



**Digital R&D Fund for the Arts in
Scotland**

**Consortium for Research into Arts
and Technology in Scotland
CReATeS**

**Final Report
March 2014**

Universities of Stirling, Strathclyde
and St. Andrews



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1. Executive Summary

The Digital R&D Fund for the Arts in Scotland

The Digital R&D Fund for the Arts in Scotland has funded ten arts and cultural organisations to collaborate with technology partners in order to generate 'digital propositions' centred around extending audience reach and engagement and developing new business models. The fund involved two calls, with the first call projects awarded funding in June 2012 and the second call projects awarded funding in March 2013.

The six first-call projects were led by the arts and cultural organisations An Iodhlann, Dundee Contemporary Arts, Edinburgh Cultural Quarter, Glasgow Film, National Galleries of Scotland, and the National Piping Centre.

The four second-call projects were led by the arts and cultural organisations Culture Republic (formally The Audience Business), National Theatre of Scotland, Publishing Scotland and the Scottish Documentary Institute.

The CRaTeS Research Consortium

The Consortium for Research into Arts and Technology in Scotland (CRaTeS) is a group of researchers from the Universities of Stirling, St Andrews and Strathclyde, also supported by the Digital R&D Fund for the Arts in Scotland. CRaTeS' research focused on the collaboration between individual arts and cultural organisations and their technology partners; the relationship between the collaborations instigated by the Fund and the cultural ecology in Scotland, the UK and internationally; and the methodologies and approaches employed in the analysis of research, development and innovation in arts and cultural organisations.

This report

The purpose of this Final Report is to provide an overview of the contexts, workings and impacts of the Fund, bearing in mind that at the time of writing, not all impacts of the individual project activities, or the Fund more broadly, had had time to develop. Its primary intended audience is decision-makers and project managers in arts and cultural organisations in Scotland and more broadly.

Outcomes and impacts

The report categorises the outcomes of the Fund into results (relatively clearly defined outcomes with a close connection to the project activities themselves) and impacts (changes or new behaviours that occur related to a project but that concern an organisation's activities more broadly). It also analyses between types of innovation, categorises R&D, analyses hard and soft benefits, and discusses the measuring of project results.

Across the Fund the emphasis was on exploration, research and development. Nine of the ten projects aimed to develop a digital product, with most project schedules culminating in the launch of an app, web-based or mobile service. At the time of writing seven of the nine intended digital products and services had successfully been launched. The technical development of an

eighth product had been completed and a beta version of the ninth product, which requires some technological fine-tuning, had been launched and trialled with audiences. The tenth project focused on the application of games design thinking rather than on the creation of a defined digital output. However, by the end of the funded period it, too, had produced two prototypes of digital products.

The report separates digital innovation into three categories:

- **Innovations in audience engagement:** The ArtHunter, Frasan and Bookspotting apps offer new ways of discovering arts and culture. They invite audiences to engage with artwork, heritage sites and books in playful, serendipitous and fun ways. A different type of audience engagement was at the centre of the Dundee Contemporary Arts (DCA) project. DCA explored how digital methods (gaming) might be applied in an arts centre. This exploration resulted in prototypes of a donations box and a revamped loyalty card scheme that, once fully developed, will engage audiences in new ways.
- **Innovations in sales and marketing:** Culture Juice and the Culture Republic's Facebook app intended to provide new sales outlets for arts and culture organisations. Both projects were particularly aimed at younger audiences who might respond better to discounted tickets and fresh, social media-linked campaigns. The Scottish Documentary Institute's project delivered a slightly different sales and marketing tool: a digital platform for fundraising and marketing documentaries and for purchasing DVDs.
- **Innovations in service delivery:** The National Piping Centre (NPC) built an e-learning platform that expands its current offering to piping students. NPC also won large audiences for their live-streaming of piping events - and with these, increased revenues. The GFT and Filmhouse project also developed new, digital ways of delivering their existing offerings. The first cohorts of users have now accessed arthouse films on demand via the player, in addition to exhibition in the two cinemas. The National Theatre of Scotland focused on a specific but crucial service in terms of audience access and participation. Their project delivered a mobile platform for relaying live captioning and audio-descriptions for hard of hearing and visually impaired theatre goers.

The report also analyses the projects with respect to the categories of R&D suggested by the Frascati Manual (basic research, applied research, and experimental development). To account for the specificities of arts and culture, these categories were supplemented with a qualitative focus on exploration, collaboration and learning, both for individual organisations and for the sector more broadly.

The report explores that the new understanding of digital technology that the projects resulted in was arguably as important as the actual digital products and services. Across the Fund, project leads stated that their organisations are now much better able to understand what digital technology can and cannot do, and most importantly in operational terms, what it can and cannot do for their organisation in particular.

The projects also resulted in a range of diverse and often project-specific hard and soft benefits. These included:

- revenue from subscription sales, film sales and donations
- valuable databases of contacts which can be drawn upon for future activities
- an often unprecedented chance to trial and experiment without pressure to succeed
- projects led to new conversations, relationships and collaborations within the arts and cultural organisations

- the opportunity to network with new people and, as the Fund involved a broad range of arts, culture and creative organisations, often with creative professionals outwith the project leads' usual circles

In terms of measuring project results, many of the digital products and services produced have not been on the market for long enough to yield meaningful statistics. Project leads typically estimated that it would take around one year of the product or service being available to users before they would have meaningful data available. Secondly, the projects had a strong R&D focus, and the collection of quantitative data can often not appropriately capture the results of such processes and was therefore not included in the programme of work.

However, where user statistics are available they point towards a close link between marketing activities and user uptake of the respective digital product or service.

They also provide valuable insight into how such quantitative data can only provide a limited insight into a project's results. Download figures and user feedback for the ArtHunter and Frasan apps show that these apps are well received. However, a much better understanding of the changes in audience engagement can be achieved through contextualising such metrics with qualitative data, such as visitor behaviour and response.

In terms of broader impacts, engagement with digital technologies prompted a rethink of how arts organisations generally produce products and deliver services, i.e. both digitally and non-digitally, and the processes and policies they employed in doing so.

Learnings from the funded projects

One aim of the Fund was to make general learning available to other arts and cultural organisations. The Funded projects offer general lessons on project scope and expectations, choosing digital experts, balancing innovation and project management, and legacy creation.

Practical tips for those looking to set up their own digital R&D projects include:

Project scope and expectations:

- Basic research requires protected spaces. Project partners need to be assured that they are not expected to produce immediately useful, let alone marketable, outcomes.
- Agile methodology, a project approach popular in technology development, can help arts and cultural organisations produce and trial digital innovations in comparatively short timespans.

Choosing digital experts:

- With pre-existing relationships between arts organisations and digital experts, projects can benefit from mutual understanding of each others' motivations, work modes and capacities. Pre-existing relationships can make it easier to build trust. However, familiarity can also lead down well-trodden paths and inhibit experimentation. New relationships can be more efficient at disrupting existing thinking and breaking new ground.

Balancing innovation and project management:

- Plan time realistically and specifically. Be honest about how long tasks are going to take.

- Start early - don't lose time at the beginning, there will inevitably be detours and delays on the way.
- Be clear about roles and responsibilities, between arts organisations and digital experts as well as within arts organisations.
- Document aims, decisions and values or principles that are integral to your project.

Legacy creation:

- During rather than at the end of the project consider how much funding will be needed to secure the benefits of whatever outcome you are working towards. Where might that funding realistically come from?
- Think through how much technical support will be needed after the end of the project. Where is this support going to come from?
- Digital products and services typically depend on the availability of up-to-date content. How will that content be provided, managed and resourced?
- If the legacy of your project is dependent on other departments' soft resources such as staff time (e.g. for providing content), consider involving these departments during the project, not only after its completion.

Conclusions

The Fund has achieved the aims and impacts it had set itself. For the future, it will be important to spread the appetite and capacities for digital R&D across the arts and culture sector and to ensure that digital skills and knowledge of digital technology remain up to date in individual organisations as well as at sector level. By connecting arts and cultural practitioners from a wide range of organisations with some of Scotland's leading experts in digital technology the Digital R&D Fund for the Arts in Scotland has built a solid foundation for achieving these future aims.

2. Background

The Digital R&D Fund for the Arts in Scotland was developed as a partnership between Nesta, Creative Scotland and the Arts & Humanities Research Council (AHRC). The Fund was capitalized with £500,000 in order to support collaborative partnerships between arts and cultural organisations and technology companies. The premise was to establish an evidence base through the development of case studies that would support the wider arts and cultural sectors to engage in digital innovation and to develop further partnerships within and beyond their traditional networks. Arts and cultural organisations were invited to submit applications developed in partnership with technology companies that detailed project proposals focusing on digital research and development (R&D).

The Fund also supported a research consortium. The Consortium for Research into Arts and Technology in Scotland (CReATeS) is a group of researchers from the Universities of Stirling, St Andrews and Strathclyde, which was responsible for the preparation of this report, individual research reports relating to each project, and other associated outputs. CReATeS' research focused on the collaboration between individual arts and cultural organisations and their technology partners; the relationship between the collaborations instigated by the Fund and the cultural ecology in Scotland, the UK and internationally; and the methodologies and approaches employed in the analysis of research, development and innovation in arts and cultural organisations.

The Fund also had a Learning and Evaluation Partner, Tom Fleming Creative Consultancy, which was tasked to survey the international sector for case studies, and the Scottish sector for attitudes towards digital innovation.

Art and cultural organisations were invited to apply with projects that, broadly, were geared towards the Fund's two main aims, i.e. to

- expand audience reach and engagement and/or
- explore new business models.

These overall aims were translated into six 'thematic areas' that indicated investment priorities for the Fund:

- Digital content distribution - delivering content in new ways;
- Social media - using technology for interactive engagement;
- Making the most of archives through digital technology;
- Mobile and location-based services;
- Fundraising - using technology to generate giving, sponsorship and membership;
- Connecting thinkers with doers: methodologies for emergent collaboration.

The opportunities offered by new digital technology and its application to the arts and cultural sector were at the heart of rationale for the scheme. Of equally strong interest was the opportunity to diversify and potentially increase revenue streams in the face of growing pressures on other traditional funding sources such as public monies. The £500,000 Fund was also centrally invested in inspiring and supporting innovation in the arts and cultural sector more widely, by providing a rich body of research evidence and data along with individual case studies.

The Fund sat alongside a range of other initiatives encouraging research and development in relation to digital technologies, arts and cultural organisations, and the creative industries more broadly. Nesta has supported a range of activities and dissemination activities, including Data-

Driven Innovation (helping businesses turn data into value); Digital Makers (encouraging young people to create as well as use digital technologies); and FutureFest (an event showcasing future-oriented thinking and technologies).¹ Through its publications, Nesta is also leading on thinking around creativity, innovation and digital technologies (see Links to Useful Resources). Creative Scotland's Cultural Economy programme comprises three strands aimed at facilitating digital innovation in the arts and culture. Creative Scotland's involvement in the Digital R&D Fund for the Arts in Scotland constitutes the first strand. The second strand, Sync, is working to bring cultural organisations, technology and technologists together. Its activities include evaluating the Digital R&D Fund for the Arts in England, as well as Culture Hack Scotland (an annual event) and a Geeks-in-Residence Programme.² The third strand, AmbITion, funds a range of projects increasing arts and cultural organisations' 'digital fitness' and is run by Culture Republic and Rudman Consulting. The AHRC has 'Digital Transformations in the Arts and Humanities' as one of its strategic themes, linking to the RCUK's Digital Economy Theme. It also has a focus on Research in the Creative Economy. Current and past projects funded via the Digital Transformations in the Arts and Humanities theme have aimed at 'exploiting the potential of digital technologies to transform research in the arts and humanities, and to ensure that arts and humanities research is at the forefront of tackling crucial issues such as intellectual property, cultural memory and identity, and communication and creativity in a digital age.'³

For the Digital R&D Fund for the Arts in Scotland, proposals of all sizes up to a maximum projected budget of £100,000 were considered, grouped into two categories: up to £25,000 and £25,000-£100,000. Each proposal was expected to demonstrate the potential for new technologies to change and enhance the way the arts and cultural organisations could reach audiences and generate revenue. Funded projects were to be ten months in duration, and were supported via a series of workshops, which brought together the funders, project partners, the research consortium, and the Learning and Evaluation Partner.

The purpose of this Final Report is to report on the ten projects funded under the Digital R&D Fund for the Arts in Scotland. The report presents a cross-project analysis of results, impacts and learnings as well as individual in-depth research reports on the ten projects. Importantly, at the time of writing, not all impacts of the individual project activities, or the Fund more broadly, have had time to develop fully. The report's primary intended audience is decision-makers and project managers in arts and cultural organisations in Scotland and more broadly.

Digital Innovation, Research & Development

Proposals at various stages of development were considered, from untested ideas through to technologies that were ready to be commercialized. Many of the received and funded proposals reflected the different stages and types of R&D and progressed at different speeds from one another. Understanding the different types of R&D is thus critical to analysing the different projects and critically assessing their success.

The Organisation for Economic Cooperation and Development (OECD)⁴ defines R&D in its Frascati Manual (first published in 1963) as comprising:

creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock

¹<http://www.nesta.org.uk/project/data-driven-innovation>; <http://www.nesta.org.uk/project/digital-makers>; <http://www.futurefest.org/>

² <http://www.welcometosync.com/>

³ <http://www.ahrc.ac.uk/Funding-Opportunities/Research-funding/Themes/Digital-Transformations/Pages/Digital-Transformations.aspx>; <http://www.rcuk.ac.uk/research/xrcprogrammes/Digital>

⁴ The OECD is an international organization comprised of 34 countries, founded in 1961 and comprised principally of developed Western nations who fund its activities and research.

of knowledge to devise new applications. R&D is a term covering three activities: basic research, applied research, and experimental development... R&D covers both formal R&D in R&D units and informal or occasional R&D in other units.⁵

The three principal types of R&D activities defined by the Frascati Manual are 'basic research', 'applied research' and 'experimental development':



Figure 1: OECD Frascati Manual defined R&D Process

Basic Research

Basic research is experimental or theoretical work undertaken with the principal aim of acquiring new knowledge of the basis of phenomena and observable facts, without any particular application or use in mind. Basic Research is most often described as 'blue sky' thinking and is considered risky for private firms to undertake. The OECD defines basic research as the analysis of properties, structure and relationships, which inform the formulation and testing of hypotheses, theories or laws. It is however, often undertaken with 'no particular application in view' and those carrying it out may not know or be aware of any applications of their studies. Basic research results are usually not sold but may be shared with colleagues/partners or publicized in journals. Occasionally, depending on the nature of the work they may also be classified or considered a competitive advantage and thus not shared outside of the organization.

There are a number of economic benefits that can emerge from the undertaking of basic research. Basic research can provide new interactions, networks and technological options (Callon, 1994), create technological opportunities (Klevorick et al, 1995) and be a source of skills required to translate knowledge into practice. It can be the development of an enhanced ability to solve complex technological problems, an 'entry ticket' to the world's stock of knowledge, providing the ability to participate in networks, and to absorb and exploit resultant knowledge and skills (Pavitt, 1991, 1998; Rosenberg 1990, 1992). Basic research is often the foundation on which R&D is established within an organization as a viable option and using the R&D advances made by others. It is often carried out by the private sector in order to prepare organisations for next generation technology usage.

Salter and Martin (2001) found that publicly funded basic research produces the following outcomes:

- Formation of networks and stimulation of social interaction;
- Creation of new scientific instrumentation and methodologies;
- Increase in the stock of useful knowledge;
- Training of skilled graduates;
- Increase in the capacity for scientific and technological problem solving;

⁵ OECD Frascati Manual (2002), 30.

- Creation of new firms.

Although basic research is an uncertain undertaking with no guarantee of results, it forms a critical part of the R&D process in developing and pushing the boundaries of knowledge that future research, innovation and adoption of new technology and information is based upon. Basic research opens up the opportunity to tap into external scientific knowledge through exchange, transfer, and networking, which in turn necessitates the ability to understand the application of such knowledge.

Applied Research

Similar to basic research, applied research is original investigation undertaken in order to acquire new knowledge but is directed primarily towards a specific practical aim or objective. Applied research usually entails the creation of a new project or programme with targeted aims to investigate what are considered promising findings arising from basic research (either conducted internally or learned from others sharing). Perhaps unsurprisingly, Rassenfosse and Van Pottesberrghe (2008) found that private sector R&D is usually more focused on applied research and development with market potential,⁶ which van Beers et al. (2008) argued was a consequence of the higher likelihood of an economic return on investment due to the easier diffusion of basic research findings. Basic research is more likely to be undertaken without a commercial target in sight and is often a part of public sector activities whether in government, education or elsewhere in that realm. As a result, there is usually a lag which reduces the potential commercial value of such research so companies prefer the more applied option.

However, some studies have found that there are greater economic returns to basic research than applied research. Snapshot estimates discovered that firms spending more of their budgets on basic research have higher productivity levels than those who do not. Mansfield (1980) found a positive relationship between long-term research and productivity at the firm level, a finding supported by both Griliches (1986) and Link (1981).

Experimental Development

Experimental development is systematic work that draws on existing knowledge gained from research and/or practical experience, is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed. This is the final part of the overall R&D process and the one that offers the highest returns to private enterprises due to its proximity to the commercialization process. It is thus the stage that is usually of most interest to business.

Analysing Digital R&D in the Arts and Culture

Although the above outline of the R&D process gives an indication of the likely economic benefits of undertaking the different types of R&D, an American Congressional Budget Office report argued that:

industries differ substantially in the return they receive from R&D. Those disparities are much greater than the differences among firms in the same industry or the differences

⁶ De Rassenfosse, G & Van Pottesberrghe, B, 'A Policy Insight Into the R&D-Patent Relationship', Ecore Discussion Paper, 18/2008, pg. 14.

among the same industries in different countries... several studies have found that that R&D performed in 'scientific or 'research-intensive' industries... produces bigger returns than R&D carried out in other manufacturing sectors.⁷

In addition, the Frascati Manual has been criticised for being too centred on technological and scientific innovation, and for not aptly capturing the soft innovation more typically occurring in the arts and culture (e.g Nesta 2013). Stoneman (2009:20), for instance, proposes to instead focus on soft innovation, denoting 'changes in goods and services that primarily impact on sensory or intellectual perception and aesthetic appeal rather than functional performance'. Stoneman's definition is explicitly aimed at innovation in the cultural and creative industries. However, while it is useful for capturing innovation that occurs beyond products and processes in the narrower sense, it is focused on those innovations that can be measured by their impact on economic welfare. As described above, the Digital R&D Fund for the Arts in Scotland sought to support innovation projects that focused on exploration and on connecting arts and culture with digital. The Fund explicitly looked at soft benefits and at the wider learning for the sector, making impact on economic welfare a less appropriate analytic lens. As Miles and Green (2008) point out, much innovation in the arts and culture is hidden from the traditional gaze of innovation research. For instance, R&D that centres on audiences' tastes and preferences or explores new business models is a crucial innovation activity in this sector, but one that is easily overlooked if analytical perspectives are preoccupied with results and impact measures.

In addition, the defining feature of the Digital R&D Fund for the Arts in Scotland in Scotland was that it brought together arts and cultural organisations with technology partners, i.e. with companies from a sector in which the broad distinctions of basic research, applied research and experimental development are largely applicable. Therefore, the distinctions between the three categories of R&D were useful pointers for exploring the different projects' degree of innovation within the arts and culture versus in relation to digital products and services generally. In terms of the different projects funded from the Digital R&D Fund for the Arts in Scotland, the categorisations of types of R&D provided by the Frascati Manual thus offered a practical way of understanding where the funded projects sat in relation to each other as well as what commercial standing they had. To account for the specificities of R&D and innovation in the arts and culture, the three broad categories were supplemented with a qualitative focus on exploration, collaboration and learning, both for individual organisations and for the sector more broadly.

In bringing together arts and cultural organisations and technology partners, the Fund fostered all three types of R&D process. The Results and Impacts of each project are explored in further detail in Section 5.

⁷ CBO op cit p 19

3. The CReATeS research activities

The CReATeS Research Consortium investigated the following research questions:

- ❖ What is the impact, and what are the implications, of digital innovation within arts and cultural organisations?
- ❖ What is, and what can be, the role of interventions made by agencies such as Nesta/Creative Scotland/AHRC with regard to digital innovation?
- ❖ How can that innovation and intervention be appropriately and effectively analysed?

In order to do so, the Consortium's analysis focuses on three levels:

- ❖ the collaboration between individual arts and cultural organisations and their technology partners;
- ❖ the relationship between the collaborations instigated by the Fund and the cultural ecology context in Scotland, the UK and internationally;
- ❖ the methodologies and approaches employed in the analysis of research, development and innovation in arts and cultural organisations.

Each of the ten projects worked with an academic Expert Lead who was responsible for liaison with the project as well as data collection and analysis of data pertaining to that particular project. Expert Leads decided on the methodologies used for working with the respective project and drew in other Consortium members and research assistants as appropriate (see Figure 2).

Research activities included initial meetings with all projects, in-depth interviews with all project leaders at the arts and cultural organisations as well as technology partners, participant observation of project activities and informal meetings as appropriate to the respective project, and analysis of secondary data.

This final report draws particularly on in-depth interviews conducted with all project leaders at the ten arts organisations, technology partners and where appropriate with additional project team members. Interviews were carried out face-to-face, by telephone and Skype across the project in three stages (initial, interim and final) and lasted between 27 and 96 minutes. Interviews were transcribed verbatim and transcripts were analysed by CReATeS.

All research activities were carried out with approval of the University of Stirling Research Ethics Committee and following the University of Stirling's Code of Good Research Practice (<http://www.goodresearchpractice.stir.ac.uk/>).

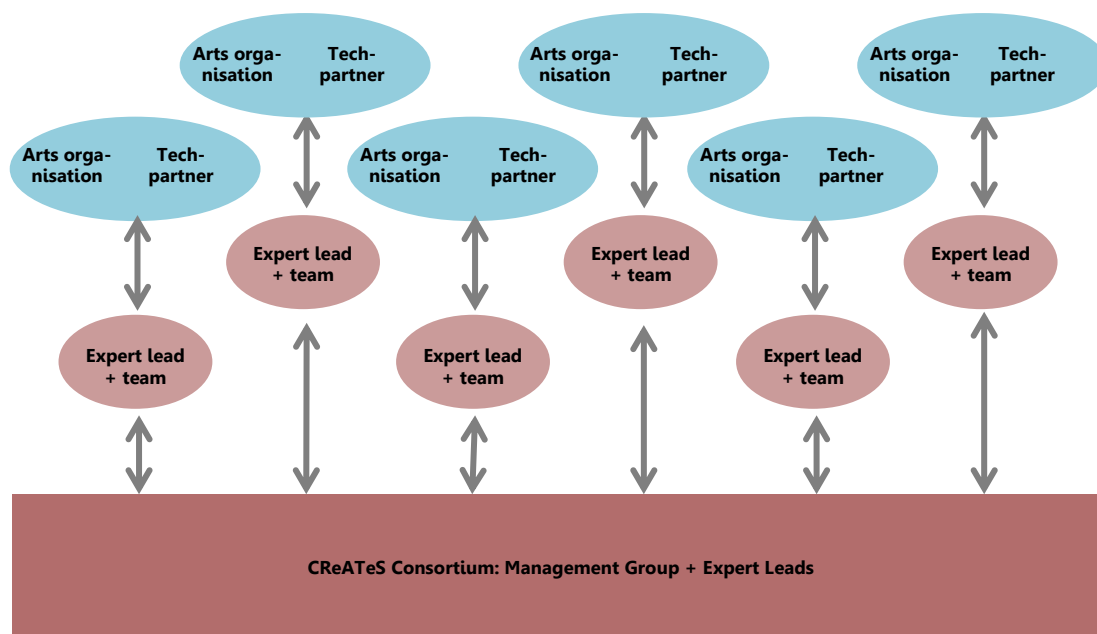


Figure 1: CReATeS Consortium: Expert Leads and projects

The analysis presented in this report is based on empirical data gathered in the interviews, but informed by the researchers' involvement in additional activities (participant observation, workshops, user testing, etc.).

The research activities were undertaken from June 2012 and concluded in March 2014.

CReATeS Data Set and Analysis Methods

The analysis presented in this report is mainly based on four data sets:

1. Twenty-eight semi-structured face-to-face interviews with the arts and cultural organisations and technology partners followed the interim stage of their funding. This comprises of fifteen first call interviews and thirteen second call interim interviews. Interviews lasted 52 minutes on average and the interview schedule focused on gaining insight and understanding of how the project had developed at that point and the projects' interaction and involvement as a result of their participation in the fund. The purpose of these interviews was firstly, for project leads to reflect on the project's current status. Secondly, the interviews explored changes in the project since the funding had been awarded. Questions covered how the project came about and where the project stood in their organisation. The project leads were then asked about the projects' progress and challenges until the interim point. Finally, project leads were asked for their top tips for any organisations bidding for the next round of funding.
2. Seven semi-structured face-to-face initial interviews with project leads from the second call projects (both arts and cultural organisations and the technology partners) were undertaken at the beginning of their engagement in the fund. On average, interviews lasted 47 minutes. Questions covered how the initial idea for the project came about, the process of applying for funding to Nesta, specific roles and responsibilities assigned to each project partner and the key milestones of the project. Secondly, the interview schedule focused on background context about each organisation, specifically where the project fitted within the organisations' wider activities as well as in relation to the sector as a whole. The project partners were then asked about what success would

mean to them and to identify any challenges that they anticipated throughout the project process. The purpose of these interviews was to establish direct contact with the key project partners, gain a fuller understanding of the arts and cultural organisations and technology companies involved and capture their initial thoughts about where the project sits in relation to their respective organisations and wider sectors.

3. Twenty semi-structured face-to-face interviews with arts and cultural organisations and technology partners were undertaken at the end of the Nesta-funded project period (first call interviews were conducted between March and June 2013 as appropriate to the project and second call interviews were conducted in January and February 2014). On average, interviews lasted 62 minutes. The interview focused on gaining an insight and understanding of the project leads' perception of the project over the course of the funding. The interviews were designed for project leads to reflect on the project's processes, achievements and outcomes. The interview schedule contained questions similar to the first interview in order to enable comparisons over time of the fund and enable reflections to occur. The purpose of these interviews was additionally to reflect on the projects' experiences, participation and individual engagement in the fund, to understand how these may have changed over time and to explore how their project could influence their organisation and the cultural industry as a whole.
4. Project observations and notes from internal project meetings, project workshops, project product testing and launches and documentation provided by the projects such as policy documents, sales and user statistics and data on success measures were collected. This was supplemented by data collected at the Nesta workshops across the duration of the Fund, and external documentation such as websites, Twitter and Facebook engagement. Articles regarding the projects and its activities were also included in the analysis.

All interviews were fully transcribed and subjected to qualitative content analysis using NVivo software and a coding scheme devised by the research team. This analysis was guided by the research framework outlined above, but was developed on an inductive basis, allowing for central themes to emerge from the data.

4. Overview of the funded projects

The Digital R&D Fund for the Arts in Scotland funded ten projects across two Funding Calls. The Fund awarded a total of £499,846 and individual project awards ranged from £21,300 to £90,000.

In June 2012, An Iodhlann, Dundee Contemporary Arts (DCA), Edinburgh Cultural Quarter, Glasgow Film, the National Galleries and the National Piping Centre were awarded funding totalling £264,999 (project average of £44,167).

In March 2013, the National Theatre of Scotland, Publishing Scotland, the Scottish Documentary Institute and The Audience Business (now Culture Republic) received a total of £234,847 (project average £58,712).

The Funds sought to support digital innovations that would expand audience reach and engagement or explore new business models (see also Section 2). The ten projects translated these overall aims into a range of individual project aims (see Table 1). Consistent with the Fund's aim to support collaborations between technology partners and several arts organisations, five projects featured more than one – and up to four – arts and cultural organisations. The project descriptions below give full details of all project partners involved.

The projects focused strongly on developing digital products and services. Four projects developed and built apps. Five projects focused on developing web-based platforms for a diverse range of activities, such as an E-Learning Portal, a platform to deliver captioning and audio description directly to smartphones and tablets, a platform to deliver reduced price tickets to arts events and a digital media player. Only one project took a different approach: Dundee Contemporary Arts explored how principles of digital gaming can be used to enhance audience reach and engagement.

In developing and delivering their projects, the arts and culture organisations also responded to six 'thematic areas' identified as the Fund's priorities (see also Section 2):

1. **Digital content distribution** is key to the apps produced by An Iodhlann, National Galleries and Publishing Scotland, the digital players developed by Glasgow Film and Scottish Documentary Institute and the National Piping Centre's and National Theatre of Scotland's digital services.
2. **Interactive engagement via social media** is integral to the apps and platforms developed by The Audience Business, Scottish Documentary Institute, Publishing Scotland, National Galleries, An Iodhlann and National Piping Centre.
3. The projects by An Iodhlann, National Galleries and the National Piping Centre centred on **making the most of archives through digital technology**.
4. **Mobile and location-based services** were at the heart of projects by An Iodhlann, Edinburgh Cultural Quarter, National Galleries, National Theatre of Scotland, Publishing Scotland and The Audience Business.
5. **Fundraising** was an explicit aim of the Scottish Documentary Institute's project. Despite its broader initial focus on methodologies, the DCA project also contributed to this thematic area by developing a digital donations box.
6. The highly collaborative projects undertaken by DCA and An Iodhlann also sought to **connect thinkers with doers**.

Eight projects were based in Scotland's Central Belt. Three projects involved Edinburgh-based arts organisations, one featured a Glasgow-based arts organisation and four projects involved

an Edinburgh/Glasgow cross-city partnership. Six of these projects' technology partners were from Glasgow and two from Edinburgh. Of the remaining two projects, one involved a Dundee-based arts organisation and technology partners from Dundee and Edinburgh. The other project was based in a rural community, with the arts organisation and technology partners both located on the island of Tiree.

Table 1: Overview of Project Aims

	An Iodhlann Dundee Contemporary Arts	Edinburgh Cultural Quarter	Glasgow Film National Galleries of Scotland	National Piping Centre National Theatre of Scotland	Publishing Scotland Scottish Documentary Institute	The Audience Business
Content & Digital Environments						
make existing content available in new ways	✓		✓	✓	✓	✓
connect real and digital worlds	✓			✓	✓	
create a digital product	✓	✓	✓	✓	✓	✓
Audience Reach & Engagement						
engage new audiences	✓	✓	✓	✓	✓	✓
engage existing audiences in a new way	✓	✓	✓	✓	✓	✓
ensure or broaden geographical reach	✓		✓	✓	✓	
improve data capture		✓	✓	✓		✓
increase diversity					✓	
support cultural tourism	✓			✓		✓
Business & Organisation						
unlock new revenue streams	✓	✓	✓	✓	✓	✓
trial a new business model			✓	✓		✓
innovate organisational processes and policies		✓		✓		
Leadership & Advocacy						
provide cultural leadership	✓		✓		✓	✓
provide learning leadership for the sector	✓		✓	✓	✓	✓
promote artistic excellence					✓	✓

[Note on layout and editing: the following copy is meant to be presented as textboxes interspersed with visual material. The idea is to make key information on the projects available at one glance.]

An Iodhlann: Frasan

<http://www.frasan.org.uk>

Arts Organisation: An Iodhlann, <http://www.aniodhlann.org.uk/>
Technology Partners: Alan Dix and Mark Vale, <http://alandix.com/>
Project Contact: john.holliday@nhs.net
Project Start Date: June 2012 Project award: £21,300

The project explored how to increase visitor engagement with An Iodhlann. It created an HTML5 app, 'Frasan'. Frasan enables mobile access to items from An Iodhlann's archives to Tiree's visitor, diaspora and local communities, both while on the island and remotely. The project resulted in an increase in visitors to An Iodhlann and to its website and an enhancement of traditional archival and cataloguing practices at An Iodhlann. The project also inspired the creation of a crowdsourced collection of Tiree photographs and other objects via a Facebook group, Tiree Memories.

Culture Republic: Social Ticketing

[https://apps.facebook.com/socialticketingappThe Queen's Hall/](https://apps.facebook.com/socialticketingappTheQueen'sHall/)

Arts Organisations: The Audience Business, <http://www.theaudiencebusiness.org.uk/> (now renamed Culture Republic, <http://www.culturerepublic.co.uk/>)
The Queen's Hall, <http://www.thequeenshall.net/>
Technology Partner: Whitespace, <http://whitespacers.com/>
Project Contact: info@culturerepublic.co.uk
Project Start Date: March 2013 Project award: £50,425

The project explored the possibility of social ticketing for performance venues across Edinburgh. It created, tested and launched an app which allows users to view events and buy tickets directly through Facebook. The app was developed as a white label app so that venues can rebrand it to meet their own requirements. The app was developed to plug into Clicket, the box office software used by most Edinburgh venues.

Dundee Contemporary Arts: Gaming the Contemporary Arts Complex

Arts Organisation: DCA, <http://www.dca.org.uk/>
Technology Partners: Denki, <http://www.denki.co.uk/>
Lucky Frame, <http://luckyframe.co.uk/>
Project Contact: Clive.Gillman@dca.org.uk
Project Start Date: June 2012 Project award: £24,050

The project explored alternative ways of innovating in order to deepen audience and employee engagement. It used principles of game design, following the belief that products or tools used by staff or audience members should not only be functional, but also fun. The project employed 'technologists in residence' and engaged staff members in workshops. Two sub-projects were identified and developed: an exploration of how to encourage DCA loyalty card holders to register when using the gallery and a rethink of the DCA donations box.

Edinburgh Cultural Quarter: Culture Juice

<http://www.culturejuice.com/what-is-culture-juice>

Arts Organisations: The Edinburgh Cultural Quarter, comprising
The Royal Lyceum, <http://www.lyceum.org.uk/>,
The Usher Hall, <http://www.usherhall.co.uk/>,
The Traverse, <http://www.traverse.co.uk/>
The Filmhouse, <http://www.filmhousecinema.com/>.

Technology Partner: tictoc, <http://www.tictocfamily.com/>

Project Contact: info@lyceum.org.uk

Project Start Date: June 2012 Project award: £62,234

The project used digital marketing to engage new, specifically younger, audiences. It created Culture Juice, a dedicated website with mobile and desktop versions, that offers students and young professionals reduced-price tickets for certain events at the four venues. It also explored the possibility of cross-art-form collaboration between the four venues in order to enable cross-promotion and cross-attendance of their programmes.

Glasgow Film Theatre and Edinburgh Filmhouse: Player

<http://www.filmhousecinema.com/player> and <http://www.glasgowfilm.org/player>

Arts Organisations: Glasgow Film Theatre, <http://www.glasgowfilm.org/theatre>
Edinburgh Filmhouse, <http://www.filmhousecinema.com>

Technology Partner: Distrify, <https://distrify.com>

Project Contact: jaki.mcdougall@glasgowfilm.org

Project Start Date: June 2012 Project award: £90,000

The project explored the use of digital technology to increase and deepen audience engagement. It developed an online digital media player for the GFT and Filmhouse cinemas. The player allows users to download or stream GFT/Filmhouse-curated films from wherever they are, without the need to physically attend the cinema. The player offers the potential for new income streams to the cinemas. Further, the player allows for sharing via social media and other platforms as well as the ability to earn revenue from sharing through its built-in affiliate marketing capability.

National Galleries of Scotland: ArtHunter

<http://www.nationalgalleries.org/visit/arthunter>

Arts Organisation: National Galleries of Scotland, <http://www.nationalgalleries.org/>

Technology Partner: Kotikan, <http://kotikan.com/>

Project Contact: online@nationalgalleries.org

Project Start Date: June 2012 Project award: £42,715

The project explored visitor engagement with artworks in the National Galleries and other participating galleries across Scotland. It developed a mobile app, 'ArtHunter', which features selected artworks in a competitive art 'collecting' game. Ten 'must see' NGS artworks are published in ArtHunter every month. The aim of the game is to visit all ten artworks in the respective galleries and share the visits through social media. User engagement with specific artworks has increased as a result of the project.

National Piping Centre: E-Learning Portal & Livestreaming

<http://elearning.thepipingcentre.co.uk/>

Arts Organisations: National Piping Centre, <http://www.thepipingcentre.co.uk/>

Technology Partner: Yellow Brick House, <http://yellowbrickhouse.co.uk/>

Project Contact: info@thepipingcentre.co.uk

Project Start Date: June 2012 Project award: £24,700

The project explored how digital technology could extend the reach of the NPC's existing teaching and events programming. It developed an E-Learning Portal, with associated livestreaming of piping events. The Portal enables the NPC to expand its existing teaching beyond its physical walls by creating a virtual classroom. As a result of the project, the NPC has enjoyed increased viewing figures for its livestreamed events as well as increased subscriptions for virtual teaching.

National Theatre of Scotland

Arts Organisations: National Theatre of Scotland, www.nationaltheatrescotland.com

'Flip – Disability and Equality in the Arts, www.flip.org.uk

Technology Partner: We Are Everyone, www.weareeveryone.com

Project Contact: Elly.Rothnie@nationaltheatrescotland.com

Project Start Date: March 2013 Project award: £54,862

The project explored digital technology in captioning and audio descriptions. It developed a digital platform that relays content directly to smartphones and tablets during NTS's live theatre performances. The platform offers audiences an alternative to traditional provisions. The project also explored the possibility of making captioning and audio description location independent, which is important for NTS and its changing performance locations. Project partners worked closely with visually impaired and hard of hearing audience members and benefitted greatly from their feedback.

Publishing Scotland: Bookspotting

<https://itunes.apple.com/gb/app/bookspotting/id827757271?mt=8>

Arts Organisation: Publishing Scotland, <http://www.publishingscotland.org/>

Technology Partners: Saraband Books, <http://www.saraband.net/>

Spot Specific, <http://www.spotspecific.com/>

Bibliographic Data Services: <http://www.bibliographicdata.co.uk/>

Project Contact: bookspotting@booksfromscotland.com

Project Start Date: April 2013 Project award: £53,960

The project explored the possibility of increasing and deepening audience engagement with Scottish books through digital technology. It developed an app, 'Bookspotting', to promote and present Scottish books to new and existing audiences. Also, it explored innovative and new ways to guide readers into different genres, authors, locations and books and offer personalised reading recommendations.

Scottish Documentary Institute: The Portable Fundraiser

Arts Organisation: Scottish Documentary Institute, <http://www.scottishdocinstitute.com>

Technology Partner: Distrify, <https://distrify.com>

Project Contact: info@scottishdocinstitute.com

Project Start Date: March 2013 Project award: £75,600

The project developed a digital online fundraising and marketing tool for documentaries. Through a digital media player customers can purchase or rent films online, donate money to charitable causes, share films via social media, gift viewings of a film to others, and host their own community screening of the film. Films are flexibly priced, so users can spend what they like and there are additional options of earning affiliate revenue by sharing films as well as purchasing DVDs.

5. Results and impacts

This section reports on the results and impacts from the ten projects within the Digital R&D Fund for the Arts in Scotland. It is important to distinguish the outcomes that the projects delivered from what these outcomes achieved - for the organisations, but also for the sector more broadly. A project may have delivered an app, for instance, but delivering this app may have also produced new knowledge, new thinking and new relationships. This section reviews what outcomes the projects resulted in and then analyses the broader impacts that the project had on the participating organisation. In doing so it provides a view across all ten projects. Full details of each project are available in the Research Reports (see Section 8 – CReATeS Research Reports for further detail).

Results

Project results are here defined as relatively clearly defined outcomes with a close connection to the project activities themselves. Such results comprise the products and services that the project produced, but also new knowledge about digital technologies and a range of hard and soft benefits such as financial resources and new relationships.

Three types of innovation

Across the Fund the emphasis was on exploration, research and development. Nine of the ten projects aimed to develop a digital product, with most project schedules culminating in the launch of an app, web-based or mobile service. At the time of writing seven of the nine intended digital products and services had successfully been launched. The technical development of an eighth product had been completed and a beta version of the ninth product, which requires some technological fine-tuning, had been launched and trialled with audiences (for details see the research report on each project in Section 9). The tenth project, DCA, had focused on the application of games design thinking rather than on the creation of a defined digital output. However, by the end of the funded period it, too, had produced two prototypes of digital products.

In terms of producing the intended outputs, the projects had thus overwhelmingly achieved their aims and presented the intended results. They delivered digital innovations in three categories:

- **Innovations in audience engagement:** The ArtHunter, Frasan and Bookspotting apps offer new ways of discovering arts and culture. They invite audiences to engage with artwork, heritage sites and books in more playful, serendipitous and fun ways. Download figures for ArtHunter and Frasan were higher than the project leads had expected, making these apps a success in distribution. At the time of writing Bookspotting had just been accepted into the App store, so user feedback was not yet available. A different type of audience engagement was at the centre of the Dundee Contemporary Arts (DCA) project. DCA explored how digital methods (gaming) might be applied in an arts centre. This exploration resulted in prototypes of a donations box and a revamped loyalty card scheme that, once fully developed, will engage audiences in new ways.
- **Innovations in sales and marketing:** Culture Juice and the Culture Republic's Facebook app intended to provide new sales outlets for arts and culture organisations. Both projects were particularly aimed at younger audiences who might respond better to discounted tickets and fresh, social media-linked campaigns. The technical

development for both products has largely finished, but in both cases it is too early to gauge user uptake. The Scottish Documentary Institute's project delivered a slightly different sales and marketing tool: a digital platform for fundraising and marketing documentaries and for purchasing DVDs. The conversion rates for both films from previews to view were significantly higher than the industry average.

- **Innovations in service delivery:** The National Piping Centre (NPC) built an e-learning platform that expands its offer to piping students. A significant number of students now access NPC teaching long-distance, including from overseas, and at a greater variety of times. NPC also won large audiences for their live-streaming of piping events - and with these, increased revenues. The GFT and Filmhouse project also developed new, digital ways of delivering their existing offerings. The first cohorts of users have now accessed arthouse films on demand via the player, in addition to exhibition in the two cinemas. Lastly, the National Theatre of Scotland focused on a specific but crucial service in terms of audience access and participation. Their project delivered a mobile platform for relaying live captioning and audio-descriptions for hard of hearing and visually impaired theatre goers. User feedback was overwhelmingly positive and helped develop the design and functionalities of the platform.

Section 2 (Background) of this report articulated three types of R&D as defined via the Frascati Manual: basic research, applied research, and experimental development. Using this typology, and bearing in mind the qualifications about its application to arts and culture made in Section 2, the projects can be further categorised:

- **Basic Research:** The only project that could be defined as 'basic research' (experimental or theoretical work undertaken with the principal aim of acquiring new knowledge of the basis of phenomena and observable facts, without any particular application or use in view) was the DCA project. DCA did not set out to create any product – predefined or otherwise – but instead to follow a process of experimenting with ideas of gaming within DCA as a work and visitor space. The process actually culminated with the development of prototypes, but these were not the intention of the project.
- **Applied research:** The only project that could clearly be defined as 'applied research' (original investigation undertaken in order to acquire new knowledge but directed primarily towards a specific practical aim or objective) was the NTS project, which had a clearly defined aim (an exploration of using digital technology for captioning and audio description directly to smartphones and tablets). The project developed and user-tested the technologies, and gained user feedback through those processes, but by the end of the process had not yet developed a product ready for service.
- **Experimental development:** All eight of the remaining projects' R&D could be defined as 'experimental development' (systematic work that draws on existing knowledge gained from research and/or practical experience, is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed), in terms of their conceptualisation, development and delivery of a product or service. However, incidentally these projects also had aspects – intentional or otherwise – that placed them within the area of basic or applied research. ArtHunter was a product in its own right, for example, but also in the process of its making enabled the organisations involved to enact change on policy regarding mobile phone use in gallery spaces; equally, Bookspotting's use of an edited and enhanced data feed will inform future decisions about other digital aspects of Publishing Scotland's activities. These observations are explored further in the subsequent sections.

Better understanding of digital technology

Possibly as important as the actual digital products and services was the new understanding of digital technology that the projects resulted in. Through the research and development activities and in particular through the work with the technology partners, arts and cultural organisations generated a wealth of new knowledge and insight. Across the Fund, project leads stated that their organisations are now much better able to understand what digital technology can and cannot do, and most importantly in operational terms, what it can and cannot do for their organisation in particular. The case of Culture Juice and the Edinburgh Cultural Quarter illustrates the importance of distinguishing the two. The project showed that digital technology can, in principle, deliver a one-stop-shop app or mobile website for selling discounted tickets. However, in the specific case of Culture Juice, the technological context - especially the different box office systems of the four arts organisations involved - restricted the general potential of digital technology. Other projects generated important new insights into audience needs (NTS), purchasing behaviours (National Piping Centre and Scottish Documentary Institute) or curating and metadata principles (An Iodhlann and Publishing Scotland).

A case that particularly well illustrates that better understandings can be an important result of R&D is the project led by The Audience Business (TAB). TAB worked together with Whitespace and The Queen's Hall to produce a white label Facebook ticketing app. The idea was that TAB's subscribers could purchase and re-skin the application with their own branding and use it to sell tickets through Facebook. A white label app would allow them to do so for significantly lower cost than if each subscribing organisation were to commission the work independently. At the end of the funded period, the app was delivered and it is now ready for use - an outcome that, as TAB stated, would definitely not have been possible without the Digital R&D Fund for the Arts in Scotland.

However, the real learning has been about social media and ticketing. The process of constructing the app brought to light how much Facebook locks in companies trying to sell through its platform and how any investment in social media apps needs to be carefully scrutinised if organisations want it to pay off. The TAB project thus combined a technologically successfully developed digital product with the realisation that the use of that product might come with severe constraints and challenges. Social media are attractive to arts and culture organisations; over half of the projects in the Fund built it into their digital products and services. The realisation that it is *possible* to build an app for social media ticketing, but that pursuing social media ticketing might actually not be in the interest of arts and culture organisations - or at least might come with substantial health warnings - is a valuable learning for the sector. From usage figures alone, the white label app might be misconstrued as a 'failed' project. Quite to the contrary though, in trialling a social media ticketing app and unearthing the significant issues attached to it, the project made a valuable contribution to digital innovation in the arts and culture sector, and therefore a success in terms of advancing digital understandings.

Hard and soft benefits

New digital products and services and a better understanding of digital technology were the main results from the projects. However, the projects also resulted in a range of diverse and often project-specific hard and soft benefits. The digital services launched by Scottish Documentary Institute, National Piping Centre and Glasgow Film, for instance, resulted in revenue from subscription sales, film sales and donations. All three services promise to generate more such revenue in the future. Through their projects the Scottish Documentary Institute and National Piping Centre also built up a valuable database of contacts, a "fanbase" as one of the project leads put it, which they can draw upon for future activities.

Other benefits of the Digital R&D Fund projects were less visible and countable, but according to project leads often equally important. Several project leads mentioned that the Fund offered them an often unprecedented chance to trial and experiment without pressure to succeed. Project leads felt they were given considerably more freedom than that which they were normally used to. That freedom was perceived as not just personally enjoyable but also as leading to new perspectives, approaches and outcomes that were otherwise out of reach. In addition, the Digital R&D Fund projects led to new conversations, relationships and collaborations within the arts and cultural organisations, which were perceived as beneficial. Last but not least an often mentioned benefit was the opportunity to network with new people and, as the Digital R&D Fund involved a broad range of arts, culture and creative organisations, often with creative professionals outwith the project leads' usual circles.

Measuring project results

By their very nature digital technologies offer various opportunities for capturing data about their use. Downloads, sales, traffic to and from a website, and user behaviour within a website or app can often be tracked and analysed with relative ease, although such functionality can increase cost (either in time terms for its development, or for purchase from 3rd-party platforms). However, at the time of writing there is only limited availability of such metrics for the Digital R&D Fund for the Arts in Scotland projects. Firstly, many of the digital products and services produced have not been on the market for long enough to yield meaningful statistics. Project leads typically estimated that it would take around one year of the product or service being available to users before they would have meaningful data available. Secondly, the projects had a strong R&D focus, and the collection of quantitative data can often not appropriately capture the results of such processes and was therefore not included in the programme of work.

As detailed in the individual research reports in Section 9, where user statistics are available they point towards a close link between marketing activities and user uptake of the respective digital product or service. The Scottish Documentary Institute, for instance, were able to generate significant publicity of their digital player through the marketing of the film *I am breathing*. Similarly, the success of their live-streaming of piping events helped the National Piping Centre to generate a large number of contacts which they could then market their e-learning offers to. On the contrary, Glasgow Film and Edinburgh Filmhouse, who held back on marketing until they better understood whether the digital player would or would not cannibalise cinema sales, felt that more prominent marketing would have resulted in more sales through the player.

Two other projects for which user statistics are available, provide valuable insight on how such quantitative data can only provide a limited insight into a projects' results. Download figures and user feedback for the ArtHunter and Frasan apps show that these apps are well received. However, a much better understanding of the changes in audience engagement can be achieved through contextualising such metrics with qualitative data. Research on the ArtHunter project, for instance, illustrated that user data on its own cannot provide information on the quality or nature of changed audience engagement. But when asked about their experience with the app, visitors commented that it gave them the permission 'to whizz past whole collections without feeling guilty about it' and allowed them to 'take charge of the space' rather than to feel 'a wee bit patronized by museums' organized experiences'. Such data is vital for understanding the impact of the app on visitor engagement and provides information that cannot be gleaned from statistics.

An Iodhlann's aim was 'to increase people's feeling of ownership and belonging and rootedness in a community', as their project lead explained. They wanted users to enjoy their Frasan app while out and about on the island, but they also wanted to affect the engagement with Tìre that

'will happen in people's living rooms and at home, and on the train coming here, on the train going home.' The 1889 Frasan downloads achieved by February 2014 substantially exceeded An Iodhlann's expectations. However, these figures cannot meaningfully capture the strength of user engagement created through the app. A much better indicator in this regard is the Facebook site 'Tiree Memories'. Influenced by Frasan, one app user set up 'Tiree Memories' as an online crowdsourcing site for Tiree images. It is intended to complement An Iodhlann's project, but is run independently of it. More than 200 pictures were posted to the page in the first five days alone and 'Tiree Memories' currently has 790 members – nearly 150 more than the island's declining population as measured in the 2011 census.

Impacts

Impacts are changes or new behaviours that occur related to a project but that concern an organisation's activities more broadly. Across projects the engagement with digital technologies prompted a rethink of how arts organisations generally produce products and deliver services, i.e. both digitally and non-digitally, and the processes and policies they employed in doing so. Such impacts could be quite prominent and radical, as for instance in the case of the National Galleries. Prior to the ArtHunter project, the National Galleries did not permit the use of mobile phones in their exhibitions. ArtHunter, however, was premised on visitors being able to use their mobile phones vis-a-vis the exhibits. For ArtHunter to succeed, the project partners had to pay particular attention to communication and culture change within the National Galleries and to the relationships with their curating partners such as individual lenders and other galleries. Their efforts paid off and the ArtHunter resulted not only in an app that is functioning, engaging and popular with visitors, but also effected an overhaul of the National Galleries' mobile phone policies, changed interactions between gallery staff and visitors in exhibitions and led to a generally more open attitude towards what digital technologies can offer art galleries.

While the ArtHunter project had the possibly most obvious impact on its hosting arts organisation, other projects too prompted important broader reflections and actions. As a result of the Bookspotting project, for instance, Publishing Scotland is reflecting on the principles underlying BooksFromScotland.com, the online service which also uses the data source underpinning the Bookspotting app. Translating the BooksFromScotland datafeed into a usable data source for the Bookspotting app raised questions not only about the curating principles for the app, but for the website as well. What was intended as a digital innovation project therefore initiated a review of the ways in which the organisation might change one of its central activities for the benefit of its member publishers and book consumers.

The impacts of ArtHunter and Bookspotting described above reached beyond the respective project but were contained within the respective arts organisation. The Culture Juice project provides an additional example of impacts even further removed from the core of the innovation activity. Although the name Edinburgh Cultural Quarter had been used to describe Lyceum, Usher Hall, Traverse and Filmhouse, it had not yet been developed into a brand - especially not into one with characteristics that could be translated into the Culture Juice app. An immediate consequence for the project was that developing the Culture Juice brand required more time than initially anticipated. The consequence for the four arts organisations more widely, however, was a renewed interest in formalising the Edinburgh Cultural Quarter concept and thereby creating a better defined infrastructure for future collaborative projects between these partners.

This section reviewed the results and impacts of the projects funded under the Digital R&D Fund for the Arts in Scotland. The underlying analysis is also the basis for more specific practical learnings which will be presented in the section 6.

6. Learning insights for other arts and cultural organisations

The Digital R&D Fund for the Arts in Scotland supported ten specific digital R&D projects. However, the overall aim of the Fund was to make general learning from these projects available to other arts and cultural organisations. This section presents general lessons from the Fund's project and offers practical tips for those looking to set up their own digital R&D projects. Section 8 has links to specific resources on agile methodology, alternative business models and new revenue streams, app building, audience engagement, changing organisational culture, collaborative digital projects, digital strategy, gamification, geolocation and innovation in arts and culture.

Project scope and expectations

Digital R&D projects can vary greatly with respect to their scope, nature and intended outcomes. Innovation can take many forms, from blue skies thinking to a novel commercialisation of existing ideas (see Section 2). Analysis across the ten projects shows that it is important to be clear what type of R&D activity is and is not to be included in a project. If a project is meant to focus on basic research and experimentation, it cannot also be expected to deliver a refined product. Conversely, if a certain product or service is required, it would be counterproductive to start with methodologies developed for blue skies thinking. Key lessons from the Digital R&D Fund for the Arts in Scotland projects therefore include that:

- Basic research requires protected spaces. Project partners need to be assured that they are not expected to produce immediately useful, let alone marketable, outcomes.
- Agile methodology, a project approach popular in technology development, can help arts and cultural organisations produce and trial digital innovations even in comparatively short timespans.

Choosing digital experts

A key lesson from the Digital R&D Fund for the Arts in Scotland is that good relationships between arts organisations and digital experts are paramount to project success. Most project leads and technology partners thought existing relationships to be more effective than new ones, but in principle both can lead to positive results.

- With pre-existing relationships between arts organisations and digital experts, projects can benefit from mutual understanding of each other's' motivations, work modes and capacities. Pre-existing relationships can make it easier to build trust, which has been shown to facilitate innovation. However, familiarity can also lead down well-trodden paths and inhibit experimentation.
- New relationships can be more efficient at disrupting existing thinking and breaking new ground. The Digital R&D Fund projects that were successful with new arts organisation/technology partner relationships attributed their success to both partners having an open-minded attitude and a clear shared vision for the project right from the start.

Balancing innovation and project management

The focus of a digital R&D project needs to be exactly that - digital R&D. But immersion in new thinking, the disruption of old beliefs and the exploration of new opportunities can create a temptation to focus on these exciting new avenues and to lose sight of project management. When project leads were asked what they would do differently in hindsight, mundane managerial tasks topped the list:

- Plan time realistically and specifically. Be honest about how long tasks are going to take.
- Start early - don't lose time at the beginning, there will inevitably be detours and delays on the way.
- Be clear about roles and responsibilities, between arts organisations and digital experts as well as within arts organisations.
- Document aims, decisions and values or principles that are integral to your project. That way you don't end up going over previous ground or reinventing the wheel if opinions or team members change.

Legacy Creation

Whether they are to deliver a defined product or to scope possibilities and explore potential new avenues, all digital R&D projects have outcomes. But what happens to these outcomes at the end of the project funding? Ensuring the legacy of whatever has been achieved during the project was a task that, by the project leads' own admissions, was not necessarily a key concern for the ten Digital R&D Funded projects. To some extent, the ideas of legacy planning and innovation contradict each other: how to plan if you don't know what you are planning for? However, depending on the nature and aim of a Digital R&D project, the following lessons may be helpful even if the project outcome is not completely predictable:

- During, rather than at the end of the project, consider how much funding will be needed to secure the benefits of whatever outcome you are working towards. Where might that funding realistically come from?
- Think through how much technical support will be needed after the end of the project. Where is this support going to come from? Will you need to buy in or can you build in-house capacities as part of the project?
- Digital products and services typically depend on the availability of up-to-date content. How will that content be provided and managed? How will content provision be resourced?
- If the legacy of your project is dependent on other departments' soft resources such as staff time (e.g. for providing content), consider involving these departments during the project, not only after its completion.

[Note on layout and editing: the following copy is meant to be presented as textboxes interspersed with the main text for this section (above). The idea is to make practical tips visible in a different, more accessible way.]

Make data your friend

Underlying many digital projects are large datasets. Manipulated and exploited successfully, they can provide extraordinary access to content, by discovering hidden or forgotten

information, and finding new and exciting routes. As the Bookspotting project demonstrated, though, large datasets can be very hard to deal with and often have to be assessed sight unseen. Do you have an iceberg or an iceflow? Think through carefully how metadata will enable you to achieve your goals. Undertake quick iterations to test your data and metadata, before building large and flawed systems which require substantial remedial action.

Create real collaborations

Digital innovation in the arts typically means buying in digital expertise. To achieve real innovation, don't be satisfied with a pure client/supplier relationship. Get your staff and the digital experts to think and experiment together. Choosing a 'technologist in residence'-approach can facilitate genuine collaboration and mutual inspiration. Close collaborations build trust and keep processes and thinking open for as long as possible, which benefits innovation. In the DCA project close collaboration created such good relationships that the brief for the digital experts could be swapped around half-way through the project - with great results and without causing frictions.

Work closely with users

For a project to be a true success, it has to work for the end users. Don't be satisfied with creating a product and then consulting with end users afterwards. Involve users in the process throughout and integrate their feedback into the development of the project. The National Theatre of Scotland learned valuable lessons about their audience's needs from focus groups with visually impaired and hard-of-hearing audience members. Although time consuming and often cumbersome to organise these focus groups provided indispensable input.

Be pathfinders, and think big

Think of the difference digital can make to your community, and don't be inhibited or stereotyped by location and connectivity. The team behind Frasan set out to become a 'pathfinder digital community'. Remote and rural locations, and technological challenges such as a limited 3G signal, can force you to be ingenious, pull in expertise from across your community, and achieve substantial buy-in. Be ambitious, bold, and have a strong sense of vision of how digital technologies can amplify who you are, where you are, and what you want to say about and do with your community or organisation.

Secure buy-in across your organisation

For ArtHunter to work, the project team had to get the National Galleries to change their mobile phone policy. The team had to convince senior management, curators, lenders, gallery attendants and other stakeholders, who all had different concerns about the app development. To get buy-in across the organisation, the project lead continuously communicated with everybody involved and built up 'pockets of enthusiasm' for ArtHunter across departments. From those pockets word about the benefits of ArtHunter spread out until eventually there was broad support. Lesson: don't retreat into a digital innovation ivory tower – communicate and explain again and again and again.

7. Conclusions

The Digital R&D Fund for the Arts in Scotland aimed to facilitate digital innovation that would expand audience reach and engagement or explore new business models. In particular, the Fund was looking for project applications in the thematic areas of digital content distribution; social media; making the most of archives through digital technology; mobile and location-based services; fundraising; and connecting thinkers with doers. In June 2012 and March 2013 the Fund awarded a total of £499,846 to ten Digital R&D projects.

The ten projects produced digital products and services, delivered as four apps, five web-based platforms and two digital prototypes. The projects focused on innovations in audience engagement, sales and marketing, and service delivery. In doing so, they collectively addressed the two overall aims of the Fund as well as the six thematic areas. The Fund therefore succeeded in supporting digital innovation in its priority areas.

Of the ten projects, only one project engaged in so-called basic research, i.e. experimental work that seeks to produce new knowledge without having any particular application or use in mind. This project resulted in the construction of two digital prototypes aimed at engaging audiences in new ways and capturing data and increasing donations at the same time. A second project delivered applied research, i.e. an exploration in pursuit of new knowledge, but with a specific aim in mind - a mobile website for relaying location-independent live captioning and audio-descriptions in theatre. The remaining eight projects comprised experimental development, i.e. they used existing knowledge to produce new products and services.

However, this typology of R&D focuses on the novelty of the technology itself. With respect to the Fund an important consideration is the level of digital technology and digital technology skills in the sector prior to the Fund's intervention. Arts and cultural organisations do not necessarily have the resources to engage in cutting edge digital R&D on a daily basis. Much more common is the adaptation of digital products and services developed elsewhere to the context of the art and cultural sector, for instance the use of social media for marketing. Some of the digital technologies at the heart of the products and services developed through the Fund may not be ground-breaking innovations as far as digital technologies generally are concerned. However, in the context of arts and cultural organisations, and modified to meet the needs of this sector, such innovations have considerable novelty value and disruptive potential.

The Digital R&D Fund for the Arts in Scotland also aimed to provide learning about digital R&D projects for the sector more widely. A wealth of such learning materialised, ranging from new insights into specific questions such as the potential of Facebook ticketing apps to more general considerations of useful project management approaches. Projects gained better understanding not only about the potential benefits and pitfalls of digital technology but also about audience needs, purchasing behaviours, data capture and management and curating principles. These learnings were made explicit through the interviews undertaken by the CReATeS research consortium. With this report they have been made available to other interested arts and cultural organisations, both in the form of general reflections and practical tips. In addition, the main report as well as the individual research reports offer links to further resources on a range of topics related to digital R&D.

Lastly, the Fund sought to facilitate new collaborations between arts organisations and technology partners. In total, the funded projects involved 15 arts organisations and 11 technology partners in the cities of Edinburgh, Dundee and Glasgow and on the island of Tiree. Through the Fund's workshops, projects partners were given regular platforms for knowledge exchange and networking, and both opportunities were explicitly welcomed by the participants.

As projects cut across arts forms and cultural activities, cross-project interactions often facilitated conversations and contacts beyond participants' usual professional communities.

Overall, the Digital R&D Fund for the Arts in Scotland has achieved the aims and impacts it had set itself. For the future, it will be important to spread the appetite and capacities for digital R&D across the arts and culture sector and to ensure that digital skills and knowledge of digital technology remain up to date in individual organisations as well as at sector level. By connecting arts and cultural practitioners from a wide range of organisations with some of Scotland's leading experts in digital technology the Digital R&D Fund for the Arts in Scotland has built a solid foundation for achieving these future aims.

8. Links to useful resources

Although the ten projects funded by the Digital R&D Fund for the Arts in Scotland tried to achieve different goals, several themes have emerged as important across the projects. To support other arts organisations undertaking digital R&D, the CReATeS team has sourced useful resources categorised for each theme.

Agile Methodology

Widely used by technology companies, including on the Digital R&D Fund's ArtHunter project in Scotland and Happenstance project in England, agile methodologies provide an alternative approach to project management. They are particularly suited to R&D and innovation projects.

- General information on agile methodology: <http://www.agilemanifesto.org/>
- An introduction to agile methodologies by Serena: <http://www.serena.com/docs/repository/solutions/intro-to-agile-devel.pdf>
- A video introduction to agile by CA Technologies: <http://www.youtube.com/watch?v=OJfIDE6OaSc>
- An independent blog on agile methodologies by a Collabnet employee: <http://agilemethodology.org/>
- Ten key principles of agile methodologies: <http://www.allaboutagile.com/what-is-agile-10-key-principles/>
- Article on the application of agile methodologies: <http://www.codeproject.com/Articles/604417/Agile-software-development-methodologies-and-how-t>
- The Agile Alliance supports project management through agile methodologies: <http://www.agilealliance.org/the-alliance/>
- A government perspective on agile methodologies: <https://www.gov.uk/service-manual/agile>

Alternative Business Models and New Revenue Streams

Digital innovation in the arts and culture can necessitate a rethink of business models. These links provide useful initial information.

Introducing digital into arts organisations business models:

- Arts Council Podcast on New Business Models Forum: <http://soundcloud.com/artscouncilengland/arts-council-england-digital-2>
- A report on changing business models in the creative industries: <http://www.ipo.gov.uk/ipresearch-creativeind-full-201110.pdf>
- Tips on arts and cultures business models for the digital environment: <http://www.youtube.com/watch?v=vNUVpvAeltY> and <http://www.youtube.com/watch?v=tiLVLCjGOrg>
- Good idea or not? : <http://matthewinley.wordpress.com/2012/03/21/digicapartsblog/>

Information on augmented reality as a new business model for Cultural organisations:

- How Augmented Reality enriches Culture: <http://www.digitalmeetsculture.net/article/augmented-reality-enriching-culture/>
- Augmented Reality in Museums: <http://www.museum-id.com/idea-detail.asp?id=336>
Example of Augmented Reality in practice - Brighton's 3D Sculptures: <http://www.theguardian.com/culture-professionals-network/culture-professionals-blog/2012/jan/13/augmented-reality-public-art-engagement>

App Building

Useful reads on the pros and cons of apps:

- *Apps for the Arts* Strategy <http://www.pmstudio.co.uk/pmstudio/project/apps4arts>
- With links to good practice in apps and art: <http://www.digitalspy.co.uk/media/news/a392540/apps-for-the-arts-aims-to-take-festivals-into-digital-world.html>
- Why performing arts organisations are not app-proprate: <http://mcmvanbree.com/dutchperspective/why-performing-arts-organizations-are-not-app-proprate>
- Why the arts should be wary of apps: <http://www.artsprofessional.co.uk/magazine/feature/why-arts-should-be-wary-apps>

Examples of apps in the arts:

- Tate Magic 8 Ball app: <http://www.tate.org.uk/context-comment/apps/magic-tate-ball>.
- The National Museum of Scotland's app portfolio http://www.nms.ac.uk/our_museums/national_museum/museum_apps.aspx including 'Capture the Museum': <http://www.capturethemuseum.com/>.
- The British History Museum's Pompeii App: http://www.britishmuseum.org/whats_on/past_exhibitions/2013/pompeii_and_herculaneum/app.aspx,
- Street Art London: <https://itunes.apple.com/gb/app/street-art-london/id471746725?mt=8>

Audience Engagement

Digital technology and social media can facilitate a step change from broadcasting to genuine audience engagement. Stimulating reads and examples include:

- The potential of digital technology for engaging audiences: <http://www.d2digital.co.uk/pdf/arts-and-culture-event-slides/Emma-Parsons-Engaging-audiences-using-digital-technology.pdf>
- Digital Engagement with Arts and Culture: <http://www.aandbscotland.org.uk/documents/2012-05-28-13-11-39-10-Digital-audiences-for-arts-and-culture-november2010.pdf> Loic Tallon's article on *Impact of handheld media in marketing and visitor engagement*: <http://culturehive.co.uk/wp-content/uploads/2013/03/The-impact-of-handheld-media-in-marketing-and-visitor-engagement..Loic-Tallon..2010.pdf>
- The limits of boosting audience engagement through mobile technologies http://www.spiked-online.com/newsite/article/technology_in_museums_less_is_more/14433
- Ambition podcast on using mobile technology and gaming to reach new audiences: <http://www.getambition.com/2012/08/arts-digital-rd-podcast-2/>

Good practice examples include:

- Campaign for Grayson Perry Exhibition at the British Museum : <http://mhminsight.com/files/graysonperry-case-study-final-PR5G-21-2206.pdf>
- MoMa's audio guides aimed at generating a post visit experience for its visitors: <http://press.moma.org/2013/10/moma-audio-plus/>
- CultureCloud Project from the Nesta R&D Fund: <http://www.artsdigitalrnd.org.uk/content/culturecloud-%E2%80%93-pioneering-new-ways-curating-exhibitions-and-engaging-artists-and-audiences>

Changing Organisational Culture

Digital innovation in the arts and culture requires culture change in organisations.

Tips for changing organisational culture when introducing digital: <http://www.londonmuseumsgroup.org/2013/08/15/digital-participation-engagement-and-crowdsourcing-in-museums/>

Stimulating reads about why that change is necessary and how it can be supported have been published by:

- The V&A: <http://www.vam.ac.uk/b/blog/digital-media/museum-visitors-using-mobile>
- The Tate: <http://www.tate.org.uk/research/publications/tate-papers/tate-digital-strategy-2013-15-digital-dimension-everything>
- Museum of Modern Art (MoMA): http://www.huffingtonpost.com/lilia-ziamou/creating-engaging-museum-_b_2808331.html# ; <http://www.intk.com/research/allegra-burnette>
- British Museum: <https://econsultancy.com/blog/62581-are-apps-the-future-of-the-british-museum> and <http://www.history.ac.uk/reviews/review/1479>

Project examples of organisational change from the Digital R&D Fund for the Arts in England:

- Happenstance Project: <http://www.artsdigitalrnd.org.uk/content/happenstance-%E2%80%93-transforming-arts-organisations-embedding-technologists>
- Scratch Project: <http://www.artsdigitalrnd.org.uk/content/scratchr-%E2%80%93-artists-and-audiences-create-new-work-online-innovative-development-process>

Collaborative digital projects in the arts and culture

Digital projects bring together a range of partners with potentially quite different perspectives, methodologies and cultures. The links below introduce useful considerations for making such collaborations a success.

- Working with technology partners: <http://www.theguardian.com/culture-professionals-network/culture-professionals-blog/2013/sep/23/digital-innovation-arts-creative-practice>
- Using digital collaboration to help arts organisations grow: <http://www.bbc.co.uk/academy/news/article/art20130711164644939>
- Impact of partnerships and technology on arts organisations: http://www.aandbscotland.org.uk/documents/2012-05-28-13-08-39-41-artsandbusiness_Evolution-of-Partnerships.pdf
- Using digital and the influence it can have on partners to arts organisations: http://www.aandbscotland.org.uk/uploads/research/New_Territory_for_Art_-_iphone_to_Brooklyn_Museum.pdf

An example of what digital collaborations can achieve is Visual Arts Glasgow, a mobile site that connects arts organisation's social presences in one place: <http://www.culturesparks.co.uk/digital/visual-arts-glasgow-new-mobile-responsive-website-culture-sparks>

Digital Strategy

There is a broad range of information on developing digital strategies. The following links offer good starting points:

- Arts Council England: <http://digitalcapacity.artscouncil.org.uk/>
- Ambition: <http://www.getambition.com/>
- Jasper Visser & Jim Richardson: <http://digitallengagementframework.com/>

- Sync:<http://new.a-n.co.uk/news/single/sync-in-print-digital-innovation-and-the-arts/mail%20to:%20hello@welcometosync.com>

The following publications can support deliberations of whether or not to introduce a digital strategy in the first place:

- Thomson, Purcell and Rainine (2013) *Arts Organisations and Digital Technologies*: http://www.pewinternet.org/files/old-media/Files/Reports/2013/PIP_ArtsandTechnology_PDF.pdf
- A video of Pitlochry Theatre's digital strategy: http://www.youtube.com/watch?v=sd44IVe0w&feature=player_embedded
- TAGcloud: <http://www.digitalmeetsculture.net/article/tagcloud-project/>
- Embedding digital strategy into museums: <http://www.artsprofessional.co.uk/magazine/260/feature/strategies-digital-culture>, followed by the report of the study: http://www.wcmt.org.uk/reports/1065_1.pdf
- Case studies of digital technology from Arts and Business Scotland: http://www.aandbscotland.org.uk/uploads/research/Innovations_for_the_future.pdf

Gamification

Gamification involves using games and their philosophies to enable problem solving. The following links offer useful information regarding the use of gamification in a cultural organisation:

- What is gamification?: <http://www.idea.org/blog/2011/10/20/what-is-gamification/>
- What can gamification add to cultural heritage?: http://www.digitalmeetsculture.net/wp-content/uploads/2013/07/Sara_de_Freitas_What-can-Gamification-add-to-cultural-heritage.pdf
- Crowdsourcing cultural heritage metadata through social media gaming: <http://195.178.227.4/handle/2043/16114>
- Jane McGonigal's TED talks: http://www.ted.com/speakers/jane_mcgonigal
- From game design elements to gamefulness: defining "gamification": <http://dl.acm.org/citation.cfm?id=2181040>
- Nameless Gameless (blog entry about the difficulties in designing games for museums): <http://fauxtoegrafik.wordpress.com/2013/08/10/nameless-gameless/#>

Geolocating

Geolocation is the use of location-services by radar or mobile service, where the user can identify their location and surroundings using geolocating based services. Below are some introductory sources to geolocation and how it can be used in your organisation:

- A guide from Social Media Examiner on *How to Use Geolocation in Your Marketing Initiatives*: <http://www.socialmediaexaminer.com/how-to-use-geolocation-in-your-marketing-initiatives/>
- Susan Deuschte's article for Columbus Business First on the use of geolocation technology to connect with customers: <http://www.bizjournals.com/columbus/print-edition/2012/12/21/location-liberation.html?page=all>
- Mashable.com offer a concise introduction to geolocating service: <http://mashable.com/category/geolocation/>

Mashable.com offer a number of articles involving geolocation services:

- 3 top geolocation apps: <http://mashable.com/2013/05/08/top-geolocation-apps-you-need/>
- How Geolocation Will Revolutionize the On-Site Service Industry: <http://mashable.com/2011/04/07/geolocation-field-service/>

- Flowd, an app that allows bands (or organizations) to sign up in order to keep their fans up to date with their activities: <http://mashable.com/2010/12/24/flowd/>

How the arts are using geolocation:

- NYC arts: <http://www.thirteen.org/mobile/arts/>

Innovation in the Arts and Culture

Innovation in the arts is not only hard to measure but one that is not readily invested in by the government⁸. The following articles and case studies demonstrate how innovation is taking place within the arts and culture and are good starting sources for exploring how to be innovative:

Academic Articles and research reports that provide an insight into the utilization of innovation in the Creative Industries:

- Bakhshi. H. and Throsby. D. (2009), *Innovation in arts and cultural organisations*; Interim Report; Nesta: http://www.nesta.org.uk/sites/default/files/innovation_in_arts_and_cultural_organisations.pdf
- Bakhshi. H. and Throsby. D. (2010), *Culture of Innovation: An economic analysis of innovation in arts and cultural organisations*; Nesta: http://www.nesta.org.uk/sites/default/files/culture_of_innovation.pdf
- Cunningham, Stuart D., Cutler, Terry A., Hearn, Gregory N., Ryan, Mark David, & Keane, Michael A. (2004) An innovation agenda for the creative industries : where is the R&D? *Media International Australia Incorporating Culture and Policy: quarterly journal of media research and resources*, 112, pp. 174-185.
- Colapinto. C. and Porlezza. C. (2012) *Innovation in the Creative Industries: from the Quadruple Helix Model to the System's theory*; *Journal of Knowledge Economy*; Vol. 3 Issue 4, PP 343-353
- Miles. I. and Green. L. (2008) *Hidden innovation in the Creative Industries*; Nesta: http://www.nesta.org.uk/sites/default/files/hidden_innovation_creative_industries_report.pdf
- Oakley. K. (2009) *The disappearing arts: creativity and innovation after the Creative Industries*; *International Journal of Cultural Policy*; Vol 15, Issue 4
- Stoneman. P. (2009) *Soft Innovation: Towards a more complete picture of innovative change*; Nesta: http://www.nesta.org.uk/sites/default/files/soft_innovation_report.pdf

Specific Examples of Innovation in the ARTS:

- Royal Shakespeare Company - a creative report for organisational change by Hewison, Holden and Jones: http://www.nesta.org.uk/sites/default/files/royal_shakespeare.pdf

⁸ Guardian article: <http://www.theguardian.com/culture-professionals-network/culture-professionals-blog/2012/apr/03/innovation-arts-culture-nesta-fund>

9. Appendices:

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