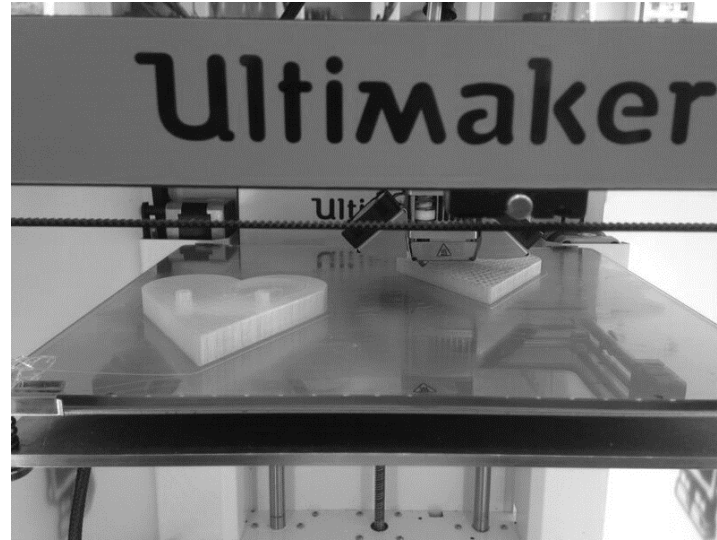# Design Innovation Development Awards
October 2013

'Enhancing the authenticity and sustainability of the visitor heritage experience through 3D Printing Technology'

Dr Samantha Vettese

Reader in Applied Art and Design

Edinburgh Napier University

Project cost – FEC £41,563

Follow on projects - (3D printing and 3D printable materials)

New processes for transforming unexploited textiles into high value products – The Textiles Future Forum FEC £58,592 (plus equivilent in kind support)

Exploring the ethical textiles industry in India – Global Challenges Research Fund FEC £7200

Towards sustainable textiles – can fungi be used to produce useful textile materials – Scottish Funding Council FEC £10,411

3 Bags Wool : product and market development using selvedge material – Scottish Funding Council FEC £4993

***Reflections on place and modern heritage through site-specific music and 3D printing activities* – Arts Council England £25,000**
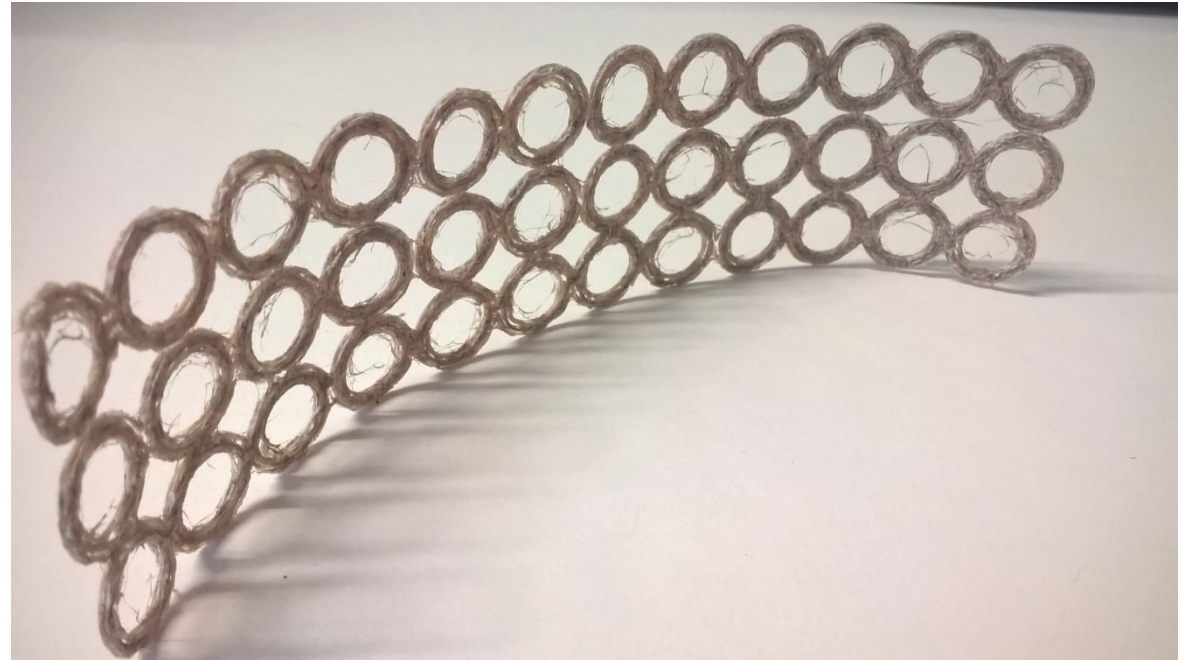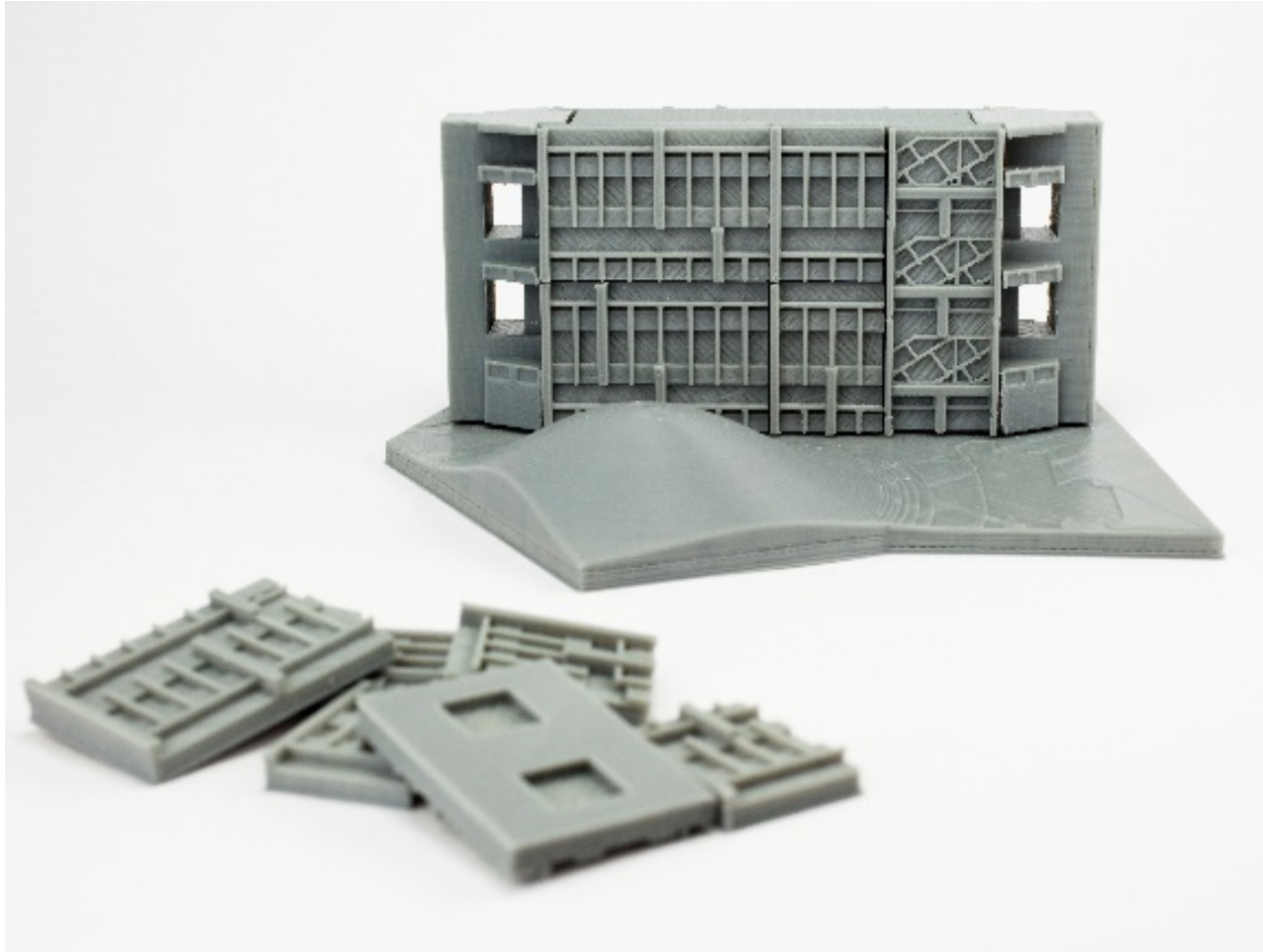
Dr Kathy Vones

Interdisciplinary project between Design and Tourism at Edinburgh Napier University

In collaboration with Historic Scotland at Stirling Castle

(Historic Environment Scotland)

6 months

- Dr Samantha Vettese – jewellery and silversmithing, materials, design history

- Dr Constantia Anastasiadou – customisation and authenticity in tourism, museum interpretation

- Dr Lynsey Calder – textile design, smart costume and textiles

- Mr Will Titley – product designer, urban design, medical technology design
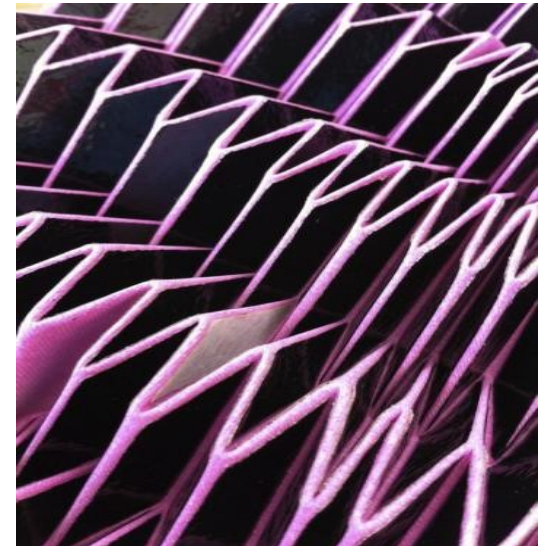
Details of support sought or received from any other source for this or other research in the same field.

| Awarding Organisation	Awarding Organisation's Reference	Title of project	Decision Made (Y/N)	Award Made (Y/N)	Start Date	End Date	Amount Sought / Awarded (£)
Edinburgh Napier University	Research Funding Competition 2013/14	Enhancing the authenticity and sustainability of the visitor heritage experiences through 3D printing technology	N	N	01/12/2013	30/06/2014	11180

Stages of the bid ...

Aims and objectives

- The aims of the project will be met by firstly, working with a museum, gallery or heritage site to negotiate and scan artifacts towards this scheme (potentially adding to their digital archive of relic information).

- It is also an objective to create a straightforward, preliminary, usable interface from this digital material towards 3D printing, which will be done within Edinburgh Napier University, within the Product Design workshops, and at the open access facilities at MakLabs in Glasgow. It is intended that this part of the process will be expanded and refined at a further stage of this project.

- In addition to this, it is the intention to create a small, prototype collection of **3D printed 'souvenirs'**, based on the scanned artifact information. At this stage of the project, the researchers intend to trial this process within a selected case study museum, gallery or heritage site.

- During and following this, visitors, museums and gallery staff and other stakeholders will be interviewed to determine the perceived success of the process from the perspective of the museum and gallery managers and curators as well as that of the visitors (and buyers of souvenirs).

Summary of bid

Gift shops are a common part in most museums and galleries that provide visitors with shopping experiences (Swanson and Timothy, 2012) as well as the opportunity to transform their intangible experience (gallery/museum) visit to a tangible memory through the purchase of a souvenir (Collins-Kreiner and Zins, 2011). It can also often be shown that the 'souvenirs' stocked within these gift shops are 'inauthentic' and 'homogenized' (Boorstin, 1961), 'commodified products', 'imitations', 'deceptions' (Greenwood, 1997), 'staged' (MacCannell, 1973), 'socially constructed interpretation of the genuineness of observable things' or 'mass standardisations oriented towards the export market' (MacCannell, 1989). Errington (1998) claims that making souvenir objects solely for the mass market undermines authenticity and promotes decadence. This can have the effect of detaching the viewer from engagement with the actual heritage experience and the overproduction of globalized, unsustainable, muddled, interpretive, disposable 'cultural' mementos. However, technological innovations in design and personalization of tourist souvenirs, through 3D printing offer opportunities to escape the **serial reproduction of culture through creative processes** that engage the visitor in the creation of meaning. By becoming involved in the design of souvenirs, a new supply chain is created which transforms the visitor from a consumer to a co-designer and co-producer. Through this personal and emotional engagement in the production of the souvenir, visitors may assign more emotional value and attachment to the customized souvenirs.

This project proposes to offer an alternative approach to the contemporary heritage souvenir experience through the utilization of 3D scanning and printing and online, remote interfaces between the museums, galleries and heritage sites and local 3D printing facilities, without an in-between 'gift shop' provision. It proposes to provide a desirable, customizable, co-created range of products, based on scanned in versions of artifacts within the museums, galleries and heritage sites, produced remotely in the tourists nearest local 3D printing facility.
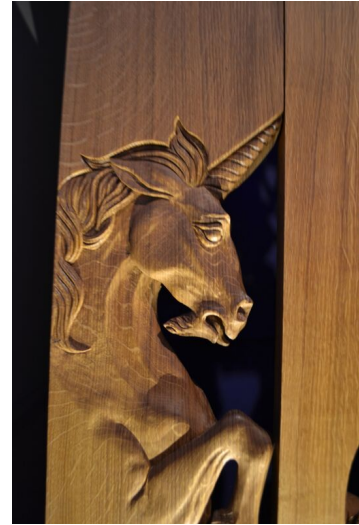
3D PRINTED SOUVENIRS SURVEY

Thank you for you time and assistance

please can you sign the consent form

1) Gender:

Male [ ]

Female [ ]

2) What is your age group?

16 1or under,

17 - 30

31 - 45

46 - 60

61 - 75

76 +

3) What is your nationality?

4) Have you heard of 3d printing before?

Yes [ ] (in what context?)

No [ ]

5) What do you think of the printed items as souvenirs?

6) If you had the opportunity to personalise your sounvenir, is this something you would be interested in? (Anything you saw today when you visited the Castle?)

7) How much would you be prepared to pay for a 3d printed souvenir?

We will only collect responses from adults (16 years and upwards) because of our Research Integrity Code of Practice provision.

Edinburgh Napier University Research Consent Form

3D PRINTED SOUVENIRS

Edinburgh Napier University requires that all persons who participate in research studies give their written consent to do so. Please read the following and sign it if you agree with what it says.

1. I freely and voluntarily consent to be a participant in the research project on the topic of 3D printed Souvenirs be conducted by Dr Lynsey Calder who is staff member at Edinburgh Napier University. The interview will be recorded anonymously while doing so unless you specify otherwise.

2. The broad goal of this research study is to explore visitor reactions to 3D printed souvenirs in a historical site. Specifically, I have been asked to answer a few questions, which should take no longer than 10 minutes to complete.

3. I have been told that my responses will be anonymised . My name will not be linked with the research materials, and I will not be identified or Identifiable in any report subsequently produced by the researcher.

4. I also understand that if at any time during the survey I feel unable or unwilling to continue, I am free to leave. That is, my participation in this study is completely voluntary, and I may withdraw from it without negative consequences. However, after data has been anonymised or after publication of results it will not be possible for my data to be removed as it would be untraceable at this point.

5. In addition, should I not wish to answer any particular question or questions, I am free to decline.

6. I have been given the opportunity to ask questions regarding the survey and my questions have been answered to my satisfaction.

7. I have read and understand the above and consent to participate in this study. My signature is not a waiver of any legal rights. Furthermore, I understand that I will be able to keep a copy of the informed consent form for my records.

Participant's Signature Date

I have explained and defined in detail the research procedure in which the respondent has consented to participate. Furthermore, I will retain one copy of the informed consent form for my records.

Researcher's Signature Date

Outputs
The main outputs of the research

- Book (chapter)
- Journal article (refereed)
- Conference paper
- Website
- Exhibition or installation
- Case Study Material
- Teaching Material
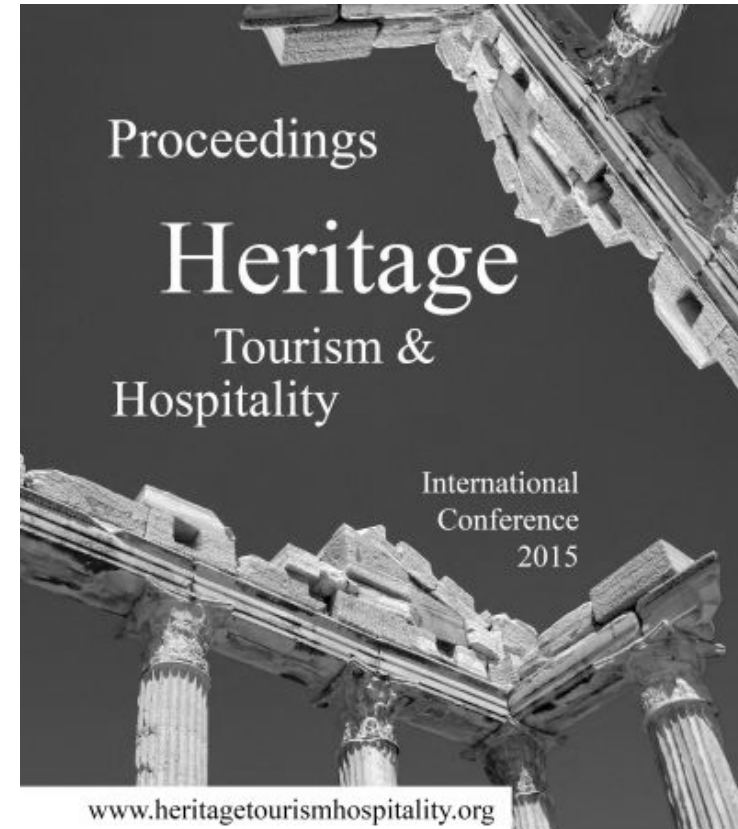
Ethical Information

Are there ethical implications arising from the proposed research ?

There may be ethical implications if video recording is used as a data collection method in the case study organisations. All due ethical processes will be followed as per Edinburgh Napier University's Code of Practice for Research Integrity (2013), which has been aligned with the Concordat to Support Research Integrity, published in July 2012, and the Singapore Statement, established in 2010.

Academic Beneficiaries
Describe who will benefit from the research

The academic beneficiaries of this research will include researchers in the field of heritage, cultural studies, design, tourism and marketing/retailing as well as other researchers who are currently holding AHRC/ESRC funding. Equivalent projects have currently received funding from the Arts and Humanities and Research Council (see for instance, Digital Building Heritage project) the EU Seventh Research Framework project (see for instance, Creative Cooperation for Cultural Heritage) and Historic Scotland (see for instance, Scottish Ten). All these projects integrate technological innovations in computing, including 3D design and printing to manage heritage resources and enhance our understanding and engagement with heritage through alternative media.

By incorporating interdisciplinary perspectives and methods from heritage, tourism and design, this project considers how the personalisation of souvenirs by the visitors may lead to more meaningful connections with the objects and the places/heritage these represent. As such, it adds another perspective on the existing academic debates on the nature of the souvenir, its purpose and its significance in remembering the heritage experience after the visit has taken place.

As technological innovations are altering existing supply chains of products and services, it also considers the theoretical implications of an alternative supply chain where the visitor becomes a co-creator and co-designer rather than a passive consumer of mass manufactured souvenirs.

To ensure the broader dissemination of findings, top rated journals in tourism, design and possibly, marketing will be targeted. It is envisaged that at least two REF-rated journal articles will be produced but, if funding is available, dissemination through specialist conference sessions, book chapters will be considered.

As all the participating investigators are also lecturers, the findings of the project will inform their teaching practice through the production of case study materials, specialist lectures and practical examples. Due to the nature of this project, the range of academic beneficiaries may become more clear once data has been collected. Further elaboration is also given to theoretical/conceptual issues in the Case for Support document that is attached to this application.

Impact Summary

Users and beneficiaries outside the academic community will be the participating museums and galleries, other heritage and visitor attractions which will gain insights from visitors' engagement with souvenirs and their collections. Depending on the project findings, there may be implications in terms of the retail offerings in their gift shop. A report summarising the main findings of the project will be circulated to the focus group participants. Presentation of the findings in specialist annual conference and publication in practitioner or specialist association journal will ensure the findings of the projects are disseminated to these type of beneficiaries around the UK and possibly, internationally.

Third sector organisations involved in heritage management such as the National Trust may also find the findings of the project useful as they manage a number of heritage attractions across the UK and would be interested in the potential for revenue generation through retailing that the project could pinpoint.

Beneficiaries may also include private sector companies such as 3D design/printing companies or manufacturers/retailers of souvenirs, who may be interested in the findings of the projects in terms of better understanding how consumers engage with 3D printed products and identifying products and services they could offer.

Invitations to the Exhibition of produced artifacts and the process of souvenir production will be sent out to private, public and third sector organisations. Attendance of the Exhibition by these organisations may also generate opportunities to establish how to progress this study further.

Finally, the general public may also benefit from the project as they will have the possibility to engage with the 3D printed souvenirs and consider the potential of 3D printing in their daily lives. Attendance at the exhibition will be the first experience of 3D printed objects for some parts of the general public. The possibility to further disseminate the findings of the project through Edinburgh Beltane will also be explored to maximise the opportunity of public engagement.

Summary of Resources Required for Project

Summary fund heading	Fund heading	Full economic Cost
Directly Incurred	Staff	13776.00
	Travel & Subsistence	450.00
	Other Costs	5050.00
	Sub-total	19276.00
Directly Allocated	Investigators	9421.39
	Estates Costs	1380.00
	Other Directly Allocated	0.00
	Sub-total	10801.39
Indirect Costs	Indirect Costs	11496.00
Exceptions	Other Costs	0.00
	Sub-total	0.00
	Total	41573.39

Staff

Role	Directly Incurred Posts										
	Name /Post Identifier		Start Date	**EFFORT ON PROJECT**							
				Period on Project (months)	% of Full Time	Scale	Increment Date	Basic Starting Salary	London Allowance (£)	Superannuation and NI (£)	Total cost on grant (£)
Researcher	Research Assistant		03/02/2014	6	40	36381	03/02/2014	36381	0	7696	13776
									Total		13776

Applicants

Role	Name	Post will outlast project (Y/N)	Contracted working week as a % of full time work	Total number of hours to be charged to the grant over the duration of the grant	Average number of hours per week charged to the grant	Rate of Salary pool/banding	Cost estimate
Principal Investigator	Dr Samantha Vettese	Y	20	148	6.7	55195	4951
Co-Investigator	Dr Constantia Anastasiadou	Y	80	38	1.7	66297	1527
Co-Investigator	Mr William Titley	Y	10	88	4	55195	2944
						Total	9422

Travel and Subsistence

Other Directly Incurred Costs

Destination and purpose			Total £
Within UK	Local travel for investigators and research assistant		300
Within UK	Focus Group Participants travel reimbursement		150
		Total £	450

Description			Total £
Venue hire for focus group interviews, half a day x2			500
Catering (teas & coffees) for focus group participants			250
Setting up exhibition to present project findings			1500
Focus group interviews transcription, approximately 30 hours			1800
Consumable costs (3D printer materials)			1000
		Total £	5050

Case for Support

Fit to call

The project fits the AHRC Design in Innovation call by focusing specifically on the role of Design in Service Innovation and providing evidence on the impact of Design.

The project seeks to establish whether personalisation through 3D printing (additive manufacturing, rapid prototyping, laser sintering), that enables visitors to co-design and coproduce their own souvenirs, reconfigures the notion of authenticity in heritage consumption and engagement, and the levels of visitor emotional attachment with the souvenirs they purchase. The findings of the project will have significant theoretical implications and generate new insights in the areas of heritage, design, museums and galleries, and tourism and provide an innovative, sustainable alternative to current souvenir design practices .

From a practical point of view, the project also challenges existing market chains that reinforce souvenirs as objects that are mass produced and of limited value and instead tests an alternative supply chain which transforms the visitor from a passive to an interactive consumer of culture and heritage. Facilitated by the service innovation potential of 3D design and print, museums and galleries can thus gain further insights into the evolving motivation and purchasing behaviours of their visitors using an archival bank of digital data based on their particular artefacts.

Rationale and context

Museums, galleries and heritage sites are frequently positioned as spaces that incorporate dining and shopping activities to make them more attractive for consumption (Wirth and Freestone, 2001). Gift shops are a common feature in museums and galleries that provide the opportunity to transform visitor‟s intangible experience of the visit to a tangible memory through the purchase of souvenirs (Collins-Kreiner and Zins, 2011). By providing a material point of reference for a specific memory, souvenirs create, recreate and mediate a multi-sense tourist experience (Morgan & Pritchard, 2005). However souvenirs‟ stocked within these gift shops have been described as „inauthentic‟ and homogenized‟ (Boorstin, 1961), „commodified products‟, „imitations‟, „deceptions‟ (Greenwood, 1997), „staged‟ (MacCannell, 1973), „socially constructed interpretation of the genuineness of observable things‟ or „mass standardisations oriented towards the export market‟ (MacCannell, 1989). Errington (1998) claims that making souvenir objects solely for the mass market undermines authenticity and promotes decadence. More recently, authenticity has been perceived as a subjective notion; thus, it is the personal relationship that is formed between the tourist/visitor and the souvenir that gives it authenticity rather than the way it was produced. *"The object acts foremost as a memory holder for the person, but beyond being a reminder, the souvenir also functions to express a person's individuality and sense of self, group conformity, creativity and esthetic taste"* (Anderson & Littrell, 1996; Fairhurst, Costello, and Holmes, 2007; Littrell, 1990; Littrell et al., 1994; cited in Swanson and Timothy, 2012: 492).

Go, Lee and Russo (2003) argue that the way tourism products are packaged, promoted and sold leads to harmful commercialization of destinations, product commoditisation and a disintegration of local cultures. This can have the effect of detaching the viewer from engagement with the actual heritage experience and the overproduction of globalized, unsustainable, muddled, interpretive, disposable „cultural‟ mementos. However, the personalization of souvenirs through 3D printing can facilitate the escape from the serial reproduction of culture through creative processes that engage the visitor in the creation of meaning. Authenticity and uniqueness can be achieved through the personalization of the souvenir (i.e. size, pattern and colour) which will allow the visitors to create their own meaningful mementos of their visit. In addition to this, contemporary experiments with 3D printing allows for personalization through material choices, such as metal alloys and polylactic acid bioplastic. The technology provides the opportunity to design with minimal waste and to produce products locally, through networks of 3D printing facilities, rather than transporting them from the tourist destination. By becoming involved in the design of souvenirs, a new supply chain is created which transforms the visitor from a consumer to a co-designer and co-producer. Through this personal and emotional engagement in the production of the souvenir, visitors may assign more emotional value and attachment to the customized souvenirs, therefore, lessening the likelihood of disposal. The heritage experience is constructed through learning, understanding and feeling the visited spaces and the culture that is embedded in these. The personalisation of souvenirs could then transform the consumption of heritage and its cultural narratives from passive to interactive. Customisable souvenirs enhance and extend the mediated gaze by allowing for greater flexibility and creativity on the part of the visitors.

The project aims to define and investigate an alternative approach to the heritage souvenir experience utilizing 3D scanning and printing technologies. It seeks to create and assess a user interface that allows for customization and personalization and a remotely 3D printed souvenir product that is desirable and, through its use of materials and emotional connection with the user, sustainable. It intends to consider whether the approach is successful in its method. It will endeavor to collate this information towards the capability to extend this approach to other heritage sites, utilizing remote networks of 3D printing facilities. It aims to create specific research that will determine how visitors engage with the collections, the souvenir consumption process and the proposed devices. It also intends to ascertain the achievements of the design outcomes, from a perspective of their sustainability, in comparison to current practices. To this end, funding is requested to initially undertake a pilot study with the view of developing a more detailed and in-depth follow up project.

Aims and Objectives

The aims of the project will be met by firstly, working with a museum, gallery or heritage site to negotiate and scan artifacts towards this scheme (potentially adding to their digital archive of relic information).

It is also an objective to create a straightforward, preliminary, usable interface from this digital material towards 3D printing, which will be done within Edinburgh Napier University, within the Product Design workshops, and at the open access facilities at MakLabs in Glasgow. It is intended that this part of the process will be expanded and refined at a further stage of this project.

In addition to this, it is the intention to create a small, prototype collection of 3D printed „souvenirs", based on the scanned artifact information. At this stage of the project, the researchers intend to trial this process within a selected case study museum, gallery or heritage site. During and following this, visitors, museums and gallery staff and other stakeholders will be interviewed to determine the perceived success of the process from the perspective of the museum and gallery managers and curators as well as that of the visitors.

By the end of this project, it is anticipated that the researchers will have collated a body of information on the commercial success of the process, the perceived attainment of the interaction, personalization and co-creation processes, any divergences in the way visitors have engaged with the collection, through this mediation process and will have acquired insights as to how to advance the procedures. As such the project findings could have significant implications in making novel contributions in the areas of heritage, museums and galleries, design and tourism. In addition, museums and galleries could stand to benefit by gaining further insights into the shopping behaviour of their visitors.

Timetable of Activities

The following timelines and milestones are offered as targets- they may have to be slightly adjusted to accommodate the case study organisation's requirements, however the researchers will ensure that final deadlines are met.

Advertise postdoctoral research assistant post in early January 2014; recruit by end of January 2014 with a formal start date of 3rd of February 2014 or soon after.

Finalize literature review and research design by end of February 2014. (All investigators and the RA).

Confirmation of case study organisation(s) by end of February 2014.- [*The PI and coinvestigators will liaise with one or two museums or galleries with the view of running the pilot survey possibly during a forthcoming temporary exhibition. To this end, they intend to begin liaising with the museum or gallery imminently to ensure projected deadlines are met*].

Initial Focus Groups with museums and gallery curators conducted by early March 2014 to identify initial attitudes to souvenirs, personalization and 3D printing. [*The PI and coinvestigators will run the focus groups with administration support from the RA*]

The experiment with prototypes based on the focus group data and the case study organisation preferences will be set up by mid April 2014. [*The prototypes will be produced at Edinburgh Napier University or one of the specialist 3D printing labs by the RA under the leadership of the PI*]

Carry out experiment(s) with museum/gallery visitors and collect data by early May 2014. [PI will lead the project]

Analyse project findings and produce initial summary reports for participating organisations and case study museum/gallery by the end of June 2014.

Set up specialist exhibition possibly at the case study museum/gallery that describes the research project, the process of production and the artifacts by the end of July 2013.

Management and Coordination

The project will be managed by the Principal Investigator, two Co-investigators and a postdoctoral research assistant. The PI will take leadership in the aspects of research that are specifically related to design whereas the co-investigators, will lead those aspects that deal with the practical implications of the project and in producing and disseminating outputs, as well as assist in the research design, analysis of findings and writing up of papers.

A postdoctoral research assistant will be employed under the leadership of the PI and the Coinvestigators with technical expertise in design to assist in the production of the 3D souvenirs. They will work primarily under the leadership of the PI but also collaborate closely with the other co-investigators to undertake administration duties such as the setting up of the focus group or to offer assistance in the setting up of the final exhibition.

Outcomes and dissemination

The following outcomes and dissemination activities are planned at this stage. However, it may be possible to produce more journal articles depending on the success of other funding applications and the identification of relevant case study organizations.

Two 4* rated journal articles on design technology and tourism/heritage management (i.e. Annals of Tourism Research, Tourism Management or Journal of Heritage Studies).

Exhibition of produced artifacts and documenting the process of souvenir production.

Report to museum/focus group participants of the outcome of the project.

Specialist conference paper (i.e. annual museum/heritage association conference) and publication in practitioner research journal.

Dedicated website that summarises the project's aims and objectives and key findings.

Production of teaching materials (i.e. case studies, practical examples, etc)

Presentation of findings through Edinburgh Beltane for public engagement.

End of project report to AHRC as directed by the organisation.

Justification of Resources

Funds are requested to cover staff salaries, travel and subsistence and other costs relating to data collection and the dissemination of findings through an exhibition.

Directly Incurred Costs

Directly Incurred costs include funding to recruit <u>a post-doctoral researcher</u> for 40% FTE for six months. The post-doctoral researcher will be knowledgeable in design and in particular 3D printing to mainly undertake the development of the specialist software that will be used to scan the artefacts that will be then used as the souvenir templates. This expertise would complement existing knowledge of design aspects that the PI, Dr Sam Vettese and Mr Will Titley already possess. They will also assist with administration tasks throughout the project as well as the setting up and organisation of the final exhibition. Finally, if time allows, they may also become involved in the analysis of the data and the production of summary reports for the participating stakeholders.

An additional expenditure for <u>consumables</u> is included here. At the time of writing this bid, it is not clear how expensive the materials for 3D printing will be as part of this expenditure may be subsidized by other sources. However an estimate of £1000 has been allowed to cover all eventualities.

Other Directly Incurred costs include <u>travel and subsistence</u> for the investigators and the RA as well as the participants in the focus groups. As most of the data will be collected locally in Edinburgh with the possibility of some regional travel, no request is made for overnight costs. Participants in the <u>focus groups</u> will only be compensated for their travel expenses as due to their professional standing they are unlikely to expect remuneration for taking part. The focus groups will run over two half days so estimate for <u>venue hire and catering</u> have also been included. Dr Constantia Anastasiadou will organise and run the focus groups with administration support from the RA and additional input from the other investigators as necessary.

An associated cost is the <u>transcription</u> of the interview data that will be generated in the focus group discussion. A specialist transcription service will be used to speed up this stage of the research which can be quite time consuming for the research team otherwise. This will allow the investigators to focus more of their time and effort to analysis and dissemination of findings.

Furthermore, other directly incurred costs are costs associated with the <u>exhibition</u> of the 3D printed souvenirs and the presentation of the production process and some estimate costs are presented here. Due to the nature of this output, it is anticipated that the PI Dr Sam Forster and

Mr Will Titley, will lead this aspect of the project with the support of the RA. Dr Constantia Anastasiadou will lead the publicising of the event using existing networks of the School of Marketing, Tourism and Languages and Edinburgh Napier University.

Directly Allocated Costs

The directly allocated costs are related to the salaries of the PI and the co-investigators.

Dr Sam Vettese will work on the project for the equivalent of 0.2 FTE for six months. She has extensive theoretical and practical knowledge relevant to this project having completed a PhD that examined the culture of art and design as well as working with innovative technologies. The proposed project allows her understanding of aesthetic cachet, sustainable materials and methods and the understanding of their wider cultural applications to be realized and applied to an interdisciplinary concern beyond craft's conventional boundaries. As the PI for the project she will manage the project and organise the recruitment of a suitably qualified postdoctoral RA whom will also work under her leadership and supervision. She will liaise with the funding organisations and ensure that deadlines are met and the project objectives are met.

Dr Constantia Anastasiadou, will work on the project for the equivalent of 0.1FTE for six months. She is involved in the project because of her previous work on personalisation through printing which considered its relevance to tourism providers. She also has an in-depth knowledge of heritage related issues having taught related subjects and previously researched in the area of visitor attraction management. As such she complements the strengths of the other two researchers in design by considering the relevance of the project and its findings to users and beneficiaries outside academia. She will undertake the data collection during the focus groups and its analysis. She will also assist in initial stages of the projects research design by assisting the PI in finalising the case study museums/galleries.

Mr Will Titley will work on the project for 0.1 FTE for six months. Given his previous experience and expertise in new product development he will be instrumental in the design and production of the 3D printed souvenirs. He will work support the PI throughout the project and is likely to take leadership of the production of the final exhibition as he has extensive experience of presenting his work in exhibitions.

Other costs such as Estates and Indirect Costs have been set by Edinburgh Napier's Research Office based on the University's costing models for research projects.

Pathways to Impact

Users and beneficiaries outside the academic community will be the participating museums and galleries, other heritage and visitor attractions which will gain insights from visitors' engagement with souvenirs and their collections. The PI and co-investigators have already started forming relationships with interested organisations including the National Trust for Scotland, which have indicated an interest in the project and a shortlist of museums and galleries will be produced once a full review of the literature has been undertaken. It is likely that those museums and galleries that participate in the research from the outset, are likely to shape part of the research and consequently, stand to benefit more directly. Dr Anastasiadou, who is based in the School of Marketing, Tourism and Languages will utilise her extensive personal and professional networks to identify and approach potential participating organisations.

Depending on the project findings, there may be implications in terms of the retail offerings in the museums and galleries gift shops. This is particularly poignant for these organisations as they may lack the resources to undertake marketing/consumer research and would stand to benefit from greater awareness of shopping behaviour and motivations of their visitors. A report summarising the main findings of the project will be circulated to the focus group participants as the end of the project, including aspects relating to retailing, where relevant/possible.

The presentation of the findings in specialist annual conference and publication in practitioner or specialist association journal will ensure the findings of the projects are disseminated to these type of beneficiaries around the UK and possibly, internationally. This will be undertaken by the PI and co-beneficiaries subject to the availability of funding. The presentation of the project and findings through a dedicated website will also assist in the dissemination of the findings to as broad a range of stakeholders as possible.

Third sector organisations involved in heritage management such as the National Trust may also find the findings of the project useful as they manage a number of heritage attractions across the UK and would be interested in the potential for revenue generation through retailing that the project might generate.

Beneficiaries may also include private sector companies such as 3D design/printing companies or manufacturers/retailers of souvenirs, who may be interested in the findings of the projects in terms of better understanding how consumers engage with 3D printed products and identifying products and services they could offer.

Invitations to the Exhibition of produced artefacts and the process of souvenir production will be sent out to private, public and third sector organisations. Attendance of the Exhibition by these organisations may also generate opportunities to establish how to progress this study further. All the investigators and the RA will assist in the production and organisation of the exhibition, however the Mr Will Titley may take leadership of aspects of the exhibition given his previous experience in putting together design-related exhibitions.

Finally, the general public may also benefit from the project as they will have the possibility to engage with the 3D printed souvenirs and consider the potential of 3D printing in their daily lives. Attendance at the exhibition will be the first experience of 3D printed objects for some parts of the general public. The possibility to further disseminate the findings of the project through Edinburgh Beltane will also be explored to maximise the opportunity of public engagement. Edinburgh Napier University take part in this initiative and the investigators will seek guidance on how to maximise the dissemination of the project findings to the general public through this initiative.