancipation migration out of the Caribbean had occurred prior to this timeframe, notably to Britain and Europe in response to the call for recruits in the First World War and to Panama during the construction of the Panama Canal (1903–1914). However, the choice to focus on the Windrush generation came from an identified gap in the collections and narratives of museums across the Caribbean region. Although this theme may have been accessible to diasporic communities in the United Kingdom, UWI's research revealed limited opportunities in Caribbean museums to share the significance of this migration's impact on the economic, social, academic and cultural landscapes of the United Kingdom and the Caribbean. In a fluid, regional space, where so many Caribbean people have come from somewhere else over centuries, whether by force or freely, UWI's research into the collection holdings in Caribbean museums revealed that those institutions had so far made little effort to reflect on past and present experiences of migration and diaspora.

The exhibition *The Enigma of Arrival: The Politics and Poetics of Caribbean Migration to Britain* focused on Caribbean migrations from the 1940s to the 1970s in order to highlight and provide a comparison for the modern migration crisis in Britain. Alongside the VMCMM, it aimed to serve as a medium for informing the general public across the Caribbean and in the United Kingdom about the current state of affairs for Caribbean migrants. Through interpretive panels and interactive audio-visual materials, the audience was introduced to the historical parameters and scope of post-World War II Caribbean migration to Britain and its legacy among later generations, both in the Caribbean and abroad.

The growth of access to technology

Access to technology is at an all-time high and surely set to rise. In 2018, for every 100 people globally, there were 107 mobile and 69.3 mobile broadband subscriptions, compared to 63 and 12 per hundred in 2010. According to ITU (2021) statistics, Barbados saw an increase of 16.66 per cent in internet use in seven years, from 65.1 per cent in 2010 to 81.76 per cent in 2017. Jamaica saw a rise as well, from 26.67 per cent in 2010 to 55.07 per cent in 2017. Greater still, the growth of mobile broadband subscriptions allows access to the internet through social media platforms and search engines. Barbados had significant growth from 2000 at 10.48

subscriptions per 100 people to 124.08 in 2010 and a slight levelling out of 114.74 in 2019. Jamaica saw a similar increase from 13.82 subscriptions per 100 people in 2000 to 113.22 in 2010 and 102.56 in 2019. These figures are consistent with previous experiences working with communities and their museums during the EU-LAC Museums project. In each country and region, the digital infrastructure of mobile phones, computers and digital literacy in communities across Latin America, the Caribbean and Europe was sufficient to facilitate community engagement in digital heritage.

Digital technologies have seen qualitative transformations in recent years in terms of fidelity, usability and presentation. These have allowed digital technologies to represent heritage in a myriad of ways, making mobile and immersive interactions available on commodity devices while promoting accessibility, since potential audiences have both the required digital literacy and the access to devices that are capable of delivering immersive content. This potential coincides with strategies pushing for the creative use of digital technology, such as the UK government report *Culture is Digital* (Department for Digital, Culture, Media & Sport, 2019) and *Digitising Collections: Leveraging Volunteers & Crowdsourcing to Accelerate Digitisation*, which stresses the importance of museums adopting a digital strategy (AXIELL, 2017). The relevance and importance of digitising collections as part of collections management is demonstrated in the European Union (2017) report *Promoting Access to Culture via Digital Means*.

Digital technologies are not only important tools for improving accessibility to museums' resources but can also introduce new methods of gathering digital data. If a museum has the capacity to go digital, it is able to expand from being locally rooted to having a global footprint. Through digital technologies, museums can contribute to the growth of global knowledge, promote social cohesion and inclusion and promote a better understanding of different cultural roots within societies in ways that go beyond direct contact with audiences.

Virtual museum innovations

Virtual museums have typically focused primarily on providing remote access to interpretation of collections held physically by a museum. In recent years, considerable technological progress has been made, allowing virtual museums to advance from simple image galleries, to support 3D and other immersive media and now VR with fully explorable environments. As a result, their scope has undeniably changed, as new media and resources have had to be made compatible with platforms already familiar to heritage professionals to improve interoperability (Fabola et al., 2017).

In order for virtual museums to deliver content, narratives and experiences that adhere to the same principles as their physical counterparts, multiple processes must take place to ensure interconnectivity with known curatorial procedures, schemas and databases. Exhibitions require research into collections as well as interpretation

of materials; these processes rely on the capacity and skills of museum staff, volunteers and community members. This is also the case when curating an online exhibition using objects and stories held in a physical museum. Moreover, data and media should link with larger digital libraries for better global accessibility and should be comprehensible to different types of audiences using the content.

Perspectives from a Caribbean round table on virtual museums

The above issues were at the centre of a discussion held during the Museums Association of the Caribbean annual conference in 2018 held within the *Itinerant Identities* conference at UWI Cave Hill Campus in Barbados. A round table discussion was organised during the proceedings, in which participants included community and university museum leaders, as well as digital heritage experts. The members of this ‘Caribbean Virtual Museums: Opportunities and Challenges’ round table discussed the design, functionalities and specific requirements of future virtual museums for the Caribbean.

The panel was an opportunity to consider how new media might help in the process of learning to create and archive digital heritage, and develop mixed virtual exhibitions in a digital format. The potential for drawing connections and sharing perspectives through digital heritage is perpetually growing. Advances in technology have improved general digital literacies to the point where museums and their audiences can use these technologies for both engagement and dissemination. The panel also addressed common challenges and misconceptions related to digital



FIGURE 11.1 Panellists in the round table discussion ‘Caribbean Virtual Museums: Opportunities and Challenges’ during the *Itinerant Identities* conference at UWI Cave Hill campus, Barbados.

heritage and virtual museums and shared solutions with one another. All participants agreed that the rich heritage spread geographically across the Caribbean means that virtual museums have great potential to enable its interpretation and communication.

The panellists began by deliberating and establishing the place of virtual museums within regular museum programming and discussing whether they expand or restrict the museum's ethos. The risk that a virtual museum could overexpose a museum's collections and divert physical audiences exclusively online was raised as a known concern, mostly in organisations that did not already have a prominent online presence. In this regard, the expenses of smaller community museums may not be as large as those of national museums, but these institutions still require patronage. It was agreed that new technology does not threaten to replace a unique in-person museum experience but should run conjointly with existing processes and frameworks to enhance the museum's message. This was said succinctly by anthropologist Karin Weil: '[the museum] wasn't created to bring more people. It was created for identity, memory, human rights, native population [...] it is important to attract more people [...] but also you have to have a balance' (Cassidy, 2018, p. 2). It was agreed that, if community museums are part of their communities, and intended to contribute to their social sustainability, the digital domain can broaden and bolster these aspirations, as well as boost visits to physical exhibitions.

Moreover, as Geology lecturer and museum curator Sherene James-Williamson noted, a virtual museum can change and evolve with both online and physical audiences. James-Williamson observed that '[her] visitors [were] participating more in making [her] virtual museum a virtual museum' (Cassidy, 2018, p. 3). She argued that this could be achieved by allowing visitors 'to take their images [...] and they have their own narrative [...] when visitors come, they also come with information [...]. So I see our online museum environment more interactive and more informative in the next couple years' (Cassidy, 2018, p. 3). Crowdsourcing and co-curation have been a part of museology for the last few decades, but the digital domain can cast a wider net than has been previously accomplished. The internet has facilitated access to a global audience that can contribute to narratives and knowledge, and these contributions could be furthered by a virtual museum. Computer scientist Adeola Fabola confirmed that

there are so many opportunities here, so many possibilities that our technology would allow, no doubt there would be challenges, but if the interest is there, the tech circles and the heritage experts could work together for a viable solution.

(Cassidy, 2018, p. 5)

Within the context of sharing in the digital domain, an issue was raised regarding travelling exhibitions, which is both a distinctly Caribbean challenge and a wider contextual issue. Collections are shared externally through libraries and community centres as well as with other museums throughout the islands, but the process is still difficult. It also presents physical risks to objects that are eliminated through

publication as digital models in a virtual museum. Such models could be exhibited with interpretation and metadata, as well as the capacity for viewers to examine the object more closely than they might in person. Rather than printed and sent panels, interpretative material could be included as a digitally packaged exhibition that either remains completely digital or can be printed at the host's discretion. However, it was remarked that converting a physical exhibition to a digital form in a virtual museum is not a 'one size fits all' approach; the resourcing and goals of each exhibition require consideration. Yet, as James-Williamson argued, the addition of an online element to a physical exhibition need not replace it but rather might enhance and augment the experience, leading to different types of engagement and reactions: 'the borrowing and the booking of the exhibition [...] but doing it in an online environment is really really exciting' (Cassidy, 2018, p. 4). Researcher and curator Natalie McGuire could also see the potential for 'these community centres instead of relying on us to bring panels to them, they could download interpretative material provided by institutions and share reach and build agency within their own spaces' (Cassidy, 2018, p. 2).

A common challenge observed by the panellists was the requirement to educate current staff in digital skills and terminology, acquire new digitally conversant staff who could manage a virtual museum and its components and pass down knowledge gained by an individual to other staff. Weil wondered 'if I got out of museums, not working anymore there, who's going to continue, who's going to get training from whom' (Cassidy, 2018, p. 8). The work required to create and add digital content to an online resource, as well as access to technical support when needed, seemed daunting. A few members of the round table had been a part of the EU-LAC Museums project and had experience of helping to generate and manage digital content for a larger project but may not have done so by themselves. A discussion between the museums and technology experts led them to agree that building capacity within museums was valuable, as was utilising the digital literacy of their communities. Tapping into the community as a resource can provide insights, skills and perspectives needed to design a virtual museum that meets the community's needs and interests. This was a frequent observation made during the digital workshops that were run as part of the EU-LAC Museums project and hosted across nine countries. Each participant's skills benefited the digital content created as well as the museum, as new connections were made that could lead to future collaborations.

One aspect of digital collections that was enthusiastically acknowledged was their potential to aid global research. The value of digitised collections is undeniable. Researchers were once required to either travel to an object or request that an item be shipped to them. Barriers that may prohibit or restrict this fundamental part of research can be removed if the object is digitised. Speaking of her museum, James-Williamson commented that

[it] would benefit a lot, some of our collections people want to study them but Jamaica is quite far away from where the people are. So I'm seeing, in terms of

a virtual space, making my collections accessible, whether by database initially [...] there are a bit more intricacies to get things going, but to provide an online kind of a catalogue.

(Cassidy, 2018, p. 3)

Primary sources were considered. An accurate and accessible digital representation of an object allows research to continue and for comparative analysis and new inquiries to be made. Digital representations allow access for anyone who would not be able to see the physical object in person, which could be as a result of distance, disability or financial strain. Digitisation is then mutually beneficial to the researcher and the museum. Once collections are digitised, their uses are infinite. A digital object is a single file—or, in the case of 3D models, a few file types—that can promote museums, their collections and exhibitions in the form of digital or printed media. It can increase the visibility of the object, museum and associated community. Additionally, digitisation captures an object at a certain point in time, which allows it to be examined as it once was. This is imperative in case of damage or loss. Digitally safeguarding collections is a method for museums to be actively sustainable and to future-proof themselves against unforeseeable incidents.

Participants in the round table also acknowledged the misconception that technology has a high barrier to entry in monetary terms and the skills required for use. When asked how a museum can fit a new technology into its practices, Fabola recommended that museums should rather ask: how can this technology ‘supplement how we do things? This technology could walk hand in hand with your existing processes and your existing infrastructures’ (Cassidy, 2018, p. 1). Fabola argued that new technologies should not be considered merely for the sake of their novelty or flashiness but must be able to contribute and assist within the museum’s existing framework. He also asked that practitioners ‘consider the notion of the resource spectrum [...] where as we know there are hundreds of thousands of museums across the world with varying resource availability’ (Cassidy, 2018, p. 2). His research suggests that, in order for all museums to take advantage of what emergent technologies can offer, ‘it’s possible to have some sort of framework where you can use some subtle technology with varying levels of cost and availability irrespective of the resources at the museum’s disposal’ (Cassidy, 2018, p. 2).

Developments and outcomes in the EU-LAC Museums project demonstrate that even with resource restrictions, the commodity technology held by the community was enough to produce new types of digital content, such as 3D models and 360-degree virtual tours. The threshold to new technologies is lower than commonly thought. Moreover, once established, the use of these technologies can be expanded and adapted in museums’ practices.

The question of who virtual museums are for, and what their roles are, was raised as a response regarding resourcing and capacity-building within museums. Uncertainty about staff availability was prominent, especially since a majority of small or community museums have limited resources. Practitioners noted

that the role of a virtual museum needs to be resolved before staff allocation can be considered, as the responsibilities of a virtual museum depend on its core function. If it is primarily to increase visitor numbers and promote footfall, then a staff member with tourism and public relation skills could be best placed to manage it. If it is to be a resource for digital collections and exhibitions, however, then a curator may lead its development. A clear understanding of what programme the virtual museum supports can assist in evaluation, which aids in proving its effectiveness to authorities. As Weil suggested, one of the questions to ask before developing a virtual museum is: ‘who is going to be in charge of the virtual museum, for what, and maybe [moving forward], you can use it for a lot of things [...] but each one has to be directly in touch with that’ (Cassidy, 2018, p. 7).

In the discussion, the possibility of sharing a pan-Caribbean vision for the island nations with the world was an exciting proposal that overrode trepidations. Preserving and sharing knowledge using new technologies and methods was understood as having the potential for sustainability that small museums strive to achieve. Historian and curator Suzanne Francis-Brown observed that the UWI museum’s focus on a ‘pan-UWI complete Caribbean perspective’ is what it was created to pursue (Cassidy, 2018, p. 8). She stated that ‘from that perspective of knowledge creation and knowledge sharing, it would be something useful and possible, and perhaps pull in many elements of the university’s teaching and learning endeavours, as well the level of students as lecturers’ (Cassidy, 2018, p. 8). This involvement would in turn link to capacity-building within the museum, as sustainability for virtual museums depends on the proficiency of a team of staff and volunteers. In cases where a virtual museum relies on only a single person, it must be of the utmost importance to disseminate their knowledge so the management and upkeep of such a resource are continuous.

Summary from the round table discussion

As agreed upon by heritage and technology professionals during the round table, virtual museums are in a unique position to offer local communities, as well as regional and international audiences, access to and inclusion in museum collections and narratives. In a Caribbean context, the functions and capacities of such a resource could solve familiar challenges faced by island museums. The round table discussion, with its variety of panellists, illuminated the possibilities and prerequisites for the success of virtual museums. Drawing on this conversation, we determined that the crucial requirements for a pan-Caribbean virtual museum resource would include:

- community-sourced content and narratives
- access and creation beyond the walls of the museum
- guidance in the use of commodity hardware to create new digital content

A prototype virtual museum, the VMCMM, was developed and trialled at the opening of *The Enigma of Arrival* exhibition, which occurred during the same event as the round table. The VMCMM was created using a practice-based methodology such that user needs and perspectives identified at the exhibition opening were incorporated into the design process. The main points made by the panellists were considered and served to shape future iterations of the VMCMM. In turn, this process has informed the design and practicalities of virtual museum resources in subsequent initiatives, including the CINE (2017), CUPIDO (2018) and STRATUS (Northern Periphery and Arctic Programme, 2019) projects.

Engaging with migration and memory

The digital domain enables stories and media to be shared without the constraints presented by the physical world. A transatlantic event such as the Windrush migration includes those from multiple communities in various countries, and its effects resonate with other migration stories all over the globe. It is therefore an ideal topic to explore within the digital domain and to test the technical range in which a virtual museum platform can be developed.

The design for a migration-themed virtual museum would need user journeys to include the following in order to educate the audience:

- an exploration and understanding of the communities involved
- where in the world the event took place
- why it is a significant part of history
- the human connection

These social elements feed into design decisions based on the content available and the best method for dissemination. The virtual museum, as a digital online platform, collates exhibition materials, as well as the primary resources used to create the exhibition, in one location. A comprehensive collection of digitised content is at users' fingertips, with the potential for increased interaction compared to a physical visit. With these intentions, the conclusion that a virtual museum would complement an EU-LAC Museums history-based exhibition was acknowledged and developed.

The mixed-media exhibition for *The Enigma of Arrival* opened at UWI Cave Hill Campus in Barbados in 2018. Curators from the BMHS implemented a community practice approach for co-curating content for the exhibition, a community peer review system and sustainable exchanges of content between the museum and its communities (Cummins et al., 2020).

For the exhibition and the VMCMM, the information panels were converted into interactive digital displays on touchscreens, as well as projections for the physical exhibition. Additional content—such as recorded songs, and historic performances and images—was embedded in the panels, thus enabling a rich

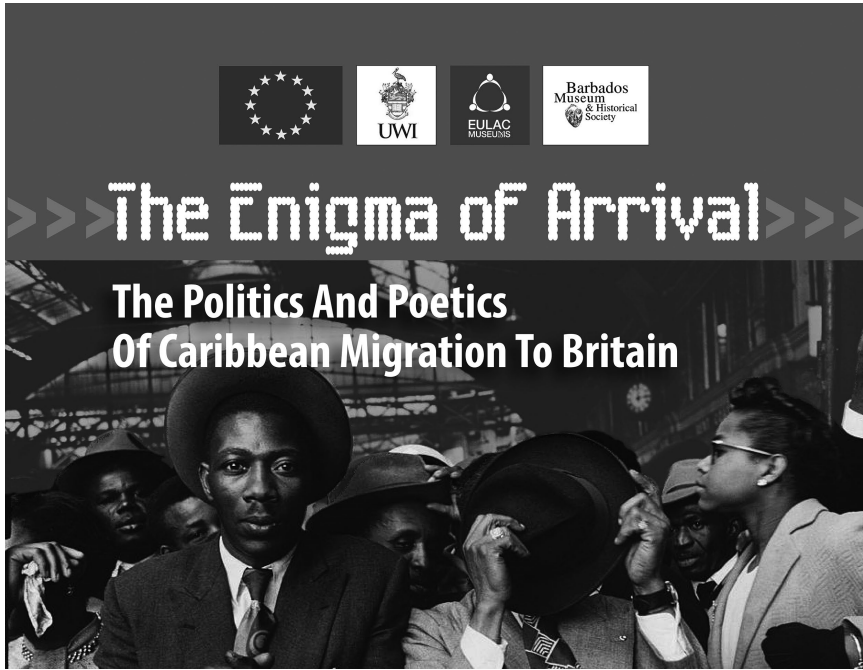


FIGURE 11.2 Digital poster panel from *The Enigma of Arrival* online exhibition, available on the VMCMM.

multimedia environment. Poignant interviews and archival videos were projected on the exhibition's walls. In addition, a mobile application was developed for the exhibition that facilitated interaction with 3D models created from the BMHS and UWI collections; this was available on provided tablets. The process of photogrammetry was shown on the opening night as a sustainable entry into 3D digitisation, and the VMCMM's 3D queue system for remote processing was demonstrated. To complement the curators' intentions for community co-curation of content, a video capture area offered attendees the ability to share their own migration stories and add them to the VMCMM. Participants filled out an upload form with information associated with their stories, including the location of departure and arrival. This information was added to the archival database and then appeared on the mapping interface. Entries to the database in turn contributed to a wiki platform, which built upon and connected multiple contributions. Whether contributing from the physical exhibition or from their own homes, audiences were encouraged to tell their personal stories, adding to the breadth of cultural narratives and co-curated content.

Available online as well as within the exhibition, the VMCMM reaches beyond the physical barriers of the exhibition space and provides a platform for further investigation, research and uploading of personal migration stories. It is designed to be an active resource for content collation and generation, informed by evaluation

from the EU-LAC Museums' digital workshops and strong ties between the content curators (BMHS and UWI) and their community.

In the VMCMM, an interactive map is the main navigational tool used to display audience-provided stories as well as spotlighted narratives and notable



FIGURE 11.3 3D model of a suitcase from the BMHS collections, digitised during their 3D Summer Intensive. The physical object was on display at *The Enigma of Arrival* exhibition at the BMHS in 2019 alongside the 3D model.



FIGURE 11.4 The homepage of the VMCMM, which allows users to view digital exhibition panels or continue to the map interface.

figures. The map is organised into layers that connect digital resources together: for example, Caribbean carnivals, which have spread globally and are evidence of migration. It also enables users to explore the social media presence and websites of related organisations, making external resources for further research available. Layered within the map are 3D digitised objects that link personal accounts or events with physical objects, most of which originate in BMHS collections. The panels from the physical exhibition, including the embedded media, are available digitally. These provide access to users who could not visit the exhibition and proved the exhibition's resilience during the COVID-19 pandemic.

Virtual museum design and implementation

As the conceptual framework was established, design of the VMCMM was motivated by the state of technology accessible to the heritage sector. The internet, World Wide Web, social media platforms and mobile applications are today part of the everyday practice of museums. There is constant disruption caused by technological developments that are making new functionalities available.

Design priorities

The design of the VMCMM was informed by our previous experience of workshops on creating digital content, from the 'Caribbean Virtual Museums: Opportunities and Challenges' round table discussion, and through practice-based research into developing and using virtual museums. The VMCMM would:

- provide support for emergent media, such as 3D, 360-degree and aerial photography, and integrate it with established support mechanisms for traditional digital media forms, including audio, video, images and text
- allow for the straightforward uploading of personal migration stories, text-based and/or in video format, from the physical exhibition or remotely, with necessary metadata for archiving and analysis
- serve as a platform for the digital panels from the physical exhibition, with embedded media, such as 3D models and videos, associated with the selected themes
- supply a photogrammetry service that automates the creation of photogrammetric models from sets of photographs
- provide a wiki interface that enables community participation in the construction of narratives.
- The design priorities informed the functionality that the VMCMM would require. The VMCMM would need to:
- connect to existing open-source resources to create the functionality needed: leaflet for mapping, Open Street Maps, Omeka, MySQL, MediaWiki, WordPress and the International Image Interoperability Framework (IIIF), which provides support for spherical, 3D and flat media in galleries

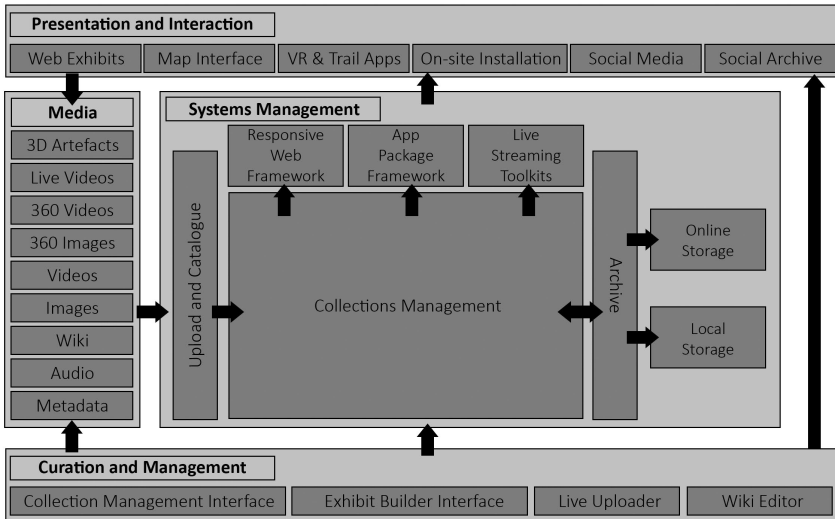


FIGURE 11.5 The architecture of a previously published VMI used for the VMCMM.

- make resources embeddable so that they can be included in web pages and social media and be shared through email and messaging applications.

The VMCMM further developed the Virtual Museum Interface (VMI) framework, which was initially created for the EU-LAC Museums project's virtual museum. The main system components are shown in Figure 11.5. Interaction typically begins with users creating content using the Management Interface. The Management Interface is a web-based form that enables users to upload and modify content, which is stored in the Data Store. Once in the Data Store, the data can be pushed to supported Social Archive platforms and backed up in an Online Store. The data that exists in the Data Store can be used to make exhibits either as VR and mobile applications or museum installations. The content created and curated using the Management Interface and the Exhibit Builder Interface can be accessed using the map-based Web Interface, mobile applications, museum installations and Social Archive sites, each of which draws content from the Data Store. The diagram shows the active nature of the VMI, which supports not only the collaborative creation and management of content but also the presentation and reuse of this content in different ways, such as web-based exhibits, mobile applications, museum installations and social media.

System back end

The back end uses a free and open-source Digital Asset Management System (DAMS) based on Omeka. DAMS provides interoperability with popular web-based


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1 function load_data(api_url, api_key, element_type)
2 {
3 //api_url e.g. "http://mydomain.org/omeka/api"
4 //api_key e.g. "al0NgstRlNgwItHnumB3rsanDlett3rs"
5 //element_type e.g. "items"
6 $.ajax({
7 url: api_url+'/'+element_type+'?key='+api_key,
8 crossDomain: true,
9 type: 'get',
10 timeout: 6000,
11 success: function(json_response)
12 {
13 parse_data(json_response, element_type);
14 },
15 error: function (xhr, ajaxOptions, thrownError)
16 {
17 console.log(thrownError);
18 }
19 });
20 }

```

FIGURE 11.6 API call to retrieve all items from the Omeka database.

systems and frameworks and is supported by a Relational Database Management System, MySQL, which stores the data, and a Representational State Transfer Application Programmable Interface (API), which facilitates retrieving, modifying and adding to the data. Calls to the Omeka API are made using JavaScript (from the online presentation front end) and Python (from the management front end). The code snippet in Figure 11.6 shows a JavaScript function that is used to retrieve items in the Omeka repository using an AJAX call. Upon successful completion of the call, a 'json_response' object is received, which contains the result of the call in JSON format, and is then parsed as required by the 'parse_data' function. If the AJAX call fails or times out, an error is thrown instead. Data management and metadata handling are important features of cataloguing and archiving systems.

Schemas developed using Dublin Core help to provide interoperability between the vocabularies of cataloguing and archiving systems. The Europeana Data Model builds on the Dublin Core schema and is widely adopted across Europe; hence, it boasts a high level of familiarity with heritage practitioners. For this reason, the information provided using the management front end is mapped to UNESCO and Europeana types (which are, in turn, described in Dublin Core terms) so as to facilitate interoperability with existing systems such as Europeana. Classifications cover schema for intangible, tangible movable and tangible immovable heritage, allowing for a varied ingress of metadata.

Management front end

The online front end has two facets: first, a management front end, which is implemented as web-based forms that contributors use to create and manage data; and, second, a presentation front end, which includes a map-based interface, digital galleries and archive searching. The map interface features icon-coded pins that represent entities. Users can click on a pin to reveal a pop-up, which enables further viewing or interaction. Uploaded and archived media appear in IIIF galleries in a Universal Viewer, adapted for 3D models and 360-degree photography.

A web-based archive form enables the general public and heritage practitioners alike to upload files and supply metadata that together represent and describe entities that are presented to users using multiple media types. The associated files and metadata constitute the digital heritage representation mechanisms supported. Three-dimensional artefacts created using photogrammetry and scanning processes are used to disseminate physical heritage with greater digital reach. 360-degree images and videos are used to show landscapes and cityscapes as scenes in immersive virtual tours. Traditional media such as flat images, video and audio capture both tangible and intangible heritage, and associated narratives support heritage interpretation.

The VMCMM facilitates content curation and management through a variety of interfaces. A Live Uploader enables users to transfer digitised content to the Data Store. The content is described using metadata, while narratives are added and



FIGURE 11.7 A demonstration of photogrammetry, used to create 3D models of physical objects in *The Enigma of Arrival* exhibition.

modified using a wiki editor. Collections are created and managed by thematically grouping uploaded items, while an exhibit builder facilitates the creation of exhibits that can be made publicly available. The content that is created using the curation and management interfaces is stored using both local and online storage solutions. Local storage facilitates access to resources despite a lack of internet access, while online storage facilitates interconnectivity and reach. The ability to ensure responsive delivery of resources is a desirable feature of the VMCMM design; it enables the system to serve the appropriate quality of content to users depending on their operating platforms.

The capacity to upload and manage content using the Live Uploader and Management Interface, respectively, and the ability to reuse this content and resources in different ways, emphasises the dynamic nature of the VMCMM. Heritage practitioners and community members can continuously create and digitise content; once uploaded, the same content can be used to build web exhibits and mobile applications and is accessible on a map interface as well as on social media. Metadata added to the content while it is being created or uploaded, or even subsequently, can be changed continuously within the resource throughout its lifespan.

Interactive map

The map-based interface facilitates the geographical visualisation of data, as it represents entities on an interactive map of the world. This enables the visualisation of the spatial and geographical relationships between entities. The interactive map supports:

- zooming and positioning, which enables geographical selection of data. Layers allow the semantic selection and presentation of data.
- categorical visualisation of data, such that users can choose to view only museums, 3D artefacts, tours, images or any of the other entity types available, and any combination of these types.

In addition to the visualisation of content by geographical location and category, the VMI supports descriptive visualisation of content using a wiki system, which collates provided metadata. The wiki is displayed in a panel alongside the map interface and features metadata, descriptive text and data as well as any associated multimedia in the form of 3D artefacts, virtual tours, images or video.

Exploratory visualisation is facilitated using an instant search feature that enables users to query the Data Store for entities that match a given search string. The search results are updated after every key press that modifies the query string, and it is performed on the title and description fields of entities. The instant search is facilitated by locally storing representations of the entities contained in the Data Store so as to preclude the need to repeatedly access the server while searching for entities.

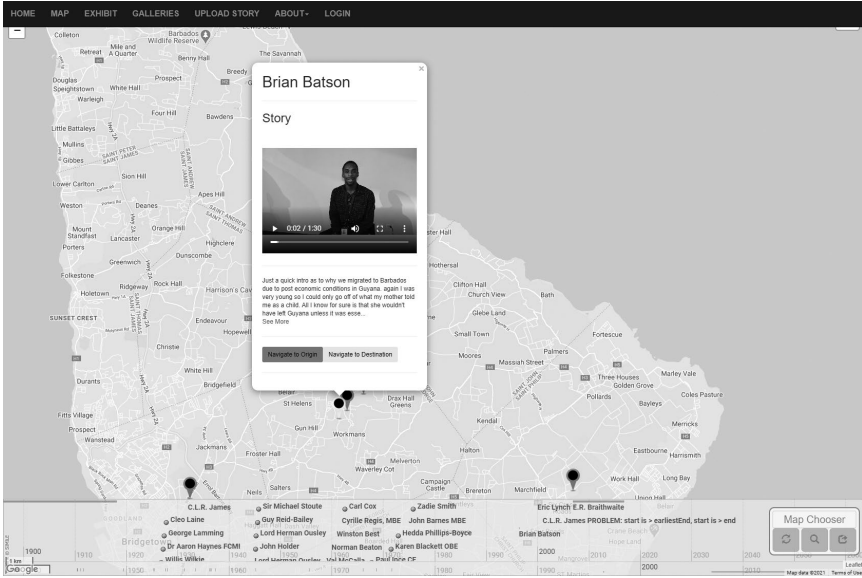


FIGURE 11.8 The video-recorded migration story of Brian Batson in the Destination location on the interactive map interface.

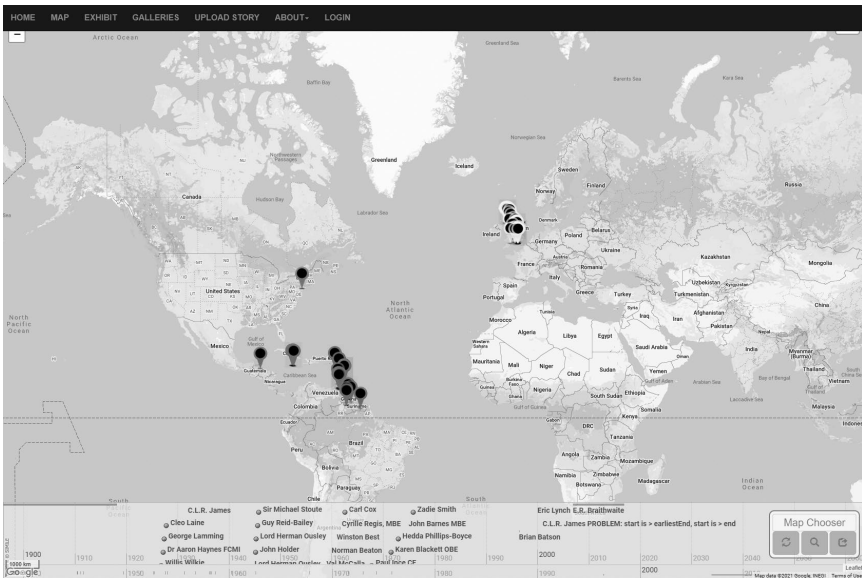


FIGURE 11.9 Mapping interface with an expanded timeline, showing notable figures from the Windrush generation.

Users can access the results geographically by viewing an entity's location on the map, descriptively by viewing the wiki content for the entity and categorically by viewing type-specific information for the entity. These features work together to facilitate the visualisation of heritage content in geographical, semantic, categorical, descriptive and exploratory visualisations, thus providing breadth and depth to the dissemination of, and engagement with, migration, as well as satisfying the information-seeking needs of virtual museum users.

Response to COVID-19: a use case for the VMCM

The methodologies and system outputs from the project proved to be effective methods in reaching and connecting to audiences when faced with the disruption that COVID-19 brought to heritage engagement. As museums closed, the only way for audiences to engage with heritage was digitally. The use of virtual tours, live virtual events, social media and digitised collections have expanded heritage organisations' digital offerings, whether in a pre-planned or ad hoc manner. Many museums have seen their audiences grow as a result of their additional content and their outreach online.

The topic of Windrush and the VMCM were part of discussions during several live heritage events broadcast on social media platforms as part of lockdown activities in 2020. As part of the CUPIDO project, alongside the Highland and Islands Enterprise, the curators of *The Enigma of Arrival* joined international conversations around digital themes and participated in discussions about digital methods

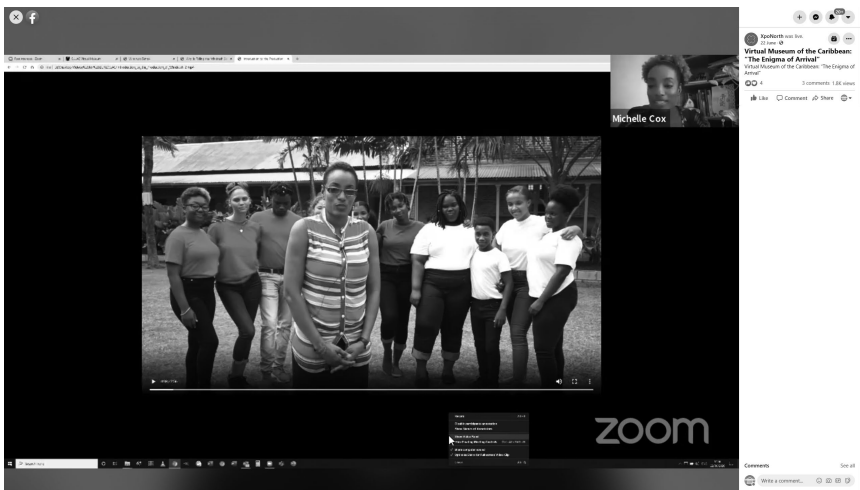


FIGURE 11.10 'Virtual Museum of the Caribbean: The Enigma of Arrival' live Facebook event, showing a video-recorded presentation of the play *Windrush* by members of the Barbados Community College.

for communicating heritage. One live event was solely dedicated to the 72nd anniversary of Windrush. It featured tours of the exhibition panels and the interactive elements of the VMCMM, narratives discussed by the curators, a screening of the Barbados Community College original play *Windrush* and a live reading of poetry shaped by the historical events.

In order to build digital heritage capacity during the period of lockdown, the EU-LAC Museums project's 3D workshops were recreated in the digital realm as a live online webinar series. Topics were expanded to include interactive mapping, the use of social media and virtual museums. The curators of *The Enigma of Arrival* offered their perspectives and knowledge on the topics and gave feedback on the use of digital methods, educational outreach and digital outputs.

Both live event series allowed for the framework and functional features of the VMCMM to be part of the public debate regarding community-based museums and the creative responses to the COVID-19 lockdown. The initial prototype virtual museum, which was launched in 2018 and influenced by the exploratory round table discussion, became a platform for experimentation with digital heritage activity that continued to connect communities to heritage throughout the global lockdown. The use of a virtual museum to supplement live events and webinars can enable heritage organisations to survive and develop resilience in times of unprecedented challenge.

The original plan for *The Enigma of Arrival* exhibition was to include a physical element, such as its travelling to various museums along the geographical migration route of the *Empire Windrush*. The exhibition opened at the UWI Cave Hill Campus in Barbados, the UWI Mona Campus in Jamaica and the BMHS. The BMHS launch was highly successful, and following multiple requests, the exhibition was extended until the end of 2019, doubling its initial duration. The 2nd Generation Barbadian & Friends community group in Birmingham, United Kingdom, alongside Brasshouse Lane Community Centre, hosted the *Enigma* exhibition from December 2019 until January 2020. Through the Centre for Caribbean and Diaspora Studies, the digital poster exhibition was installed at the Goldsmiths University Library in 2019. The display coincided with the celebrations for Black History Month in the United Kingdom.

However, with travel and work restrictions tightening due to COVID-19, the exhibition could not travel further in its physical form. Yet, what seemed like a disappointing turn for the exhibition and curatorial team in fact revealed new ways for interaction with the narratives and digital material. Reading Museum (2020) hosted virtual events for the anniversary of Windrush Day in June 2020. The museum integrated content from the exhibition panels into a virtual display on its website, generated new content in the form of community videos, objects and photographs and developed educational materials. The new content was co-created with a Caribbean community steering group which worked closely with the exhibition team from the BMHS. The digital exhibition poster panels were then used by Vodafone UK through The Black Professional Network for over a month as a



FIGURE 11.11 *The Enigma of Arrival* online exhibition by Reading Museum.

part of their Windrush Day celebrations. The exhibition was free to access for all Vodafone UK employees, of which there are approximately 11,500.

The methods and processes used to convert physical exhibitions to a digital format were employed in other projects after the success of *The Enigma of Arrival* and the VMCMM was acknowledged. For example, an exhibition on Walter Tull, a British footballer who died in the Battle of the Somme, was intended for physical display at the BMHS. Remote work with heritage organisations on the project enabled collaboration through online tutorials to create digital outputs that were then exhibited. In the end, the BMHS (2020) launched a digital exhibition, *Walter Tull: A Strong Heart Beating Loudly*. BMHS hosted a Facebook Live event for the exhibition in conjunction with the Barbados Defence Force and the Tull family on 11 November 2020, Remembrance Day.

Conclusion

The inclusive development of the VMCMM provides a framework to facilitate the development of novel, flexible and creative online exhibitions—in this case, with a focus on Caribbean perspectives on migration and memory. It proved a valuable addition to *The Enigma of Arrival* exhibition as a resource to further explore Windrush stories and histories and a platform for collecting and exhibiting previously undocumented oral histories. In this way, it has helped to expand the world's current knowledge and understanding. The VMCMM is based on the VMI framework developed for the EU-LAC Museums project but included Caribbean-specific features and

functions that were developed following the *Itinerant Identities* conference round table discussion. It taps into Caribbean digital skills and literacies while integrating emergent technologies with traditional media and historical records. Although the VMCM was initially designed to be a companion to *The Enigma of Arrival* physical exhibition, it became the only accessible method for engagement during the global lockdowns as a result of the COVID-19 pandemic. Its unique design and bespoke functionality allowed for broader use and several iterations while the world could only access the content digitally. The framework has since been used in other digitally progressive projects that feature a virtual museum, but the VMCM stands more particularly as an archetype for migration-themed resources.

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The VMCM may be found at <https://eu-lac.org/vmcarib/>

References

- AXIELL (2017). *Digitising collections: leveraging volunteers & crowdsourcing to accelerate digitisation*. [Online]. Available at: <https://www.axiell.com/app/uploads/2019/04/digitizing-collections.pdf> (Accessed: 2 March 2021).
- BMHS. (2020). *Walter Tull: a strong heart beating loudly*. [Online]. Available at: <http://walmartullexhibition.org/> (Accessed: 2 March 2021).
- Cassidy, C. (2018). ‘Transcription of “Round table Caribbean virtual museums: opportunities and challenges”’. Zenodo. Available at: <https://doi.org/10.5281/zenodo.4573653> (Accessed: 1 March 2021).
- Cassidy, C., Fabola, A., Miller, A., Weil, K., Urbina, S., Antas, M. and Cummins, A. (2018). ‘Digital pathways in community museums’, *Museum International*, 70(1–2), 126–39.
- CINE. (2017). *CINE: See the past, imagine the future*. [Online]. Available at: <https://cineg.org/> (Accessed 4 March 2021).
- Cummins, A., Persaud, V., Hall, K. and McGuire-Batson, N. (2020). *Exhibiting migration and gender. Companion reader: reflections, response & resilience*. [Online]. EU-LAC Museums. Available at: <https://eulacmuseums.net/index.php/bibliography-2/details/1/109> (Accessed: 1 March 2021).
- CUPIDO. (2018). *CUPIDO*. [Online]. Available at: <https://cupidoeu.org/> (Accessed: 4 March 2021).
- Department for Digital, Culture, Media & Sport. (2019). *Culture is digital: June 2019 progress report*. [Online]. Available at: <https://www.gov.uk/government/publications/culture-is-digital/culture-is-digital-june-2019-progress-report> (Accessed: 1 March 2021).
- European Union (2017). *Promoting access to culture via digital means. Policies and strategies for audience development*. [Online]. Luxembourg: European Union. Available at: <https://op.europa.eu/en/publication-detail/-/publication/7839cb98-651d-11e7-b2f2-01aa75ed71a1> (Accessed: 1 March 2021).

- Fabola, A., Kennedy, S., Miller, A., Oliver, I., McCaffery, J., Cassidy, C., Clemens, J. and Vermehren, A. (2017). 'A virtual museum installation for virtual time travel', *Communications in Computer and Information Science*, 725, pp. 255–70.
- ITU (2021). *Statistics*. [Online]. Available at: <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx> (Accessed: 1 March 2021).
- Northern Periphery and Arctic Programme. (2019). *Project Stratus*. [Online]. Available at: <https://www.interreg-npa.eu/projects/funded-projects/project/240/> (Accessed: 4 March 2021).
- Reading Museum. (2020). *The enigma of arrival*. [Online]. Available at: <https://www.readingmuseum.org.uk/whats-on/enigma-arrival> (Accessed: 2 March 2021).