Chapter 21
Fad Touch: Creative Economy Engagement

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Abstract The purpose of this chapter is to discuss the outcomes of the Fitzwilliam Museum's Arts and Humanities Research Council funded (AHRC) Creative Economy Engagement Fellowships, a practice-driven research, development programme and knowledge transfer activity. The guiding principles and methods behind these Fellowships were to make use of low cost, replicable 3D scanning of the Museum's collection, whilst working with an educational technology startup and a 3D printing artisan workshop to determine how their technologies could be exploited whilst focusing on user-centred design. This chapter demonstrates how Early Career Researchers (ECRs) can gain valuable career progression and creative industries experience whilst combining digital technologies, audience engagement and research and implement them in a short time frame.

Keywords Creative industries · 3D printing · Museology · Egyptology · Archaeology

21.1 Introduction

The heritage sector has often been at the forefront of emerging technology and is championed as having the potential for exciting or engaging case studies. 3D printing is a prime example of a technology that has been an early focus of experimentation in the museum and heritage sector (Coates 2019) with early adopters presenting the potential as early as 2014 (Reilly 2015). The potential of these technologies, techniques and associated interventions led to the Fitzwilliam Museum

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(FM) obtaining funding from the Arts and Humanities Research Council's Creative Economy Engagement (CEE) scheme (AH/S012583/1) to establish four post-doctoral fellowships (each for 6 months in duration)—identified as CEEF by the museum.

These four short term posts (6 months long) aimed to provide the opportunity for Early Career Researchers (ECRs) to work with small/medium enterprises (SMEs) as creative industry partners to explore the interface between 3D printing and associated educational technologies and museological practices, and the public engagement programmes of the University of Cambridge's (UCAM) principal art museum.

This novel approach had not been implemented before in UCAM museums and provided significant individual contributions to original research (Egyptological studies), major exhibitions (***Feast and Fast (F&F)*** and prototypes for the ***Being an Islander (BAI)*** exhibition (now delayed by Covid19) and a large-scale conference in 2019 held at the Judge Business School.

The Museum's partners in this endeavour were Museum in a Box (MiaB) and ThinkSee3D (TS3D); both SMEs use 3D materials derived from cultural heritage to provide new and meaningful interactions for museum and non-museum going audiences. To enable this programme of research, three fellowships were assigned a specific practise-led research programme of activity, with the remaining fellowship focusing on existing practices and theory, and to provide guidance for the other fellows and ideally the museum/heritage sector on the use of 3D printing. The fellowships were divided into:

CEEF1: Development of guidance for the museum sector for the use of 3D replicas.

CEEF2: Development of 3D interventions to engage diverse audiences with the Egyptian Coffins research via a 'Pop-Up Museum'.

CEEF3: Development of prototype subscription models for Museum in a Box and an intervention for the ***F&F*** exhibition.

CEEF4: Development of a prototype Museum in a Box collection for the **BAI** exhibition.

The researchers' projects were influenced by current industrial and academic challenges in the heritage sector, in line with the AHRC Heritage Priority Strategy document (AHRC 2018) and aimed to enhance the mission and guiding principles of FM public engagement activity.

Through three of these fellowships, 3D prints were offered to create tactile experiences of museum objects, with the concept of storytelling, narrative discussion and development of new content as a key component. Storytelling is at the heart of the mission for many museums (Adler & Johnsson 2006; Bedford 2001), increasingly this is via digital means through the employment of emergent digital technology such as 3D modelling and printing, immersive experiences via Virtual and Augmented Reality, mobile applications and online explorations (Wong 2015).

21.2 CEEF1: 3D Replicas within the UCM

Working in conjunction with TS3D and the FM's 'Do Not Touch' Project, and considered the development of guidance to best practice for museums who are considering working with 3D prints. The potential for museum collections to use 3D printing has been considered both formally (Di Giuseppantonio Di Franco et al. 2015) and there is a wealth of informal (anecdotal) evidence as to its potential (including that developed by our creative industries partner, TS3D).

Tactile experiences and replicas (Cormier 2018), are not a new development to the museum or heritage sector: early vestiges of the museum in the seventeenth century incorporated touch and 'manual investigation' as an integral element to understanding objects (Classen 2005). However, modern museum practices sanitised the museum experience, not only limiting our understanding of collections to a uni-sensory visual experience (Candlin 2008), conditioning us into an understanding that touching in museums is expressly forbidden (Bacci and Pavani 2014).

The turn of the century saw a return to object handling as part of the engaging museum learning experience with the notion that tactility can allow us to understand the objects and collections in new ways and that it is these experiences that enchant and excite visitors (Levent and McRainey 2014).

The re-introduction of these experiences is not straightforward; curators and conservators have pertinent concerns about the impact these experiences will have on the objects in their care. The successful introduction of long-term, mediated and permanently located object handling desks within large museums, for example the British Museum (2008) has recently incorporated 3D prints in, e.g., the Sunken Cities exhibition (Dey 2018). These handling desks are often created and maintained via large museums with institutional privileges, which included the allocation of resources to facilitate engagements through their permanent and volunteer staff have propelled this type of intervention beyond the reach of smaller museums. This being seen as an extension of the digital divide.

This project therefore focused on the adoption of 3D prints as part of un-facilitated engagements, i.e., without a member of staff or volunteer actively engaged with the objects. The project's intention was to produce a guide to best practices, following observational analysis of two 3D prints of sections of objects installed in the Antiquities galleries of the FM in late 2019 as part of the 'Do Not Touch'. Data was gathered during two hourly sessions over four days, both during the week and weekend, and at different times of day in line with the project protocol.

The first 3D intervention is an extract from an ancient Egyptian shrine built by King Thutmosis III at El Kab (E.40.1902). Dedicated to the goddess Nekhbet, the outer walls of the shrine are inscribed, but the low levels of lighting in the gallery make the inscriptions harder to identify visually. The second 3D print is taken from a large marble slab carved with a Greek inscription of the Honours for Antiochus (Loaned from Trinity College, Cambridge: Loan Ant.21) hung facing away from the centre of the room, often overlooked by visitors.

These objects were not displayed under optimal conditions—minimal temporary signage was placed next to the 3D objects and demonstrated some of the traditional museological views that needed to be overcome to facilitate this work. There was a green glyph icon showing a finger pointing towards the print encouraging visitors to touch, but the curatorial/interpretation team made a deliberate decision to provide no explanation/interpretation about the 3D prints. An opportunity exists to test the effect when enhanced interpretation is provided.

A small-scale evaluation was undertaken with 115 individuals or groups (included in the data capture individuals or groups had to walk directly past the 3D print) were observed over several sessions in August/September 2019, out of which 73 individuals or groups did not notice the print. Of those who did observe the print a further 22 did not engage with the print—leaving only 20 visitors who did interact. The small sample size can therefore lead to suppositions and insights gained from these interventions to be seen as not having significant impact, compared to the research conducted by Di Franco (Di Giuseppantonio Di Franco et al. 2015) at the Museum of Archaeology and Anthropology.

Low level oral responses were elicited from the sample, and in four instances individuals initiated the rest of their group into engaging with the prints promoting extended discourse and therefore social interaction around the artefacts and print. Interactions like these are indicative of a positive visitor experience through collaboration and social engagement discussed by Katifori et al. (2016).

The print of the 'Honours for Antiochus' was placed away from any interpretation of the artefact below the object, out of the sightline of the majority of visitors, but ideal for children and those in a wheelchair. The print from the Egyptian shrine built by King Thutmosis III at El Kab, was placed much closer to the intended view of the artefact, but below the object, so a cursory glance could miss the intervention easily. The artefact itself is on a thoroughfare so many visitors do not stop to engage. In both instances, the prints were deliberately deployed by FM curatorial and interpretation staff without full explanation about what they are or why they were placed there. The process brought out the need for advocacy and the need to demonstrate the additional value of these interventions.

These limitations highlight the need for museum staff to work in consultation with the fabricator to ensure that the prints are produced and deployed in-gallery most effectively. Simple insights obtained from this observational analysis made obvious recommendations to the FM interpretation team with the key concept being the paramount importance of object placement (much in the same vein as the original piece of work).

Derived from this, the following guidance is suggested for museum staff to develop an effective/affective experience using 3D prints to facilitate interaction and understanding of objects on display without jeopardising the conservation and protection of the artefacts.

1. **Selection**: From the initial consideration of introducing a 3D print into a gallery, it is vital to consult all relevant stakeholders and have a clear understanding why you are undertaking this work, e.g., is it in response to visitor feedback?

2. **Specification**: Once museum staff are in agreement on their selection, a discussion with the maker is important prior to commissioning. It is important to note that there is a wide variation between what a '3D print maker-artist' and '3D print maker' does: it is crucial to be clear if you are looking for a high-quality 3D print that a maker-artist would be more appropriate; if you are looking for lower-quality, higher-volume prints, a 3D print maker might be more appropriate.
3. **Installation**: The print needs to be installed in close association with the original, visible to all visitors and easily accessible.

These recommendations have since been deployed with the commissioning of a 3D print of a fossil at the Polar Museum and will be used in future at the FM.

Insights from working with TS3D and through their publications (Dey 2018) included: printing is not always the best option for creating 3D replicas, but It is often a more rapid means for replication of complex objects, it can remove the need for highly skilled crafts people, reduce costs and produce derived digital 3D model(s) which might be used for multiple purposes. Printing can often negate knowledge loss in the making process for replication of cultural artefacts whilst it can often be the starting point for more traditional craft work to occur. A print could be used to create moulds or for the production of casts.

21.3 CEEF2: The Pop-Up Egyptian Coffins Project

The FM's interdisciplinary ancient Egyptian coffins project has been running since 2014, with a team of Egyptologists, conservators, a pigment analyst, an expert in historical painting techniques, an ancient Egyptian woodworking specialist and a consultant radiologist. This research project harnessed the application of advanced imaging techniques such as Computed Tomography (CT) scanning and X-radiography, to reveal unprecedented insights into how coffins were made and decorated, the ancient Egyptian economy and attitudes to death and the afterlife.

In 2016, this research culminated in a major exhibition and publication, ***Death on the Nile: Uncovering the Afterlife of Ancient Egypt***, which was visited by 91,782 people. Despite this impressive figure, audience demographics identified an alarming division; the proportion of gap in the exhibition's visitation among socially and economically diverse visitors. In a survey conducted with 334 exhibition visitors, 67% were educated to degree level or equivalent and predominantly resided in the local Cambridge area.

As part of an institution-wide effort to remedy statistics like this, the FM Egyptian coffins team developed a 'Pop-Up' Museum—a community outreach initiative where researchers bring real museum objects, craft replicas, hands-on activities and digital experiences into the heart of communities who might not otherwise have access to our research (Fig. 21.2).

Fig. 21.1 Left: 3D print of a section of the 'Honours for Antiochus' Right: 3D print of a section of the ancient Egyptian shrine built by King Thutmosis III at El Kab (E.40.1902). Produced by ThinkSee3D (D. Pett)

Fig. 21.2 The FM Egyptian Coffin Project's 'Pop-Up' in The Wheatsheaf Inn, Wisbech (M. Pitkin)

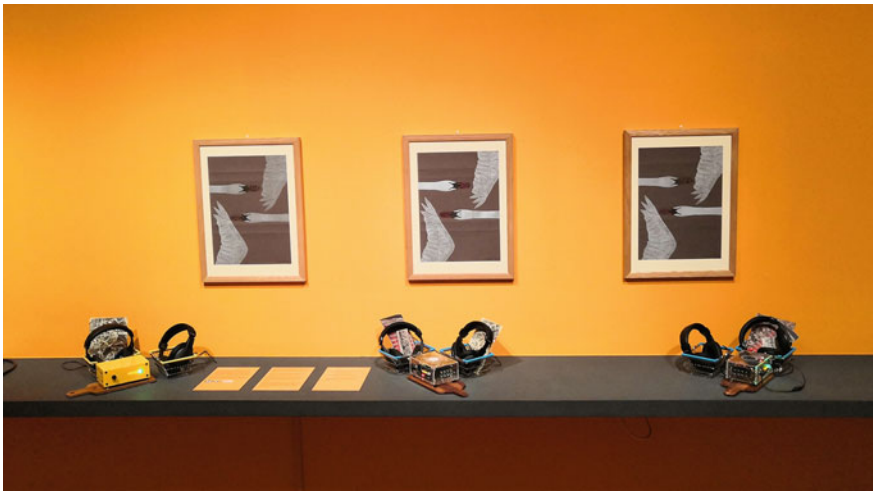

Fig. 21.3 The installation of Museum in a Box stations and the artist's prints (D. Pett)

Fig. 21.4 The wooden dig box with 3D prints, postcards and the MiAB (J. Wexler)

This is done through unexpected interventions—namely the appearance of 'Pop-Ups' in locations where people would not normally expect to have a cultural encounter, for example in a pub, supermarket, shopping centre and food bank. This concept has its origins in an outreach project initiated at the Museum of Applied Arts and Sciences (MAAS) in Sydney, Australia in 2012 as part of the exhibition ***Faith, fashion, fusion: Muslim women's style in Australia*****.** Exhibition curators, Jones and Pitkin, travelled into the heart of Sydney's Muslim community (approximately 1 h from Sydney's Central Business District) with real objects from the collection, activities and giveaways in order to broaden their reach with their research and strengthen community relationships.

With the support of the Arts and Humanities Impact Fund (AHIF, UCAM) and the Global Challenges Research Fund (GCRF, UCAM), we were able to pilot this concept in two regions, the Fenland town of Wisbech in Cambridgeshire and in Cairo

and Damietta, Egypt. Wisbech was selected owing to its location and status as one of the most deprived towns in the United Kingdom (National Conversation 2017); one-third of residents are from Eastern Europe; according to the 2011 census 35.1% of its population lack qualifications, 19.1% possess literacy skills at entry level or below (Cambridgeshire County Council 2016).

A key challenge presented by the 'Pop-Up' concept was how we would best engage diverse non-academic audiences in culturally underserved areas; how would we make the content accessible, relevant, multilayered, tactile and visually stimulating? How could we get people to invest their time in us? And, how could we encourage them to follow-up on their experience with further engagement in the subject of ancient Egypt and/or by visiting a museum? Given that our research angle was already heavily focused on industry and the handmade—something that many people, particularly those already involved in a trade, can relate to—we approached this via carpentry, pigments and painting and the concepts of ancient Egypt and museums.

The 'Pop-Up' offered the following experiences: the display of a genuine 3000-year-old fragment of a yellow coffin face and hand displayed in a secure, airtight showcase; a selection of craft replica tools from ancient Egypt displayed in a secure, airtight showcase; craft replica joints for handling; a painting activity where visitors can make their own replica ancient Egyptian paint brushes and paint with them using ancient-inspired pigments; iPads linked to the Fitzwilliam Egyptian coffins website; A3 colour photographic visual aids, to facilitate conversation with participants around the role of CT scanning and X-ray in coffin studies; and free giveaways such as the Museum's publication 'How to make an Egyptian coffin' (Dawson 2019), bookmarks and replica scarabs.

The opportunity to work with creative industry partner TS3D therefore opened up a new world of possibilities for our 'Pop-Up' project, particularly in terms of the ability to offer more tactile and visually arresting experiences. From the outset of the project, for example, we envisaged producing some type of interactive experience where visitors could actively assemble and disassemble a coffin, or parts of a coffin, in order to better understand wood construction and joinery. It would also serve as a visual aid to help illustrate the types of technical terms we might use when explaining how a coffin is made (for example, dowels and mortise and tenon joints) and help to give participants a sense of accomplishment through successfully putting it back together.

Since the element of portability was important for our project, we selected a small rectangular box coffin from the Museum's collection believed to have been made for a dog called *Heb*. Given that TS3D specialises in 3D printing, it seemed instinctive for us to first consider recreating the dog coffin in the form of a 3D print.

The production costs of a 1:1 scale 3D coffin print made in durable materials for repeat handling, such as gypsum, were too high for the project budget. A smaller version would raise questions around the importance of authenticity and the multi-sensory experience. According to a 2017 study (Wilson et al. 2017) on visitor attitudes to touchable 3D printed replicas in museum exhibitions 'many interviewees" stated that, '…the more authentic and realistic looking that the 3D prints were, the better'.

By 3D printing a smaller version of the dog box coffin, therefore, authenticity would be significantly lacking—not only in terms of size, but also material, weight, texture and smell (the original coffin is made from the sweet smelling *Cedrus libani*, or Lebanese cedar tree). An integral facet of our research is experimentation through the use of ancient processes for recreation and reproduction.

We commissioned Dr Geoffrey Killen, a specialist in ancient Egyptian woodworking techniques, to produce a 1:1 scale craft replica of the dog box coffin using the same species of wood. His approach enabled us to gain a better understanding of the mindset of the ancient carpenter who constructed the coffin. Killen estimated it would have taken 4–5 days to produce, something not apparent from a 3D print. This replica offered participants a more multi-sensory experience, particularly via its materiality, weight and the strong, sweet smell that emanates from the freshly cut *Cedrus libani* tree—which often stimulated much discussion with participants around types of native and imported timbers used in ancient Egypt. The only feature Killen was unable to reproduce was the warped effect of the wood caused by thousands of years of ageing and changed environmental conditions, which a 3D print could have generated.

Although 'authenticity' and process were important for us, we wanted to know if this was the same for participants in our 'Pop-Up' Museum. We therefore conducted an evaluation where we asked visitors what they preferred, i.e., real objects, replicas or digital experiences. The majority of respondents indicated that they preferred to see real objects because it 'invoked a sense of awe', but in the unprompted responses many people specifically pointed out how much they enjoyed 'chatting with real subject specialists'. Due to lower literacy levels of respondents, the evaluation study took on three iterations. The first was a written survey completed by 20 respondents between March and April 2019. The second was a visual chart and verbal questionnaire completed by 12 respondents between May and June 2019 and the third was an observation-tracking study.

We conducted observations with 30 participants, tracking their engagement with the different components of the 'Pop-Up' to see where people spent the most time. Considering the role our facilitation played in this process, and the nature of the hands-on activities, it is perhaps not surprising that participants spent most time talking to subject specialists followed by the painting activity. Another later addition to our evaluation, was a wellbeing study where we invited people to share how they felt both before and after their encounter with the 'Pop-Up' Museum. In almost all cases, participants reported feeling an elevated sense of happiness and inspiration after engaging with us.

The main focus of our collaboration with TS3D was the production of a digital 3D animation (Dey et al. 2019) recreated from its CT scans of a 21st Dynasty coffin box belonging to a high official named Nespawershefyt. This takes people beyond the surface of the coffin's decoration to better understand what lies beneath using CT scan technology—for example, the number of pieces of wood used in its construction, how they are joined together and how we can identify reused pieces of wood from other objects, including other coffins. Visitors 'fly-through' the coffin to see how it was

assembled with narrated commentary and subtitles (in English and Arabic—which were produced by our Arabic-speaking associates).

This digital resource has since been used within the Museum's GCRF funded work with the Egyptian Museum Cairo and its 'Pop-Up' work with the Wisbech Museum and beyond. The bilingualism and visual nature of this resource provides an ideal teaching aid, supplementing the other digital content (Pitkin et al. 2019) presented on the dedicated coffins website. This work pushed the boundaries for TS3D in terms of production time (a relatively new offering for TS3D), but also offered new ideas for the manufacture of their large-scale 3D prints (joints, segments).

While Nespawershefyt's inner coffin box is now in a ready state to be 3D printed, at least for this project it has been shown how craft replicas can offer alternative experiences to 3D prints, particularly in terms of their multi-sensory dimensions, authenticity and enhanced academic understanding of ancient processes of production. They also offer another way of preserving what is gradually becoming the endangered slow crafts movement of making things by hand. The experience of a craft replica can certainly be heightened using a digital 3D model by allowing visitors to compare and contrast the two examples when portably displaying the real object is not an option.

21.4 CEEF3:'The Fitz, but in Bit'

A rare cheese; compostable sanitary towels; tailored shirts; glittery nail polish; and gluten-free snacks for toddlers: just a few of the interests (or aspirations) catered to through subscription boxes. But if these boxes can cater to both the easily left-off-the-shopping list and to the connoisseur's prize, then why not try creating a version for museums? After all, the museum is a place for everyday access to the extraordinary.

To this end, we created and tested a prototype of a subscription box service for 3D printed replicas of objects in the FM, building on the technology created by MiaB. The test audience comprised eight adults and two children. All were based in Cambridgeshire or the London suburbs so that they could easily attend evaluation sessions at the Museum. By developing small, themed collections of low-cost 3D printed objects and paper materials for consumers to use with MiaB, we posited that we could increase the reach of the Museum's collections as well as attract new and more diverse audiences to the museum itself. The project involved collaborations with a local arts collective, voice actors and historians, with the prototype collection themed around the FM's major exhibition, ***F&F*** (original pre-Covid19 run—26th November 2019–26th April 2020).

The project was divided into two tasks: producing the physical boxes and their intellectual content. Developing a complete prototype box involved the design and/or procurement of postal packaging, branded mailer sleeves, printed 'menus' (displaying the copyright information for each museum object), and collections of 3D printed objects/postcards with NFC stickers attached. Developing the intellectual content of the boxes meant meeting with collections staff to identify suitable objects;

researching objects' background; writing copy for the recordings; acquiring voice actors, and recording appropriate material. Once this was acquired, each NFC sticker was encoded with the appropriate audio file, using the MiaB content management system.

In order to produce 3D models, each fellow was given training in photogrammetry and the basics of Agisoft's MetaShape. A long scanning session took place during the official preparatory FM exhibition photography for a mock-Baroque feast. Building the models in the software was the project of several months: the complicated nature of the subjects meant that we needed to fine-tune the models multiple times before they could be viable prints; for example, the lobster used in the feast had trailing tendrils, thin and translucent sections and hard to capture areas.

Outsourcing the design of the sleeves was important not only in aesthetic terms, but also to fulfil one of the AHRC's aims: to stimulate the local creative economy. Local artists Cambridge Art Makers designed and made custom linocut sleeves for the mailer boxes (each limited-edition print was then wrapped in vellum to protect it during transit), based on the FM's visual language and the Wisbech Swan Register.

To produce the box's content and to identify suitable models and research outputs to inform the design of our first collection, we worked closely with Dr. Victoria Avery, co-curator of the ***F&F*** exhibition. Once the boxes were complete, they were sent to each member of our test group through Royal Mail. Each member returned the enclosed feedback form, with questions designed to assess their experience of 'unboxing'. Because sending each member a MiaB would have been prohibitive both in cost and inventory terms, instead these individuals were invited to the FM for a recorded assessment of their reaction to using their collection on a MiaB.

The design of the mailer sleeves attracted widespread commendation, and each arrived at its destination more or less intact (some minor scuffs to the vellum notwithstanding). Positive feedback from the test subjects included 'beautiful, enticing, neat'; 'easy access, quality wrapped, pretty'; and 'elegant, trim'. All subjects confirmed that the mailers fit through their post box; 'a very good size of parcel'. One of the project's aims was to assess reaction to a number of different delivery styles for the copy: male/female voices, curatorial/ 'lay' delivery, educational/humorous. Thanks in large part to the skill of the voice actors recruited, these categories were represented in the final product.

The test study's participants had mixed reactions to being asked to assess the objects without any further context. Some found the initial engagement 'intriguing' and 'inviting'; others commented that they were disappointed, claiming that 'at the moment, it seems very detached'. There was also some confusion regarding the second stage of evaluation; some subjects felt that future recipients would need 'a little more briefing as to how they were supposed to use the objects'. This could be simply rectified by producing a simple document for inclusion in the box, explaining the process (or indeed streamlining the process altogether). To demonstrate the success of this project, the exhibition team installed 3 boxes within ***F&F*** for the duration of the exhibition (26 November 2019–26 April 2020) (Fig. 21.6). The 'Wisbech Swan' design caught the eye of the curators: and shop staff alike; their work was hung in the 'creative zone' of the exhibition space above the installation

of the boxes. The artists were also commissioned to produce a limited run of art prints, cushions and scarves for sale in the museum shop during the exhibition. The project has thus increased their visibility, profit and platform within the Cambridge community and beyond (the exhibition was predicted to attract 80–90,000 visitors, but realised 61,254 over two segments interrupted by Covid19).

Through the installation of these commissioned pieces, the creative industry partners gained an unexpected larger shop window showcasing the outputs of digital humanities research projects within the museum and potentially reach many thousands of visitors.

The outcomes of this project were trialed within a clinical setting, using extra funding from University of Cambridge for a spin-off project entitled ***Phish and ChYpPS***, at the Dialysis Unit, Addenbrookes' hospital and at a series of events on Parker's Piece. Surveys and interviews showed tools like this have potentially significant impact in terms of health, wellbeing and loneliness, all current national and international societal challenges. Boredom and isolation are known issues in clinical settings, and it is well-documented that intellectual stimulation and active entertainment (i.e., games, arts and crafts/creative play as opposed to passive entertainment like TV) improve the wellbeing and recovery time of many patients (APPG 2017; Uwajeh & Timothy 2016; Corrigan et al. 2017). MiaB would be an excellent contribution to these settings, allowing accessible but stimulating education and entertainment. Furthermore, the nature of the acrylic MiaB and 3D printed objects mean that they can also be sanitised easily to avoid cross-contamination.

The processes outlined above should provide ample opportunity for expansion. It is anticipated that we will be able to iron out a number of design and distribution flaws so that the creation of further collections would be significantly streamlined for future researchers.

This project has demonstrated that there may be viability for a museum subscription box. The materials here are cost-effective, and readily available online or through local producers. Content concepts are, indeed, almost limitless. Although somewhat time-consuming to design and assemble, such boxes could form part of any major exhibition's promotional materials. Aside from such pragmatic concerns, the outcomes of this small pilot study have also demonstrated the possibility of engaging wider audiences, in particular those who might be remote from the museum. The major sticking point in this process is the availability and cost of MiaB hardware; although they come at a reasonable price (£249), it is not a figure that many can afford.

21.5 CEEF4: Box of Travelling Objects/Ideas

This project, led by Jennifer Wexler, focused on the FM's Ancient Mediterranean collections in conjunction with the forthcoming major exhibition ***(BAI)***. The aim of the BAI project is to provide a platform to debate cultural evolution in the Mediterranean islands, extending to the discussion of Britain's own (perceived or not) island

identity, showcasing objects from the Aegean and Cypriot Collections of the FM. This project has been using BAI themes to look at different ways of how a MiaB can be used as a tool for storytelling and exploration, with a focus on developing new and exciting ways to tell stories around museum research and archaeological collections. This is aligned with MiaB's desired goals, which specify the importance of bringing a wealth of context and background to the museum experience and to help audiences to really explore an object's history and place in the world (Oates 2019).

By using these innovative tools for creating tactile explorations of museum collections, we can look at new ways of creating meaningful engagements and dialogues with audiences. As part of this project, we have been able to take part in the MiaB's 'Make Your Own' Pilot Scheme (Oates 2018). This has allowed us to access the MiaB's backend content management system in order to create/edit all box content in-house at the FM. The great strength of this, it has allowed us to be experimental in our approach to content management, opening up the project to multiple perspectives and interpretations of the featured historical objects.

The nature of this project allows audiences to be exploratory, like the ancient navigators of the Mediterranean, using mixed media as well as digital technology to discover different routes, places, objects and stories. The technology developed by MiaB allows us to incorporate different types of tactile and digital media to tell these stories around the early Mediterranean, utilising new 3D models of collection objects, 3D prints (in conjunction with TS3D) and additional postcards/prints from the collections.

Inspired not only by the Fellow's background in Mediterranean archaeology (Wexler 2016) and previous research (Bevan et al. 2014; Wexler et al. 2015; Galvin & Wexler in press; Pett in press) employing 3D technology for different types of engagement in a museum setting, but more significantly by the work of Winifred Lamb, former honorary Keeper of Greek Antiquities at the FM, 1920–1958. Lamb modernised and greatly enhanced the Classical collections at the Fitzwilliam, but was also an active field archaeologist who worked extensively across Greece and Turkey, discovering a previously unrecorded prehistoric link between the Aegean, Turkey and the Balkans in her ground-breaking work at Thermi, on the Island of Lesbos (Cooper 2012; Gill 2018).

This project culminated in the creation of an old wooden 'dig' box of 3D objects (scanned from the FM permanent collection and reduced in scale for cost and storage), postcards and papers collected and 'sent back' to the FM by Winifred Lamb (see Fig. 21.8), through which the fellow aimed to evoke wonder by creating opportunities for exploration and enchantment with the archaeological record via our box. The box and its materials are inspired by cabinets of curiosities, becoming metonyms and objects of resonance, representative of a larger world. In the modern context, these can be used for institutional critique—a way to replace museum rules with values that seem 'engaging, intriguing and appropriate for today's audience' (Lubar 2018: 12,16; Adamopoulou and Esther 2016).

The 'world' represented by this box (an old chest) is essentially that of Winifred Lamb's—an archaeologist's 'dig box' full of archives and objects for audiences to explore and curate. Her 'voice', employing the vocal talents of Dr. Hannah Platts,

is used as a guide, but also to envision a past lived by her, offering snippets of her life and background in order to deliver archaeological data around the themes of the box. While the box does not follow a strict narrative structure per se, it has narrative signposts accessed via the audio on NFC chips—a sort of 'choose your own adventure' for which strands of research or information you might follow depending on the type of content you choose.

Within the chest, there are five scaled 3D prints printed in gypsum, of objects chosen from the themes associated with the box and chosen in conjunction with the exhibition curator (Fig. 21.9). They have a timespan ranging from prehistory to the classical period, looking at the connections between objects and the development of ancient technological revolutions, such as metalwork, language, and artwork, in connection to the broader themes of maritime connectivity, island identities and contested geographies.

We wanted the 3D prints to be as realistic as possible to enhance tactile engagement and understanding of the objects (Di Giuseppantonio Di Franco et al. 2015; Morris, Peatfield & O'Neill 2018), so emphasis was placed on using photo-realistic gypsum material for the prints rather than a less expensive yet less realistic material. Gypsum works extremely well for this set of objects as the majority (beyond one bronze axe) are ceramic artefacts; thus the 3D prints have a similar texture and colour to the originals, though some of the prints needed to be scaled down due to funding constraints and box size. Feedback from participants undertaking initial testing of the box at Mozfest and various FM/UCM events overall responded favourably to the 3D printed materials.

Participants can explore the different elements of the box, with both short and longer engagements possible based on the level of exploration. The intention is that by discovering different elements of content and narrative will encourage participants to engage for longer and in more meaningful ways. Although each object is described by Lamb via the recorded clip on the NFC tag, participants will be asked to help 'curate' the objects—mapping and recording using the box's tools and map, and writing their thoughts/feedback in the included notebook. At a later stage, this feedback could be further employed for co-curation of the objects via additional NFC tags.

The core of this project is to evoke wonder by creating opportunities for exploration and enchantment with the archaeological record via our box. By envisioning the past as 'remembered' by Lamb, we are hoping to create a type of 'suspension of belief' that will allow users to become 'enchanted', or emotionally involved, in the data presented. This emotional involvement could be further enhanced via co-curation and participation suggested above. This builds on the concepts of Perry (2019), Tringham (2019), and Stutz (2018) calling for a further collaborative and emotional approach to presenting and using archaeological data for engagement.

Unfortunately due to time constraints of the fellowship, and the onset of the Covid19 pandemic, user testing of this box was restricted so the validity of this model is still to be tested. We hope this will happen when the exhibition is finally opened and, in the meanwhile, the box's content can be explored via our website.

21.6 Conclusion

The CEEF project brought many benefits to the FM, with multiple analogue and digital outputs that should have a lasting legacy within the Museum's physical and digital estates. Many lessons were learnt from these interventions and outputs, with processes being challenged and sometimes stretched due to the disruptive technologies and methodologies we employed for this work.

These projects enabled us to make several new interventions within the Museum's estate, including providing material for a new display of replica objects within the Museum's antiquities galleries, provision of 3 instances of MiAB boxes and bespoke content within the 'creative zone' of the *Feast and Fast* exhibition. Crucially, these interventions have meant that they have introduced and embedded focused new digital knowledge and skills within the FM non-digital team members. This is essential given the *Culture is Digital* (DCMS 2018: 1.2) report describing how 'technology offers unprecedented opportunities for the UK cultural sector and chimes with the Mendoza report' (2017:10,62): *'museums are thinking about digital in increasingly targeted ways and using it where it makes a difference'.*

Many of the outputs described above went far beyond the original scope of work. The CEEF team organised a major conference—Do Not Touch? 3D in Museums, facilitated workshops and lectures for the public, workshops for UCAM academics and students, convened sessions at Mozilla's Festival of the Open Web (Mozfest), delivered short 'bitesize' talks for FM staff, presented for the UCAM's Enterprise team at their conference, and delivered training sessions for the Royal Academy of Art's executive MBA course. The team also introduced a 1.5 sized tactile print of a fossil leaves (glossopteris) for the Scott Polar Museum to introduce a tactile 3D print from TS3D into their recently opened exhibition ***Walking on Thin Ice***, which will see similar evaluation as the work described by Cooper above, conducted in December 2019.

This project proved to be a catalyst for bringing the Creative Economy partner's work further into UCM programming—TS3D now has a strong relationship with the FM and Museum of Archaeology and Anthropology and will be producing interventions for future work within the former. However, there were severe limitations—the fellowships were not long enough to truly become fully fledged research projects with solid evidence-based outcomes, museum staff were not available as frequently as we hoped to work with the fellows and the loss of a fellow in such a short programme meant that their replacement was not an option.

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