

A report by the Design Commission

DESIGNING THE DIGITAL ECONOMY

EMBEDDING GROWTH THROUGH DESIGN,
INNOVATION AND TECHNOLOGY

‘When we are told about technology from on high we are made to think about novelty and the future... By thinking about a history of technology-in-use, a radically different picture of technology, and indeed of invention and innovation, becomes possible.’¹

- David Edgerton, *Shock of the Old* (2008)

‘Design is the difference between having a digital project in a lab or out in the real world.’²

- Lord Inglewood

¹ Edgerton, David, *The Shock of the Old: Technology and Global History Since 1900*, London: Profile (2008), pp ix-xi. Author's emphasis.
² Source: Inquiry evidence session.

WE BELIEVE

Designers are critical agents who are able to mediate between people, places and technology.

They have the ability to ask bigger questions that put people at the centre of the Digital Economy, and not the technology itself.

WE ARGUE

That designers now need to wrestle back the innovation agenda and work with technologists in order to create new forms of social and economic value in the ever-growing Digital Economy.

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Foreword

Design and 'Digital' are each:

- Enablers of interdisciplinary research and education
- A means of mediating complex information and processes
- Instruments of exploring, testing, and creating new kinds of social and economic value
- Centred on user experience

In this report, we propose that design be repositioned in order to enable the creation of new kinds of social and economic value in the ever more diverse digital economy. We believe that any consideration of the future applications of digital technology must be inseparable from user experience, and that this is only possible through the strategic application of design.

For many, design has traditionally been about consumer products and their uses, or a matter of mere styling. Although this has never been the sum total of design's remit, we argue that the digital economy now opens up new possibilities for design to play as yet unimagined roles in helping us to understand and navigate a newly connected world. Binary code—of which complex algorithms and computer programmes are made—has of course been around for a number of decades. However, the varied use of this invention is evolving all the time, and that is what makes it truly relevant to our lives. Whilst 'the digital revolution' denotes a new wave of intelligent, connected devices, the digital economy instead encompasses a critical re-assessment of our living and working spaces at the scale of city and the home. Intelligent environments, where data can flow to and from users via the 'Internet of Things' will, if designed properly, create user experiences of day-to-day life that are more efficient, sustainable and enjoyable. Design's commitment to user experience means that, if used strategically, we as people will be at the centre of the digital revolution, rather than the technologies used to achieve it. We must now ensure that the key actor in digital strategy—namely the Technology Strategy Board—understands this crucial difference that design can make.

In the process of Co-Chairing this Inquiry, we have looked discursively at the status of user-centred digital design, rather than mapping out its current territory. Digital technology is becoming increasingly enmeshed across our lives, and as such a critical assessment of the emerging trends of how and where it might be used is beyond our remit. Rather, we have reported on intriguing areas of overlap between digital and design, and outlined a series of levers to increase this convergence further still. We hope to give the reader a sense of quite how profound the proper application of design to digital technology is.

Our report begins with a serious consideration of how to encourage digital growth outside of London, which at present dominates government assessments of the creative industries and hence may undermine the innovative work occurring in the rest of the country. We have also found, that just as technologists would do well to align their practice with that of designers, the design sector should move out of its comfort zone and seek to engage with the possibilities allowed by the digital economy. We are at an important moment when design can reposition itself as a critical tool to both drive and critique the development of the applications of technology.

Commitment to interdisciplinarity in education and research—which we believe is a good thing—should also seek to embed digital and design as a core part of its mission to create economic and social value that transforms the lives of people and communities. Deep in central government, the gov.uk website’s digital transformation agenda has led us to suggest that ‘design’ (user) and ‘digital’ (open access) values may be inexorably linked in the future.

Because our focus—how design can be better exploited in the digital revolution—has been largely exploratory, our recommendations seek to outline opportunities for further research and work in the near future. However, we have tried to make this report speak to as many separate audiences as possible, as it is our firm opinion that a critical reassessment of the potential for design in the digital economy is very important and relevant to all.



A blue ink signature of Lord Inglewood, written in a cursive style.

Lord Inglewood
Inquiry Co-Chair



A blue ink signature of Professor Gillian Youngs, written in a cursive style.

Professor Gillian Youngs
Inquiry Co-Chair

May 2014

Executive Summary and Recommendations

Much of the recent significant growth in UK creative industries has been attributed to the part played by digital technology.

However, we argue that the power of design has not yet been fully exploited in the 'digital revolution'.

1. The Growth of Digital Design Clusters

Whilst a substantial level of growth in London can be ascribed to the technology sector, there is still growth in other similar, smaller scale clusters elsewhere. We argue for bottom-up policies to nurture innovative digital work throughout the UK, specifically through their strategic use of design. Support via the cluster model at a local level will drive economic growth and job creation outside of as well as in London. The Digital Design Cluster model is supported by our findings in the respective areas of the roles of central government, education and research. It is made up of a number of partners, including but not limited to Higher Education Institutions, Local Authorities, Technology and Design Businesses, Local Enterprise Partnerships (LEPs) and facilities for both physical and digital making.

Recommendation 1

Lessons must be learnt from success stories and a design-led Digital Cluster Toolkit should be devised.

Recommendation 2

The design sector should work in partnership with technologists and together with regional development mechanisms such as LEPs to assess their capabilities to develop Digital Design Clusters.

Recommendation 3

Digital Design Clusters should work together to develop networks of design-led digital activity. The Northern Metro's outer district and the development of a Design and Digital 'City' along the Liverpool-Manchester-Leeds axis is one such example.

Recommendation 4

Digital Design Clusters should provide support for shared hackspaces / makerspaces, furnished with both material and digital making facilities. These could be funded by subscription from local SMEs (currently suffering from a skills shortage) paying to access facilities and to work alongside potential future employees/contractor partners.

2. Central Government and the Digital Economy

Due to the increasing prominence and importance of digital technology, and the variety of government functions available to use and support it, we have divided this section up into three parts.

The Citizen and the State

Following the example of ‘digital by default’ and the increasing importance of the user in respect of government platforms, we argue there is much to commend in the prominence given to the role of the user in the current ‘digital transformation’ taking place in the provision of public information statutory services.

Recommendation 5

The commitment of the Government Digital Service to design and digital should be rolled out, using a similar ‘digital by default’ approach. There should be a Head of Design (whose responsibilities encompass digital platforms) appointed in each government department.

Data – Open for Whom?

Whilst government has demonstrated an impressive commitment to making public data open for use via the data.gov.uk platform, there is still limited functionality, utility or relevance in simply making this data available. Government should seek to use design to explore and demonstrate the potential applications of open data, in order to educate the public in how such information could be used. Similarly, future large scale infrastructure projects will generate a lot of data which could be used to prototype delivery and more generally provide feedback to assist designers in meeting the needs of users.

Recommendation 6

Designers should work with data.gov.uk on ‘transformer projects’ to demonstrate the social and economic use of open datasets.

Recommendation 7

Government, through the Technology Strategy Board and its partners, should find ways to embed designers in testbed big data projects.

Recommendation 8

Large infrastructure projects such as HS2 or future large-scale housing delivery should appoint a Chief User Officer with responsibility for the effective, relevant and transparent use of big data.

Embedding Digital Innovation through Design

Big data is driving the new industrial revolution, but without design, such information at worst is meaningless and at best sub-optimal. The Internet of Things is a seductive technological development which brings together the interface of physical objects and digital information, spinning out into larger projects comprising, for example, smarter cities or energy. Young designers now are not necessarily being taught how to use data, but there are a number of design studios with a specific interest in technology seeking to remedy this. However, government should seek to lead—via the TSB and various Catapult mechanisms—in embedding the importance of the user into their future Digital Strategy at the same time as educating the wider public about the potential design-led implications and benefits of the digital economy.

Recommendation 9

The Technology Strategy Board should invest in building a permanent public Demonstrator Centre to showcase design-led applications of digital technology.

Recommendation 10

The core importance of user-centred design as a key to unlocking new forms of social and economic value needs to be woven through future TSB Digital Strategy. This can be achieved both through supporting a digital research base in Higher Education Institutions (HEIs) and their partners, and through supporting design-led digital clusters, not least in respect of Big Data.

Recommendation 11

Government should increase its investment in the Internet of Things, supporting both SMEs and larger companies in respect of new innovative work.

3. Education

We will indicate how grassroots digital making has gone some way to try and bridge the current skills gap. In order for ‘digital making’ to be embedded properly within the curriculum, it must be fused with ‘physical making’ skills. We must end the simplistic assumptions that it is easy to design something on a computer using CAD, or that young people are no longer interested in building with their hands and using basic tools. Following our research, we have focused on higher education in order to make recommendations on how to ensure that young adults are being taught the design skills we feel are so integral to the Digital Economy. We also touch on primary, secondary and further education (FE). In practical terms, this means a critical reassessment of the scope of Design Education, drawing on findings laid out in the previous Design Commission report, *Restarting Britain: Design Education and Growth* (2011).

Recommendation 12

Strategic support of shared makerspaces / hackspaces should include facilities for use by primary and secondary schools, and FE and HE institutions.

Recommendation 13

Children, FE students and undergraduates should be taught using up-to-date design software or appropriate open source platforms.

Recommendation 14

We argue that design and coding skills are necessary across multi-disciplinary education. Whilst the UK will be the first country in the world to teach children how to code as part of the curriculum (from 2015), there are still measures that can be taken to close the skills gap now. For example, Ravensbourne College of Design and Communication has opted to offer coding classes as an enrichment course.

4. Research

The RCUK Digital Economy Theme (DET) has funded interdisciplinary research breaking down traditional subject boundaries. This has stimulated new forms of experimentation in pure research. Following the DET, Research Councils should continue to move further into new interdisciplinary spaces integrating design and digital technology.

Recommendation 15

Expand and develop the current RCUK funding work on linking design to the digital economy. This should cover all kinds of creative clusters and knowledge bases and the skillsets associated with them. This might include new research on links across the experiences of the digital economy and creative economy hubs, assessing their value.

Recommendation 16

New forms of Design and Digital Knowledge Exchange Fellowships should be funded. They should link research scholars with practitioners in different areas of design, for example medicine, health, industry and arts, to undertake joint projects located in both university and practice environments.

Recommendation 17

Promoting Design and Digital Knowledge Exchange Hubs associated with developed or developing creative and digital clusters to share best practice and lessons learnt that bring researchers and other stakeholders closer together. Both the Hubs and the Fellowships created by them should work closely with local Design and Digital Clusters to identify localised opportunities for growth and new kinds of social and economic value.

Our working definitions

Data

Qualitative or quantitative statements or numbers that are assumed to be factual, and not the product of analysis or interpretation.³

Digital *[Adjective]*

Involving or relating to the use of computer technology.

Digital Commons

The digital commons are a form of commons [a shared resource] involving the distribution and communal ownership of informational resources and technology, rather than seeing them as private or public (i.e. state) property.⁴ These resources can be accessed, as well as modified, by anybody for non-commercial purposes. Examples include 'wikis' like Wikipedia, and open-source software like Linux.

Digital Transformation

Digital transformation is the process of moving from conventional analogue information systems to digital. The transformation can be localised geographically, or undertaken at national level. Sufficient digital competence and literacy need to be in place to ensure successful adoption.

Interaction Design

Interaction design looks to define—and improve—our relationship with digital technology as users and consumers. Through the design process, digital technologies are shaped to fit our needs, abilities and preferences. This involves combining the subjective and qualitative aspects of an interface to improve how we use and experience digital technology.

Internet of Things

A proposed development of the internet in which everyday objects have network connectivity, allowing them to send and receive data.

Metadata

Metadata is data that describes other data, summarising basic information, and makes finding and working with particular instances of data easier. It can be created manually or automatically, and helps to organise electronic resources, provide digital identification, and supports archiving and preservation of resources.⁵ Author, date created, date modified and file size are examples of very basic document metadata. Information generated through the use of technology is also considered metadata, such as the date and time of a call, or the location from which an e-mail account was last accessed.

3 Source for all data definitions: Open Data White Paper 2012.

4 Stadler, F., 'Digital Commons: A dictionary entry', 22/04/2010, <http://felix.openflows.com/node/137>, accessed 25/04/2014.

5 Guenther, R. and Radebaugh, J., 'Understanding Metadata', National Information Standards Organization (2004), <http://www.niso.org/publications/press/UnderstandingMetadata.pdf>. Accessed 25/04/14.

Open Data

Data that is accessible (ideally via the internet) at no more than the cost of reproduction, without limitations based on user identity or intent; in a digital, machine-readable format for inter-operation with other data; and free of restriction on use or redistribution in its licensing conditions.⁶

Open Government Data

Public Sector Information that has been made available to the public as open data.

Open-Source

Software is considered open-source when its original source code—which enables the programme to be altered copied and redistributed—is made freely available. Furthermore, licences associated with the use of that software should not restrict use or users, or interfere with other software.⁷

Public Sector Information (PSI)

Information and data subject to the Freedom of Information Act 2000 and the Reuse of Public Sector Information Regulations 2005; data and information produced, collected or held by public authorities, as part of their public task.

Service Design

Service design is the process by which the constituent components of a service—people, communication, and institution for example—are organised or re-organised to improve the interaction between the service provider and customer to create an experience that is both user-friendly and business friendly.

User Experience

User experience was coined by Don Norman while Vice President of the Advanced Technology Group at Apple and is intended to capture all aspects of the end-user's experience with the company, its services and the product itself. This includes everything from the graphics and hardware, to support services and user manuals.⁸

6 Open Data White Paper.

7 'The Open Source Definition', Open Source Initiative, <http://opensource.org/osd>, accessed 24/4/14.

8 'UX Design Defined', User Experience, UX Design, <http://uxdesign.com/ux-defined>, 16/08/2010, accessed 24/4/14.

Introduction

The high value and speed of growth of the UK creative industries have recently dominated headlines defining the current state of our economy. Official government figures announced in January 2014 (using new metrics developed in partnership with NESTA) stated that the creative industries are now worth over £71 billion to the UK economy.⁹ Even before these post-recession figures, the rate of growth of the sector has indeed been remarkable with IPPR positing 9.4% GVA in 2012. This represents a rate of growth six times faster than the rest of the UK economy.¹⁰ The relative strength of the Creative Industries is central to this report because it can largely be attributed to the growth and marketisation of digital content more than any other single factor.¹¹ This has come as some surprise to proponents of Joseph Schumpeter's (1883-1950) theory of Creative Destruction: the inevitable process of erosion of older industries through the adaptation of newer technology.

The opening up of new markets, foreign or domestic, and the organisational development from the craft shop to such concerns as U.S. Steel illustrate the same process of industrial mutation—if I may use that biological term—that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one.¹²

However, the driving force behind the creation and consumption of content (television, film and games in the case of the UK) relies on its co-dependence on new platforms, mainly made possible through digital technology. Increasing access to online content has not destroyed traditional media—the 'Downton Abbey effect' constantly referred to in any discussion of the UK Creative Industries—rather it has forced content providers to enlarge and enhance their offer. Sir Mark Jones, former Director of the V&A, described to us how the process of putting their collections online (no small task) did not diminish visitors' desire to see the exquisite objects themselves. Instead, a survey of visitors to the V&A spoke of how accessing images and information about the collections on the internet brought them to the museum.¹³

Digital technology—reliant on the transmission of thousands upon thousands of lines of binary code—goes beyond Schumpeter's concept of industry and, relatedly, technological destruction. This is because digital technology relies on the increasing integration between devices, and the nature and quality of our reception and interpretation of this content. It is the case, then, that 'the digital revolution' pivots on user experience and the effective use of design.

Equally, digital technology has its own history and set of complex cultural assumptions that has prompted many organisations to speculate on the possibilities available 'if only we were digital'. A history of cloud computing shows how culturally embedded, physically contingent and even emotive our conception of this aspect of technological

9 'Creative Industries worth £8million an hour to UK economy', gov.uk, 14/1/14, <https://www.gov.uk/government/news/creative-industries-worth-8million-an-hour-to-uk-economy>, accessed 28/4/14.

10 Straw, Will and Warner, Nigel, March of the Modern Makers: An Industrial Strategy for the Creative Industries, IPPR, February 2014, p.1.

11 Kunster, Thomas et al, The Digital Future of Creative U.K.: The Economic Impact of Digitization and the Internet on the Creative Sector in the U.K. and Europe, Booz and Co., March 2013.

12 Cox, Michael W. and Alm, Richard, 'Creative Destruction', The Concise Encyclopedia of Economics, <http://www.econlib.org/library/Enc/CreativeDestruction.html>, accessed 24/4/14.

13 Sir Mark Jones, evidence to the Inquiry.

development has been. Now that, at least in the UK, we use digital technology on a daily basis, neither a life of ease or futurism is the case. Indeed, the very existence of assumptions surrounding digital technology is one of the main reasons for undertaking this Inquiry. The notion that design has, should and will continue to make technological progress relevant to everyday lived experience runs throughout this report. We aim to identify some of the current obstructions stopping us from using design to fully exploit the potential of digital technology. We sketch out some encouraging developments in central government, education and research. We bring forward a set of strategic recommendations about how we believe a design-led approach to digital technology, in the form of business-university-education clusters throughout the UK, provides a stimulus for economic growth and job creation. However, this can only be possible through a commitment to the embedding of user-centred design from the Technology Strategy Board throughout the Knowledge Transfer Network and the Digital Catapult. This is highly relevant to the research agenda, and to a discussion of how we can ensure that digital literacy is treated as complementary to the design skillset. We are also concerned about digital literacy at the granular level, and encourage the proliferation of makerspaces throughout the UK to support the fusion of digital and making skills.

Background

The History of Cloud Computing

Cloud computing refers to the provision of services through applications, platforms, and digital infrastructure via the internet rather than locally from the hard-drive of one's computer. As clients, this provides access to email accounts, databases, social networks and other applications from any computer or device connected to the internet. On a corporate level, companies such as Amazon not only use the cloud to store consumer information and deliver applications, but increasingly rent highly-sought after server space to cloud-based companies like Netflix, who are then able to operate with minimal fixed infrastructure and IT costs.¹⁴

Certain conceptual and operational aspects of cloud computing can be traced back to the 1950s and early 1960s. The pioneering work of John McCarthy, a computer and cognitive scientist at Massachusetts Institute of Technology who also gave us the term 'Artificial Intelligence', developed the first time-sharing system which allowed existing mainframe computers to serve multiple users at once. It was around this time that J.C.R. Licklider, Head of the Advanced Research Projects Network (ARPAN) the predecessor to the internet predicted the development of a network which could be accessed from anywhere at any time and would connect everything.¹⁵ This was later referred to, even in official memorandums, as the 'intergalactic computer network'.

However, by the 1970s it became clear that the hardware and the software needed to realise ambitious projects like the intergalactic computer network were still decades away. During the 1990s, great efficiencies were realised in the management of networks and bandwidth, but it was not until very recently—post-dot.com bubble—that things began to move to the cloud. The tumultuous period in the technology market following the bubble compelled many companies to make dramatic operational changes. It was in this context that Amazon—one of the few corporate technology survivors—made the decision to modernise their data centre by moving it to the cloud. This offered an enticing cost-savings opportunity, as well as the possibility to expand their services beyond selling books and DVDs. The launch of Amazon Web Services (AWS) marked a new era for Amazon, as well as for the development of cloud computing.¹⁶

14 Cohen, R., 'Cloud Computing Forecast: Cloudy With A Chance of Fail', *Forbes*, 7/2/12, <<http://www.forbes.com/sites/reuvencohen/2012/07/02/cloud-computing-forecast-cloudy-with-a-chance-of-fail/>>. Accessed 21/04/14.

15 Earnest, L., 'John McCarthy (1927-2011)', *Stanford.edu*, December 2011, <<http://www.stanford.edu/~learnest/jmc.pdf>>. Accessed 22/04/14.

16 White, C., 'Cloud computing timeline illustrates cloud's past, predicts its future', *SearchCloudComputing*, December 2013, <<http://searchcloudcomputing.techtarget.com/feature/Cloud-computing-timeline-illustrates-clouds-past-predicts-its-future>>. Accessed 22/04/2014.

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Design and Digital Growth Clusters

- We argue for bottom-up policies to nurture innovative digital work throughout the UK, specifically through their strategic use of design.
- Support via the cluster model at a local level will increase economic growth outside of as well as in London and encourage job creation.
- The Digital Design Cluster model is a driver of economic growth, and is supported by our findings in the areas of research, education, and the role of central government, later in this report.

Despite promises that the internet would allow anyone, in theory, to work anywhere, this is not what we have witnessed. Online social networks might help forge connections, but existing research indicates that the economics of agglomeration—the siting of several similar businesses together via a cluster—creates a culture open to innovation and that firms and individuals respond well to physical proximity. At the hyperlocal level, co-working spaces or ‘hubs’ are growing in popularity, representing a contemporary model of studio working in a shared space with artists, designers, technologists and even scientists.

The cluster is very important because it is quite difficult, even with all the best technology tools, as humans to achieve that incredibly important face-to-face communication.¹⁷

– Eric Van der Kleij, Tech City CEO

The frequency, opportunity for and quality of interaction in specific geographic places, and not in the cloud, matter more than ever before. In this section, we will outline how the cluster model has and could lead to future growth and jobs creation. However, with the overwhelming number of new tech businesses locating in London, we believe there is an opportunity to assess how the same growth in the sector could occur elsewhere in the UK, and suggest that the development of Digital Design Growth Clusters is perhaps the best way to achieve it.¹⁸

In terms of public policymaking, interest in the cluster model is nothing new. The concept of the industrial cluster, introduced by Michael Porter in 1990, has played an enduring role in the analysis of innovation and the policies to support it.¹⁹ The digital cluster is a further iteration of this model in technological terms. We argue that design

17 'Silicon Britain: Inside the UK's Tech Clusters', BBC News online, 20/03/2012, <http://www.bbc.co.uk/news/technology-17436113>, accessed 23/04/14.

18 'According to a ranking by TechBritain which tracks tech businesses in the UK, London is the largest cluster in the country playing host to over 2,600 companies, 15 times the number of businesses clustered around Manchester, the second biggest'. Quoted in Laja, Sade, 'Britain's Tech Cluster Geography', Connected Digital Economy (Blog), 21/1/2014, https://cde.catapult.org.uk/blog/-/asset_publisher/UZ1GysjkTQm8/blog/britain%E2%80%99s-tech-cluster-geography, accessed 23/04/14.

19 Chapain, Caroline et al. Creative Clusters and Innovation: Putting Creativity on the Map, NESTA, November 2010. p. 8.

is needed in order to optimise the impact of technology and to add new forms of social and economic value. NESTA's *Creative Clusters and Innovation* report (2010) is also right to recognise that policies of the 1990s designed to support the cluster have seen the model as a means of branding or urban regeneration, rather than as a source of innovation. We may now be moving away from promoting the cluster as a means of attracting the 'Creative Class', to thinking about the cluster as an ecosystem of innovation, where we make objects and create services that add social and economic value to people's lives.²⁰

Background

IPPR: The March of the Makers and Creative Clustering

As part of their work arguing for an industrial strategy for the creative industries, IPPR have also indicated that government should move to support co-location and clustering throughout the UK, especially in the context of an imbalance tilted towards London. On the basis of their independent research and the Wilson Review on University-Business collaboration (2012), the following components to the successful 'cluster' are listed below:

- A core of creative firms operating in close proximity, either as competitors or collaborators (or both).
- Areas of collaboration between firms, educational institutions and public bodies, including innovation, production, design and information-sharing.
- Supply-chain connections between firms in close geographical proximity.
- An environment (in both physical and business terms) that attracts creative professionals.
- Global connectivity through good physical and digital infrastructure.
- Effective local leadership, involving both the public and private sectors.
- Good connections with educational establishments, in order to provide an efficient talent pipeline, and promote knowledge exchange.

Although Local Economic Partnerships (LEPs) have the potential to fulfil the role of leadership and co-ordination, the IPPR report *Northern Skills for National Prosperity* (Henderson et al, 2013), found that 'a lack of clarity and co-ordination at a national, strategic level is acting as a barrier to the further development of LEPs' role in supporting growth and jobs at a local level!

[Source: Will Straw and Nigel Warner, *March of the Modern Makers: An industrial strategy for the creative industries*, IPPR, February 2014, p. 33-35]

Mariana Mazzucato, Professor in Science and Technology Policy Research at the University of Sussex, is an adviser to both the Government and the Opposition.

20 The 'Creative Class' was coined by Richard Florida in his work on the 'Creative City'. *Creative Clusters and Innovation*, p.9.

Mazzucato believes that Britain has focused for too long on creating an ecosystem of entrepreneurialism—supporting SMEs which create one or two short term jobs—at the risk of ignoring the much more important ecosystem of innovation. Mazzucato points out that government-supported research and development has helped large companies such as Apple use their applied design principles and knowledge of materials to create beautiful, innovative products. Crucially, she argues that this sort of innovation should be supported across the corporate sector, regardless of size, and not just in SMEs. As part of an innovation ecosystem in which new firms are ‘made relevant’, Mazzucato suggests that the public sector must be willing, and possess the political will, to invest heavily in education and research in addition to developing ‘a tax policy that rewards long term investments over short run capital gains, [and] immigration policy that attracts the best and brightest from around the world’.²¹

Throughout our research we have learnt of the breadth and variety of opportunities for design-led digital growth. Bristol and Bath Science Park is one such site where digital businesses greatly value their location and proximity to other startups and SMEs. The Design Programme, originally established by the Design Council, works at a local, granular level to support business growth through design. Increasing interest in Bristol and Bath Science Park as a future digital hub should extend to the continuing work of the Design Programme in the near future.

We suggest there is potential for a network of regional digital clusters to operate outside of London and generate innovative and potentially lucrative work. The government—at both national and local level—should consider how best to provide strategic and appropriate financial support.

Without it, the gravitational pull of digital businesses to the capital will continue to dominate GVA figures. We suggest that this might not be a true reflection of activity in other areas of the UK, and that strategic investment is needed outside London to support new areas of innovation.

Our recommendations in this section therefore focus on the need to ensure that design is integrated into key emerging technology clusters across the UK. We envisage that Local Economic Partnerships are one of many means of developing these clusters of design-led digital activity. There should be some scoping work undertaken to identify potential capacity for these kinds of firms to co-locate and thrive outside the capital.

21 ‘By Invitation: Mariana Mazzucato: Startup myths and obsessions’, *The Economist (online)*. February 2014, <http://economist.com/blogs/schumpeter/2014/02/invitation-mariana-mazzucato>. Accessed 15/04/2014

Minding the Gap

Case study

Evan Davies' recent high profile 'Mind the Gap' BBC programme outlined why the creative cluster, a place where you can meet other people face to face, is such an attractive proposition. London's Kings Cross area in particular is attracting significant investment, home to the new Central St Martins Campus (it relocated there from Holborn in 2012), the Francis Crick Scientific Research Institute and soon-to-be-home to the new Google UK HQ.

The programme sought to explore how working in proximity to others enables copying, collaborating and competing – which promote and help nurture productivity. Google is moving in because they apparently 'like the neighbours' – Central St Martins.

This is of course one end of the 'cluster', and indeed the programme highlighted the high public spend in London to support clusters like Kings Cross, rather than thinking about decentralising growth infrastructure to the rest of the country. However, it is a useful example of how key economic actors are seeking to align themselves across a range of disciplines – art and design as well as science and technology.

Scaling the Cluster Model

A critical look at existing tech clusters in Brighton and East London brings to light the extent to which the cluster model is dependent on local economic and non-economic factors. The findings from the Brighton Fuse (see corresponding case study) emphasise that the role of public policy in supporting the cluster is not immediately apparent. This presents a challenge in how we can suggest the rollout of Digital Design Clusters should happen, and how they will operate on a day-to-day basis.

It may be the case that whilst fiscal stimulus is needed from central government, overarching governance and direction may best be left to Local Economic Partnerships or an alternative regional development mechanism.

The Brighton Fuse: Key Findings²²

Case study

1) The economic importance of arts and humanities (A&H)

These skills can lead to significant economic growth when fused with technical STEM skills. Fused and 'Superfused' firms in Brighton that integrated A&H with technical STEM skills performed very strongly, generating growth rates of 14.7% in the middle of a major economic recession.

However, the current ecosystem is still a relic of the 'Two Cultures' model (C.P. Snow) between the arts and sciences.²³ The university research system is currently evaluated in ways that penalise interdisciplinary working, for example. It is also difficult in practice for firms to effectively encourage interdisciplinary integration.

2) Digital Clusters need to be able to generate and integrate new knowledge

In Brighton, there has not been the emergence of a 'Schumpeterian-Marshallian' regional agglomeration where a new innovator comes up with a new product, enters the market and rapidly generates economies of scale in production. Rather, the project identified a network of economic actors working on existing kinds of products [but still carrying out innovative work] who came to Brighton for a variety of reasons. These included both the quality of life in the city as well as the relative lower housing prices (compared to London) at that time – a weakness which in the context of the cluster, acted as a strength.

Such factors are difficult for policymakers to predict, but the project offers a number of insights for public policy. Whilst talented and innovative people and firms can be attracted by local benefits, this is not enough to generate a cluster. Therefore, this should act as a caution against zero-sum policies which attempt to draw talent from other parts of the country [and not from the ground up] through tax-breaks or subsidies.

Lessons from Brighton Fuse – How to Create Clusters Elsewhere

1) It is difficult to create artificial clusters from nothing, but policy can be helpful later on

In Brighton, 'bottom up' responsive policy proved most helpful in removing constraints to support the growth of the cluster. Problems identified over the course of time in the city included constraints on office space, and continuous learning and upgrading of skills to address a perceived talent gap. The latter in particular is symptomatic of digital businesses which work on the basis of projects, and often have to draw in external talent. The project therefore recommends that there should

22 The preceding text is adapted from the Brighton Fuse Report. As with all case studies in this report, it does not necessarily reflect the views of either the Inquiry Co-Chairs or those of the Design Commission.

23 C.P. Snow's 1959 Cambridge University lecture titled 'The Two Cultures and the Scientific Revolution' highlighted the dangers to public life caused by the growing gap between scientists and 'literary intellectuals'.

be 'aggregator organisations' in place within the cluster to be able to articulate these bottom up concerns to policymakers, and work in partnership to address them.

2) Cluster development is a mixture of 'hard' economics and 'soft' cultural and institutional support

The combination of entrepreneurial drive and industrial experience so important to the development of the Brighton creative and digital cluster is something unlikely to be created by local or national policy. However, the complexity of the networks created through proximity (in itself a non-economic activity) was highly complementary.

3) Creating interdisciplinary integration is difficult, but it can be done

The history of the Brighton cluster highlights a number of staged interventions that provided cultural spaces to encourage the fusion of knowledge so important to the cluster. However, these were not always successful, and highlighted some cultural mismatches. Universities, for example, can play a role in this integration, but some firms expressed concern about how much (or little) they actually helped.

[Source: The Brighton Fuse, Final Report, October 2013.]

Bridging the Skills Gap

In our evidence session at Bristol and Bath Science Park, we heard from SMEs who struggled to find the ‘T-shaped’ people who could add real value to their enterprise. For the businesses we spoke to, this meant people with skills in both digital and physical making, as well as the ability to deal creatively with complex working practices.²⁴ This shortage is obviously an ongoing problem for national policy relating to the skills base (comprising of education and immigration policy areas) as well as at the local level. There is substantial evidence to suggest a ‘brain drain’ away from regional UK cities to London.

...Through Changes to Immigration Policy

In late 2013, the Government announced a major change to immigration policy for highly skilled migrants. The Tech City cluster itself can now provide endorsements for foreign nationals they deem to have the right technology and innovation skills, rather than that endorsement coming from a single sponsoring employer.

...Through Informal, Grassroots Education

In the course of our research, we have learnt of several examples of grassroots activity in the technology and design communities that aim to bridge the skills gap. These will be detailed at a later stage in the report, but a key part of embedding design-led digital innovation is in ensuring access to digital and making facilities. Design skills—along with a deep appreciation of the user—are of integral importance for the future digital economy.

...And supported Makerspaces

The businesses we spoke to indicated that they would be willing to pay more for access to digital making facilities in a hackspace environment or similar.²⁵ Access to shared facilities would allow potential cost savings for businesses and enable them to work alongside possible future employees or apprentices at a granular level. They specified that people they would like to employ did not have to come from an exclusively design / digital / engineering background, but ideally demonstrate a mixture of these skills.²⁶ There is a pressing need to create the kind of spaces that can nurture this sort of talent from both academic and non-academic backgrounds, as well as amateurs and experts. This could be a central part of the digital design hub.

24 Source: Evidence Session

25 Inquiry evidence

26 Inquiry evidence

Of course, we do not see a network of supported hackspaces as the solution to the wider problem, and of course the Department for Education still has to play a role in ensuring that digital making has a place in the curriculum. We will expand on the role of education later in the report.

NESTA's *Digital Makers* project (2014) surveyed children throughout the UK, and found that whilst the South scored the highest on all measures (self-identification as a digital maker, confidence and interest), the North-West tied with London for levels of interest in making things with digital technologies.²⁷

This ground-level interest must be nurtured as children grow and learn, regardless of where they live in the country. However, the development of clusters would go some way towards ensuring that these skills would reach right through the curriculum and into employment.

Background In Demand – the T-Shaped Person

T-shaped people possess a deep competency in one particular field, as well as a breadth of complementary skills or characteristics. Typically the horizontal bar of the 'T' denotes the range of skills possessed by an individual that allow them to work effectively in a team and across different fields. The vertical bar indicates their particular specialisation or expertise.

The 'T-shape' analogy initially appeared in the 1970s in reference to the professional development of engineers. In a 1978 article titled, "Scientists become managers-the 'T-shaped' man," Denis L. Johnson of the Institute for Electrical and Electronics Engineers encouraged his colleagues to develop skills in areas such as design, marketing and management to complement their particular specialisations. A similar concept was later used by the consultancy McKinsey & Company in order to identify suitable candidates for hire. Tim Brown, CEO of IDEO, has also employed the 'T-shape' in building his team. Using a slightly different interpretation, the horizontal bar represents a designer's capacity for collaboration, whereas the vertical bar denotes their practical specialisation through which they contribute to the creative process.

Bill Buxton, Principal Scientist at Microsoft Research, has taken the idea further yet by indicating the need for a mix of both T-shape and I-shape skills. Here the 'I' represents a designer who can approach problems from the very abstract perspective, 'with their head in the clouds', and once an idea has been generated get to work making it.²⁸

27 Infographic, <http://www.nesta.org.uk/project/digital-makers>, accessed 24/4/14.

28 Johnson, DL, "Scientists become managers-the 'T-shaped' man," *IEEE Eng. Manag. Rev.*, (Sept. 1978), vol. 6, no. 3, pp. 67-68.

What Would the Digital Cluster Look Like?

- Input from HEIs with a research base that embeds digital work
- Stimulus from Central Government
- Supported makerspaces to serve the local community

Recommendation 1

Lessons must be learnt from success stories and a design-led Digital Cluster Toolkit should be devised.

Recommendation 2

The design sector should work in partnership with technologists and together with regional development mechanisms such as LEPs to assess their capabilities to develop Digital Design Clusters.

Recommendation 3

Digital Design Clusters should work together to develop networks of design-led digital activity. The Northern Metro's outer district and the development of a Design and Digital 'City' along the Liverpool-Manchester-Leeds axis is one such example.

Recommendation 4

Digital Design Clusters should provide support for shared hackspaces / makerspaces, furnished with both material and digital making facilities. These could be funded by subscription from local SMEs (currently suffering from a skills shortage) paying to access facilities and to work alongside potential future employees/contractor partners.

2

Central Government and the Digital Economy

We have divided this up into the areas of design and the digital revolution at the levels of:

- The Citizen and the State
- Data – Open for Whom?
- Embedding Digital Innovation through Design

It is important to note that the interest in and support for such initiatives will be crucial for government in the very near future. Government at all levels is investing significant resource into research in the area, asking not only how statutory requirements can be better met, but in how government itself is evolving.

There have been significant developments in government open data in the last couple of years, and key opportunities for the procurement of designers to make the most of this huge political, social and economic interest. We believe that designers can be critical agents in the socio-cultural aspects of technology and the data revolution. They have a sensibility of the relationship of people to things and systems. There is a pressing need (which is yet to be clearly understood) to design what data we even want to collect, and think about how people can generate and use data themselves.

The TSB is also increasingly moving into a space—reliant on the smart use of big data—in which the use of design and design processes can be woven through its forthcoming Digital Strategy. Areas where design can make full use of the potential of digital include Smart Cities, the Internet of Things, and widespread strategic support for programming skills to address the current skills gap. The Digital Catapult (formerly titled the Connected Digital Economy Catapult) is the mechanism by which these initiatives are researched, funded, grown and delivered, and therefore we make several recommendations specifically to this end. Whilst Research Councils are also funded by central government, we address their role in a separate section.

The Citizen and the State

For the majority of citizens, the gov.uk website will become the site of their main interaction with central government. Therefore, government's unquestioned ownership of this platform represents a huge opportunity for government to show leadership in this area. With an emphasis on both delivery and the ability to prototype and iterate design, user journey and content, gov.uk demonstrates an impressive means by which the Government can embrace design.

In the context of this report, gov.uk highlights some forward looking examples of how people interact with and even comprehend of contemporary government.

Background

Ben Terrett (Head of Design at GDS) and Digital Transformation in Government:

“It’s the difference between websites and digital services. The question is: how is digital going to affect my whole business? The website is one thing, but the whole end-to-end service is another, and digital is affecting all of that.

“One example is at DVLA, where they are doing some fantastic stuff. They recently announced that they are getting rid of the tax disc [first issued in 1921]. [From November of this year] they are going to make car tax direct-debit. Digital is changing that whole business, because it is now possible to just renew online, and pay direct-debit monthly. No longer will you forget and run out in your pajamas on January 31st going ‘Oh no, I haven’t renewed my tax!’. That’s only possible because of digital.

“Arguably it’s a service design thing I suppose, but it’s digital. Direct debit doesn’t need a website, but having one digitally changes that service. You get rid of the paper tax disc, no one uses it, the police will use your number plate to check up and see your details and so on and so on. **That’s a digital transformation.**”

[Source: Individual interview as part of Inquiry]

On the basis of the brief to ‘create digital services so good that people prefer to use them’, the gov.uk website has a relentless focus on simplicity.

It should also be noted that the user is not positioned as a consumer. The government does not, of course, face any competition when designing a means by which drivers are able to renew their tax disc, for example.

It’s not innovation, it’s just what should happen, it’s common sense. We sometimes say renewing your passport should be as easy as booking a flight.²⁹
– Ben Terrett

The shift towards the importance of service design as embedded in the working practices of gov.uk indicates a potentially radical change in how we are to think of governance structures in the main. The current interest in how the strategic use of digital technology can change how citizens interact with government is also significant - examples include the Speaker’s Commission on Digital Democracy and Labour’s Digital Government Review.³⁰

29 Ben Terrett, evidence to the Inquiry.

30 See <http://www.parliament.uk/business/commons/the-speaker/speakers-commission-on-digital-democracy/> and <http://www.digitalgovernmentreview.org.uk/>.

As with any new area, definitions regarding the citizen-state relationship are also unclear. ‘E-democracy’ is not strictly accurate, and ‘Digital Government’ does not adequately address our focus in this report on the interaction design between citizen and state. Gov.uk has enabled the digital transformation of services, but service design—a discipline that rethinks the activity of planning and organising people, infrastructure, communication and material components from the level of the user up—has and will continue to play a crucial role.

Gov.uk has created momentum for the fusion of design and digital within government. In a world with increasing reliance on online transaction, design will play a crucial role in how citizens will interact with and conceive of government in the future. There is serious potential for government to build on the success of gov.uk to continue to be the vanguard of standards of digital design.

Baroness Martha Lane Fox’s tenure as Digital Champion is considered to be a success, but it is uncertain if there will be another appointment with the same remit. If the principle of digital by default is to be followed in tandem with a similarly relentless focus on the user, there is an argument to suggest that the role of Digital Champion should not be isolated in its own department, namely the Government Digital Service. Instead, design and digital should exist in the same space within government organisations.

Recommendation 5

The commitment of the Government Digital Service to design and digital should be rolled out, using a similar ‘digital by default’ approach. There should be a Head of Design (whose responsibilities encompass digital platforms) appointed in each government department.

Data – Open for Whom?

Open Data—and how design policy can aid its capture and use—crosses both the private and public sectors. Indeed, the social and economic value that could be unlocked from its effective capture and utilisation relies on the cooperation of both government and partners from the private and third sector. Therefore, we make recommendations in this section that relate mainly to central government, but also in how they might be able to work with designers or design-led companies in the private sector.

As part of its Statistics and Open Data inquiry, the House of Commons Public Administration Select Committee (PASC) found that there was, unsurprisingly, institutional reluctance on the part of civil servants to make their data public.³¹ This is relevant to our argument (in how design can be used to explore the value of the data) because this institutional reluctance is also highly likely to colour how this data can be used. Heather Savory of the Open Data User Group reported ‘a lack of belief’ in

31 House of Commons Public Administration Select Committee, *Statistics and Open Data: Harvesting unused knowledge, empowering citizens and improving public services*. March 2014.

government that ‘the technical community can deal with this stuff’, whereas an outsider keen on making use of open data might say to government ‘Just give me big, dirty data. I’ll deal with it’.³²

However, there is on the surface an impressive drive to committing potentially extremely valuable data to the public sphere. The www.data.gov.uk website hosts over 13,000 open datasets, but on browsing the website, their purpose or value is not immediately apparent – not in terms of the datasets themselves, but to what extent they reflect the true level of ‘open data’ the government holds. Owen Baswarva, non-executive member of the Defra Network Transparency Panel, has criticised ‘the indiscriminate dumping of small, low-value datasets on data.gov.uk... creat[ing] the illusion of progress – 9000 [at the time of writing] datasets sounds like a lot, but what proportion is that of the total?’³³

It should be noted that the Shakespeare Review of Public Sector Information (2013) recommended a ‘twin track’ approach to data release, a method drawing heavily on the success of gov.uk’s mantra that ‘the strategy is delivery’. This would entail, in brief, identifying and fast tracking ‘the datasets that need to be clean, and would need to be published to certain high standards [track two]. The rest is published as track one – quick and dirty, as one might say, as long as one knows that it is dirty, and left to the data scientists to do what they can.’³⁴

The history of technology demonstrates that it is not technological advancement—in this case, the collection and display of data—but how it can be relevant in the real world. We are therefore left with the question of how to use this data and present it in a way that can add real value.

32 PASC Report, Statistics and Open Data, p.9.

33 *Ibid.*

34 PASC, p. 10.

RAW by DensityDesign

Case study

We work with ever-increasing volumes of data. Although this can be empowering, it inevitably raises the issue of how to synthesize and communicate this information in a straightforward, effective and appealing manner. One solution from DensityDesign is RAW, an open-source programme which allows users to produce quality visualisations with their own datasets. These visualisations are far more than appealing aesthetics; they can effectively unlock new perspectives and ways of interpreting information that would not be possible otherwise. With RAW, DensityDesign has bridged the gap between mainstream spreadsheet applications and the more sophisticated professional graphic editors. Because RAW is open-source it is continually being improved based on constructive input from users, and access is obviously free.

DensityDesign is a research lab based in the Design Department of the Politecnico di Milano. Their work explores visual representations of complex social, organisational and urban phenomena in order to provide engaging visual artifacts and support the progress of academic research.

Source: <http://www.densitydesign.org>

Furthermore, recent high-profile misuses of government data have proved to capture the public's imagination and risk undermining trust in future projects. In addition to the Care.data controversy, the PASC were also damning of the Government's decision to include the Postcode Address File (PAF) within the sale of Royal Mail to boost the share price at flotation.³⁵

Their report states that:

[the PAF sale] takes an immediate but narrow view of the value of such datasets. PAF should have been retained as a public dataset, as a national asset. The sale of the PAF with the Royal Mail was a mistake, [and] public access to public sector data must never be sold or given away again'.³⁶

These expensive reputational mistakes could ultimately go on to derail the Government's commitment to making data public and available for use. Therefore, there is an acute need for creative leadership in this area through the showcasing of experiments and through developing functionality that makes this mass of information available and its potential applications understood. Designers have the ability to tackle these questions head on, and mediate new areas of public concern, whilst using their skills to assess these issues in an accessible way.

35 The Postcode Address File (PAF) is a database which contains all known 'Delivery Points' and postcodes in the UK, and comprises over 29 million Royal Mail postal addresses and 1.8 million postcodes.

36 PASC, p.3.

Care.data

Case study

The recent turmoil surrounding a new initiative by the NHS has not only raised alarms with interest groups and the public over the programme itself, but it has also drawn attention to the wider issue of privacy, ownership and the governance of information. Under the Care.data programme, Hospital Episode Statistics collected since 1989 will be combined with patient information currently held in confidence by one's GP. According to the NHS, this will provide a more complete picture of the quality of care being delivered, as well as how treatments might be improved.

The major concern from medical professionals, interest groups and the public, however, is how patient information will be used once handed over to Care.data and in particular whether this information will be sold to non-NHS third parties such as pharmaceutical companies. In the face of significant public pressure and hostility towards the programme, the launch of Care.data was postponed until autumn of this year (2014). This highlights the need for sensitivity, and above all else transparency, when dealing with public data on this scale, and especially an area of acute sensitivity such as health.

Source: Valance, Chris, 'NHS Care.data Information Scheme "mishandled"', BBC News (Online), 18/04/2014
<http://www.bbc.co.uk/news/health-27069553>
Accessed 19/04/14.

User-Centred Infrastructure

The creation, capture and use of big data should also be of huge importance to central government in relation to future large-scale infrastructure projects. Crossrail, for example, was cited as having potentially generated an enormous amount of data, but there has not been any spend allocated on 'spin-out' data-led design projects that could well have led to improved services for the user.³⁷ Data-led design activity should be intrinsic part of proposals for long term public investment such as housing.

The Technology Strategy Board has committed to the built environment which includes a Future Cities Catapult. As data capture expands with this growing area of interest for user-centred design, data-led work on smart cities could also be driven by our proposed network of Digital Design Clusters.

Recommendation 6

Designers should work with data.gov.uk on 'transformer projects' to demonstrate the social and economic use of open datasets.

Recommendation 7

Government, through the Technology Strategy Board and its partners, should find ways to embed designers in testbed big data projects.

Recommendation 8

Large infrastructure projects such as HS2 or future large-scale housing delivery should appoint a Chief User Officer with responsibility for the effective, relevant and transparent use of big data.

'Big data is driving the new industrial revolution'

Opportunities for designers to work with data are not, of course, limited to the public sector. However, it is likely that the most valuable applications of data will rely on its sourcing and use from a variety of different bases. In future, the data value chain will combine public sector data with multiple sources – from social media, objects collecting data through the Internet of Things, and online open source content platforms.

The opportunity of creating new forms of economic and social value are therefore increasingly dependent on the drawing together of data from different sources, and how it is applied.

Background The Internet of Things

The Internet of Things (IoT) connects the objects, devices, services and systems that populate our lives through a shared network. The term was first used by Kevin Ashton, who co-founded the Auto-ID Center at MIT, and is responsible for the standardisation of the Radio Frequency ID (RFID) system used by the IoT. On a basic level, the IoT enables objects in the physical world to share information and communicate with one another in order to improve efficiency, safety and health; reduce waste; or generally make things more convenient.³⁸ For example, a smart fridge informs the user when more milk is needed or when goods will expire. This occurs not when we are looking in the fridge, but automatically when we are travelling to the supermarket.

This communication is made possible by assigning an individual RFID to an object, which provides it with an identity and access to the network. This enables objects to be 'smart' in the sense that they can interact with other connected devices. For example, a Dutch startup recently created a RFID system for cattle, which informs farmers when an animal is sick or pregnant.³⁹ Another move which has drawn particular attention was Google's recent acquisition of Nest Labs, the maker of the 'Learning Thermostat' and the 'Protect' smoke alarm, which alerts occupants to where the danger is located rather than simply issuing a generic alarm.⁴⁰ Such acquisitions raise speculation on just how important these developments will be. To foster further growth of this technology in the UK, Prime Minister David Cameron recently announced an additional £45m to fund projects related to the IoT.⁴¹ Although a positive step, still more needs to be done to support the development of novel IoT technology in the UK.

A particularly restrictive barrier is access to capital. The existing UK investment culture tends to default to short-termism and favour technology over design-led business-to-consumer products, creating an unfavourable environment for innovation and the commercialisation of new ideas.

Although funding from platforms such as Kickstarter provides an alternative, without further support from government, the UK will continue to trail countries like the US in what Cisco CEO John Chambers has called 'a \$19 trillion market'.⁴²

38 Ashton, K., 'That "Internet of Things" Thing', *RFID Journal*, 22/06/2009, <http://www.rfidjournal.com/articles/view?4986>. Accessed 14/04/2014

39 'The Internet of Things', <http://share.cisco.com/internet-of-things.html>. Cisco, accessed 17/04/2014

40 Whitney, L., 'Google closes \$3.2 billion purchase of Nest', *CNET*, 12/02/2014, <http://www.cnet.com/uk/news/google-closes-3-2-billion-purchase-of-nest/>. Accessed 14/04/2014

41 "'Internet of things" to get £45m funding boost', *BBC News*, 09/03/2014, <http://www.bbc.co.uk/news/business-26504696>. Accessed 16/04/2014

42 Kharif, O., 'Cisco CEO Pegs Internet of Things as \$19 Trillion Market', *Bloomberg*, 08/01/2014, <http://www.bloomberg.com/news/2014-01-08/cisco-ceo-pegs-internet-of-things-as-19-trillion-market.html>. Accessed 16/04/2014. Kickstarter is an online crowdsourcing platform popular for entrepreneurs trying to attract investment for start-up companies.

We are now in the ‘metadata’ world, which relies on the effective manipulation of the interface between the digital and the physical to make products that are relevant, innovative and desirable. This is very much the realm of the Internet of Things, which was throughout our evidence-taking process cited as where the classic design skillset ought to be: product design, the ability to make complex information comprehensible, and a commitment to understanding and meeting user needs.

Whilst the case study outlines the non-governmental reasons for why IoT has not yet taken off in the UK, the Digital Catapult’s remit includes making sure SMEs take full advantage of the opportunities promised by the data-driven revolution. This is an area traditionally occupied by the GAAFs [Google, Amazon, Apple, Facebook].

An updated ‘Two Cultures’ dichotomy – Design and Technology

There is also the question of how we bring designers into the data conversation. The area in and around Old Street Roundabout in London boasts a rich events programme, mostly free of charge, but in our evidence sessions we heard several times that designers tended not to attend. Programmers and technologists are instead generating product ideas and moving into design territory, which risks undermining the classical design skillset and training.

Questions for Designers

- How do we design things to gather data?
- How do we design things (including cities) that utilise it?
- How can we position designers as mediators of big data in a way that can be used to establish ethical principles in the future?

In our evidence sessions, we heard that there is a skills gap in the design discipline, particularly in the area of data. We learnt that designers are not—at least at undergraduate level—widely trained in how to think about and use data, and there is consequently a serious lack of talent and skills to support the growing area of data-driven industries in the UK. End of year graduate showcases such as last year’s *New Designers* demonstrate that the ramifications of data-driven design is not being taught in the majority of design courses.⁴³

We suggest that design as a discipline itself needs to engage more with the technology community, in addition to being more formally recognised in the forthcoming Digital Strategy from the TSB.

43 New Designers is an end of year showcase in London for emerging graduate designers across most disciplines.

Statement: IoT Academy

Case study

'It is estimated that by 2020, there will be more than 50 billion connected devices, adding to the 2.5 quintillion bytes of data we are already producing daily today. There are 16 billion photos on Instagram, 350 million photos are uploaded on Facebook daily and 100 hours of video uploaded YouTube every minute. And that's just from digital data, not the connected devices we envision forming the IoT world: tables, chairs, bikes and bridges or even cows, cats and dogs.

This explosion in data has meant that we are witnessing an abundance of data spectatorship, and a lack of understanding of how to turn data into knowledge we can think with and use. That lack of understanding makes us weak, vulnerable and essentially powerless to a certain vision of the future.

You can see the rise in maker culture countering this, as hundreds of thousands of initiatives teaching people to tinker with the cheap accessible technologies are growing, perhaps a clear sign of technological empowerment. But, alongside this genuine infectious enthusiasm, we also see tons and tons of rhetoric.

As members of an increasingly technologically mediated society we need to develop new kinds of critical socio-technical literacies. Making is very important, but also we need to think about what we make.

IoTAcademy is an experiment. It is an opportunity for experts, non-experts, curators, challenge seekers, people, and more people to experiment with the technology and data in inventive, playful and ingenious ways. Data, however big and plentiful, does not necessarily lead to better or more rational decisions. Through IoTAcademy we are not interested so much in how data is made public, but more about how the public make data, build their own hypothesis and make their own decisions.'

Source: Superflux website

IoTA is a good example of a design studio (Superflux) acting on its own initiative and identifying the potential for design to be increasingly embedded in the social and economic imperatives of big data. They are one of a small number of design studios with explicit interests in technology and how design might be able to demonstrate its socially and economically valuable applications.

The IoT Academy model represents one of several similar initiatives to educate both amateurs and experts in how to use big data and digital technology now. It is an impressive example of how the technology community is responding to the skills gap in its own way.

We argue that central government, through TSB structures and in addition to statutory education – should support the technology community's efforts by supporting the alignment of traditional making skills with those of an awareness of digital technology, particularly in writing code and the ability to build basic connected products.

Embedding Digital Innovation through Design

At the departmental level, the forthcoming digital strategy from the TSB will acknowledge the importance of design and will show they are now at a crucial point at which they can continue to develop design in Catapult programmes. This will most likely build on the existing work of the Knowledge Transfer Network (KTN) and the Design Special Interest Group (Design SIG).

Whilst the recent announcement for more support for the Internet of Things was welcome, it does not match the real level of investment needed to commit to this area of potential growth.

The TSB's commitment to sustained economic growth through innovation will only happen if the tech community (along with its investors) are able to see beyond the short term value propositions of focusing on development of an app, for example, to asking much broader questions about user experience and the nature of their business. These are not questions about 'digital', but historic preoccupations of design.

Digital – ‘A Trojan Horse for Design’?

‘...[The digital revolution] has been so fast – many businesses have no idea about what they should be doing, design agencies are finding that clients are constantly asking them about it. Clients are looking for people who can tell them what they should be doing. How can they improve their digital offering?’⁴⁴

Skilled designers—from a digital background or not—are currently in demand, given the need for digital innovation. However, they are often sought to ‘help with digital’, an all too common example of a very narrow brief. Digital services in the future are about user interaction, and creative approaches to business and value creation. The Cox Report of 2005 evidences a still-existing need for businesses to be able to understand creativity, and vice versa.

‘We need business people who understand creativity, who know when and how to use the specialist, and who can manage innovation; creative specialists who understand the environment in which their talents will be used and who can talk the same language as their clients and their business colleagues; and engineers and technologists who understand the design process and can talk the language of business.’⁴⁵

In the context of rapid and very concurrent development of digital, there is a unique moment in the evolution of the digital economy for design agencies to use their teams’ skills in user-centred design to look at new business models through digital innovation – going far beyond a well-functioning website.

We suggest that real digital innovation is indistinguishable from design in terms of process, and that the TSB should recognise the growing importance of user experience design in its forthcoming Digital Strategy. As part of a raft of initiatives, the TSB is currently funding SME R&D through reliance on existing clusters, notably through the ‘Launchpad’ mechanism currently operating in ‘Creative North West’ and ‘Cyber South West’.

However, to embed the importance of the user and service design, more radical possibilities allowed by digital technology must be facilitated and showcased for the purposes of wider public education. The Design Museum’s ‘The Future is Here’ exhibition (2013)– indeed where this Inquiry was launched– was very well received by the public. Respondents in our evidence sessions spoke of the great impact of the loss of the Design Centre in Haymarket which had for many years provided a public face for design and industry. In order to gain public confidence and trust in the new possibilities offered by technology, the TSB would do well to communicate what digital technology means in terms relevant to people, and not just SMEs.

44 Inquiry evidence

45 Cox, George, *The Cox Review of Creativity in Business*, HM Treasury, (December 2005). p. 28.

Recommendation 9

The Technology Strategy Board should invest in building a permanent public Demonstrator Centre to showcase design-led applications of digital technology.

Recommendation 10

The core importance of user-centred design as a key to unlocking new forms of social and economic value needs to be woven through future TSB Digital Strategy. This can be achieved both through supporting a digital research base in Higher Education Institutions (HEIs) and their partners, and through supporting design-led digital clusters, not least in respect of Big Data.

Recommendation 11

Government should increase its investment in the Internet of Things, supporting both SMEs and larger companies in respect of new innovative work.

3

Education

- We have indicated how grassroots digital making has gone some way to try to bridge the current skills gap.
- For 'digital making' to be embedded properly within the curriculum, it must be fused with 'physical making' skills. We must end the simplistic assumptions that it is easy to design something on a computer using CAD, or that young people are no longer interested in building with their hands and using basic tools.
- We now turn to higher education to make recommendations for how to ensure that young adults are being taught the design skills we feel are so integral to the digital economy. We will also touch on primary and secondary schools and FE providers.
- In practical terms, this means a critical reassessment of the scope of design education, drawing on findings laid out in the previous Design Commission report, *Restarting Britain: Design Education and Growth* (2011).

“Over the past century the UK has stopped nurturing its polymaths. There’s been a drift to the humanities – engineering and science aren’t championed. Even worse, both sides seem to denigrate the other... you’re either a ‘luvvy’ or a ‘boffin’.

“To change that you need to start at the beginning with education. We need to reignite children’s passion for science, engineering and maths... At college-level too, the UK needs to provide more encouragement and opportunity for people to study science and engineering.

“If the UK’s creative businesses want to thrive in the digital future, you need people who understand all facets of it integrated from the very beginning. Take a lead from the Victorians... bring engineers into your company at all levels, including the top.”⁴⁶

– Eric Schmidt, 2011

In education, we have heard the same concerns that have been repeated for a number of years: that there is still a large skills gap, a shortage of T-shaped people with

sufficient breadth and depth of knowledge, and that designers are not being taught the methods and requirements of industry before making the transition from higher education into their professional careers.

However, there is cause for optimism. UK design education continues to be held in the highest regard internationally, however throughout the process of this inquiry we have heard worries about complacency and whether these standards can be maintained in the face of increasing global competition. In order to stay ahead, BA and MA Design courses should integrate digital skills into the classical design skillset and look to introduce more STEM subjects into the curriculum.

The first Design Commission report, *Restarting Britain: Design Education and Growth* (2011) outlined the need for design education and the role it plays in economic growth, equipping people with the skills required to live in and shape an increasingly complex world. The report noted that:

*Incidentally, design is not the only future skillset we need, strategically-speaking. Digital literacy is increasingly important. What computer programming for games and visual effects, and other design disciplines broadly share, is a territory that blends art, science and technology—a mix of disciplines that teaches the mind to direct creativity towards specific outcomes’.*⁴⁷

Our focus in this report is obviously on the growing overlap between design and digital skills, of which educational investment, long-termism, and a granular understanding of the digital economy plays a key part. Therefore, the key messages and findings from our earlier report will not be repeated but expanded upon here.

The Fusion Agenda

Creative Skillset has defined ‘fusion’ as a ‘collective name for a number of the effects of digital disruption’, and manifestly as a mixture of the set of skills needed in the contemporary workplace.⁴⁸ They have done so in response to a trend they are seeing within the industry sectors they work with, as businesses that increasingly blend STEM with creativity and entrepreneurship. Creative Skillset have also developed a ‘tick’ accreditation system for courses which they believe match the skills needed in the ‘fused’ workplace. By the end of 2013, Creative Skillset had awarded the fusion ‘tick’ to 96 Higher Education courses, predominantly in the fields of film, television and production, and computer game design.⁴⁹

47 The Design Commission, *Design Education and Growth* (2011), p. 16.

48 It should be noted that there is no one definition of ‘Fusion’, as it is dependent on the overlap of skills, expertise and managerial structure. The reference to Fusion as the ‘collective name for a number of the effects of digital disruption’ is taken from the Creative Skillset website (<http://creativeskillset.org/>. Accessed 23/04/2014)

49 A full list of accredited courses can be found at http://courses.creativeskillset.org/assets/0000/2876/Creative_Skillset_Tick_Yearbook.pdf. Accessed 24/04/2014

Background

The Fusion Framework

- 1) Fusing Key Expertise, Knowledge and Experience in Individuals
- 2) Fusing Industry and Higher Education Together
- 3) Fusing the Different Parts of the Creative Media Industries Together
- 4) Creating Fusion Management Skills

[Source: Fusion Skills: Perspective and Good Practice, Creative Skillset, July 2013, p. 16-24.]

Design is a core activity in fusion businesses. Computer games are a frequently used example of an advanced use of design, because they are developed through a process of constant user testing, prototyping and iteration. Education systems are starting to react to government policy affecting the high growth creative industries— in Canada, tax breaks for the games industry has led to a lot of games design courses being established. A similar rollout of tax breaks for the UK game design industry will no doubt stimulate the establishment of more courses in this area. This is one good example of the fusion agenda being recognised across government, industry and education.

However, in order to influence student thinking and establish a ‘fused’ education model that is not sector specific, disciplinary crossover needs to be put into place a long time before postgraduate students are considering a PhD. Academics themselves often complain of not getting the ‘right’ students in—a reference to the too-early streaming of children down either a creative or a STEM route. The best students have strengths in both. If disciplinary crossover doesn’t happen in undergraduate education, then people emerge into the world of business with a very narrow educational experience. This can therefore limit businesses’ understanding of design—providing a very narrow brief to agencies, and so forth.

We have already touched on the difficulties of funding cross-disciplinary work in the previous section, and of the disciplinary rigidity in most British universities. However, this issue is also partly rooted in the notion of rigour in academia. The ‘fused’ subjects, where there has been the opportunity to use digital technology in a creative way, have been perceived to lack intellectual rigour. Rhode Island School of Design has, for example, been campaigning for ‘STEAMD’ (Science, Technology, Engineering, Art, Maths and Design), but has come under criticism for not demonstrating adequate depth in all subjects. The drive for fusion also challenges the old model of ‘seats of learning’ with a reputation for excellence and expertise in a particular area.

'You can't be successfully creative unless you are technically skilled'

- Design Education Now

In our evidence sessions, we heard of the need for the traditional craft-based design skillset to include digital skills in order to properly equip graduates with the skills that are required in industry. The growing requirement for digital literacy has not gone unnoticed. The UK is the first country in the world to include computer programming on the primary school curriculum (from 2015) and there is a raft of initiatives such as 'Year of Code' designed to educate learners with the skills they will require in the future. However, these initiatives will not close the current skills gap.

Designers should always be trained in technical skills appropriate for industry. Writing code for computer programmes or websites is no different. Ravensbourne College has been offering enrichment coding classes as an add-on, as there have been issues with HEFCE funding that have obstructed them from offering it as a core part of their programme.⁵⁰ More work on how to embed coding into the HEFCE funding framework should be undertaken.

Design education at all levels should take leadership at this juncture to offer coding classes as an enrichment activity if they cannot yet provide for it at core of the curriculum. In the inquiry process, we heard several times that 'creative people need to wrestle away the [innovation] agenda from the technologists'. However, it is difficult to see how this is achievable if the designers of tomorrow are still not being taught the relevant skills.

Digital and Physical Making Skills

Students of all ages need to be taught the requisite making skills in digital and physical spheres. It is this kind of knowledge and creativity that will be needed along with the development, for example, of the Internet of Things and other areas of future designed digital innovation.

We have already suggested that LEPs among other actors should support hack or makerspaces and be sure to allow access to local education institutions. This would have the effect of exposing children and young people to technology in a quasi-industrial space, and would augment design and technology teaching already taking place in schools.

'Digital is a Tool, and Code is a Material'

- Rosy Greenlees, Crafts Council

With all new technologies, digital has been hailed as an answer or solution. However, the principle of 10,000 hours (the amount of time it takes to master any discipline) still applies. Designers often speak of the frustration of working with clients who think that

digital design—such as CAD—is a rapid and straightforward process, but digital is a tool like any other and requires investment of time and skill to produce good results.

Earlier in the report we stated that there is rapidly growing demand for designers asked by companies to ‘enhance [the company’s] digital offer’. Appropriate leadership in ensuring digital literacy across the curriculum as well as in design could represent an opportunity to create a cultural shift in how people understand the design process, and to invest in designers more appropriately.

Technical skills also apply to the software used to teach children, FE students and undergraduates across a range of institutions.

Harriet Vine (of Tatty Devine) spoke of the work experience students she had hosted—even at graduate level—who did not possess the skills to use Vector Graphics software, essential for drawing design visualisation. Even if universities cannot make the resources available for in-depth software tuition, industry-standard programmes should be made available at all institutions. If they are beyond financial reach, there should be leadership at a senior level to identify open source software which teaches a similar level of skill.

Recommendation 12

Strategic support of shared makerspaces / hackspaces should include facilities for use by primary and secondary schools, and FE and HE institutions.

Recommendation 13

Children, FE students and undergraduates should be taught using up-to-date design software or appropriate open source platforms.

Recommendation 14

We argue that design and coding skills are necessary across multi-disciplinary education. Whilst the UK will be the first country in the world to teach children how to code as part of the curriculum (from 2015), there are still measures that can be taken to close the skills gap now. For example, Ravensbourne College of Design and Communication have opted to offer coding classes as an enrichment course.

4

Research

- The RCUK Digital Economy Theme (DET) has funded interdisciplinary research breaking down traditional subject boundaries. This has stimulated new forms of experimentation in pure research.
- Following the DET, Research Councils should continue to move into new interdisciplinary spaces integrating design and digital technology.

Our evidence session with representatives from the EPSRC and AHRC focused mainly on the cross-council RCUK Digital Economy Theme. A strong direction in interdisciplinary working was clear, with an increasing focus on the role and potential for design and digital research.

We also spoke to organisations such as the Crafts Council, who regularly apply for funding in partnership with Research Councils, on their thoughts for what could change to allow for a more fused model of research. Their response indicated that whilst new initiatives tilted towards measurement of economic and social impact did open up new opportunities, there are also concerns about possible constraints:

'Within a creative context [classic design territory], you just try things, and things emerge. It is more complex to give very clear reasons for what impacts your work will have if it is a process of experimentation'.⁵¹

The importance of 'trying things' is of course a historic problem for funding R&D at all levels. However, in a time of increasing acknowledgement of the importance of digital, and how it can assist convergence between disciplines, we must equally make the case for design and design practice as a mediator and enabler of technology.

Our recommendations, therefore, seek to highlight existing good practice and identify key levers which could be used to develop them further.

Background

Jerome Ma, Digital Economy Portfolio Manager, EPSRC

'Design is absolutely crucial, particularly in relation to IoT, as it is about understanding what it is going to take to get people to trust, accept and use these technologies.

That is very much a fundamental part of what the Digital Economy Theme is about – realising the transformational effects of what new technologies can have but also realising that we need to get people on board and trust that these technologies can deliver benefit.'

[Source: Inquiry Evidence]

The RCUK Digital Economy Theme encompasses 7 Centres for Doctoral Training as well as 3 'Hubs'. An external review of the DET in 2012 made the case for different assessments to measure programmes that had the same commitment to interdisciplinary working, as the REF can discriminate against, or obstruct, funding for this kind of work.

Rosy Greenlees of the Crafts Council also voiced concerns about the feasibility of truly effective interdisciplinary working. The dynamic of the REF effectively undermines knowledge transfer through applied research practice, apart from in publications, 'as this is what gets the stars, the points'. In the wider scheme of the university structure, which relies so heavily on accreditation from peers, lateral thinking or experimentation only happens at risk of not securing income to finish or extend the particular project in the future. The Crafts Council effectively overcame this uneasiness against interdisciplinarity by applying for RCUK-funded work in digital departments at Falmouth and Plymouth Universities. However, Ms. Greenlees made the point that this work was only digital 'post-watershed', as the departments already had a de facto interest in pushing the realms of digital technology – in these instances through working with craft. Within the current circumstances it is difficult to see how design could lead as a unifying, cross-disciplinary force in digital experimentation.

However, at the macro level, there was an acknowledgement by our respondents that Research Councils themselves have to actively promote and facilitate interdisciplinary work, even more than they are currently doing.

Emma Wakelin, Associate Director of Programmes, AHRC:

EPSRC and AHRC are a bit unusual among the councils [as they] regularly going into the blurry grey area between our disciplinary boundaries.

If research council funding is going to support this revolution, particularly in design, within the way researchers can operate, councils will have to be bolder about going into those areas we may have perhaps felt uncomfortable about previously.

The 2012 review also indicated that the DET should aim to scale with the growth of big data, and that the implications of open data and the Digital Commons is an area of key interest for future workstreams.⁵²

The review also identified a need for better coordination between the research hubs and the TSB to ‘ensure that the many exploitable ideas that are being produced by [the DET programme] find a downstream route to commercialisation’.⁵³

Both of these areas (big data and potential growth through TSB commercialisation) are additional levers by which HEIs could work with Digital Design Hubs (i.e. the actual use of big data – at a local level [the city, local businesses etc]).

Whilst there was a sense that design is of integral importance to the future of research, respondents were still uncertain of how to qualify design as an enabler in the research process. Part of this problem is that designers don’t tend to apply to AHRC programmes, deeming them ‘too theoretical’.⁵⁴

Other respondents explained that seeing design as a facilitator towards inter-disciplinary working might actually constrain design as a discipline.

Jerome Ma, Digital Economy Portfolio Manager at EPSRC asked:

What is the end objective of this initiative [ie, to embed design within our research on the digital economy]? Is it to have a very strong engaged community of designers - specifically people who would identify themselves as such - or is it to embed a design mindset into everyone so that even a researcher who wouldn’t typically identify themselves as a pure designer will still use design principles in their work?

Do we want a team of individuals who are very much within their core disciplines [for example pure designers collaborating with pure researchers], or do we want people who are multidisciplinary who may identify themselves as, for example, a computer scientist and a designer at the same time?

52 Collins, Brian et al, *Digital Economy: Report of the 2012 Digital Economy Theme Review Panel*, RUCK, 2012.

53 Ibid.

54 Emma Wakelin, AHRC, evidence to the Inquiry,

However, design's core preoccupation with user experience is integral to how we should come to conceive of the digital economy as a whole – what it means to our lived individual experience as well as to governmental organisations and companies. Because our conception of the digital economy is changing so rapidly, respondents indicated that design research should be used to push the boundaries of traditional Research Council territory.

*'If we want to increase the profile of design research we need to tailor our funding programmes so that they are attractive to design researchers. Working with the TSB is one way to do that as we can go to the edge of the research council comfort zone in terms of giving researchers public funding to develop solutions to things that may become commercially successful.'*⁵⁵

It is clear that there is appetite in the research community to create work that commercially successful through collaboration with the TSB. However, this can only occur through a willingness on the part of research councils to fund work that may be seen as outside their remit.

Recommendation 15

Expand and develop the current RCUK funding work on linking design to the digital economy. This should cover all kinds of creative clusters and knowledge bases and the skillsets associated with them. This might include new research on links across the experiences of the digital economy and creative economy hubs, assessing their value.

Recommendation 16

New forms of Design and Digital Knowledge Exchange Fellowships should be funded. They should link research scholars with practitioners in different areas of design, for example medicine, health, industry and arts, to undertake joint projects located in both university and practice environments.

Recommendation 17

Promoting Design and Digital Knowledge Exchange Hubs associated with developed or developing creative and digital clusters to share best practice and lessons learnt that bring researchers and other stakeholders closer together. Both the Hubs and the Fellowships created by them should work closely with local Design and Digital Clusters to identify localised opportunities for growth and new kinds of social and economic value.

Conclusion

Throughout the course of this Inquiry we have sought to highlight some of the areas of growing convergence between design and digital practice, and suggest some ways in which design can be aligned to generate new forms of value within the development of digital technology.

We believe this can be achieved across the whole of the UK via the development of existing and future digital design hubs. This proposal is greatly strengthened by our evidence-gathering around the role that the design discipline has yet to play in the digital economy of the future. However, we have also indicated some direct ways in which the digital economy can only be successful by training future designers in the varied skillset needed to operate in the modern world.

This has been an area of great interest for both the Chairs and the Design Commission to which they report. As such, we are compelled to suggest the following ideas for future research. More work needs to be done to develop ideas and stimuli for the digital economy (including concerns relating to intellectual property, ownership of data, and how digital innovation can be stimulated without infringing on personal rights). This must not be confined to design and digital experts, but should include contributions from a wide range of other disciplines, and include Parliamentarians, all of whom are, after all, ‘users’.

As we have highlighted, the digital economy is tied strongly to physical location. We strongly recommend that any future government digital strategy should include current research in this area to help drive the digital design clusters and unleash growth throughout the UK, and not just in London. In addition, more detailed work is needed to explore how current education and research funding mechanisms might encompass ‘digital by default’ and correspondingly focus on user-centred design.

Abbreviations

<u>AHRC</u>	<u>Arts and Humanities Research Council</u>
<u>DET</u>	<u>Digital Economy Theme (RCUK)</u>
<u>EPSRC</u>	<u>Engineering and Physical Sciences Research Council</u>
<u>GDS</u>	<u>Government Digital Service</u>
<u>HEFCE</u>	<u>Higher Education Funding Council for England</u>
<u>IoT</u>	<u>Internet of Things</u>
<u>IoTA</u>	<u>Internet of Things Academy</u>
<u>KTN</u>	<u>Knowledge Transfer Network</u>
<u>RCUK</u>	<u>Research Councils UK</u>
<u>REF</u>	<u>Research Excellence Framework</u>
<u>STEM</u>	<u>Science, Technology, Engineering and Mathematics</u>
<u>TSB</u>	<u>Technology Strategy Board</u>

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Appendix

Oral evidence/roundtable discussions

16.10.13

A new approach to design policy

<u>Chris Thompson</u>	<u>Connected Digital Economy Catapult (now the Digital Catapult)</u>
<u>Mischa Dohler</u>	<u>King's College London</u>
<u>Usman Haque</u>	<u>Haque Design + Research, Pachube.com, Connected Environments</u>
<u>Alexandra Deschamps-Sonsino</u>	<u>The Internet of People</u>

24.10.14

The digital revolution

<u>Jason Peart</u>	<u>Orange Digital</u>
<u>Colin Hart</u>	<u>Nissan Design</u>
<u>David Jenkinson</u>	<u>Elmwood</u>
<u>Jon White</u>	<u>Elmwood</u>
<u>Lee Schuneman</u>	<u>Microsoft Lift London Studio</u>
<u>Victor Nacif</u>	<u>Nissan</u>
<u>Neil Reeve</u>	<u>Nissan</u>
<u>Joel Bailey</u>	<u>Capita</u>
<u>Jonathan Rowley</u>	<u>Digits2Widgets</u>
<u>Ross Phillips</u>	<u>Dalziel & Pow</u>
<u>Paul Mason</u>	<u>TSB</u>
<u>Nick Appleyard</u>	<u>TSB</u>
<u>Gwen Haberman</u>	<u>HSBC private bank</u>
<u>Beatrice Rogers</u>	<u>KTN</u>
<u>Dr Andrea Siodmok</u>	<u>TSB</u>
<u>Alex Newson</u>	<u>Design Museum</u>

07.11.14

Convergence/Fusion/Creativity in Education

<u>Saint John Walker</u>	<u>Creative Skillset</u>
<u>Robin Baker</u>	<u>Ravensbourne College of Design and Communication</u>
<u>Dani Salvadori</u>	<u>Central Saint Martins, University of the Arts London</u>

12.12.13

Digital Makers

<u>Rosy Greenlees</u>	<u>Crafts Council</u>
<u>Michael Eden</u>	<u>Independent Maker</u>
<u>Harriet Vine</u>	<u>Tatty Devine</u>

22.1.14

The SME Perspective [Bristol and Bath Science Park]

<u>Bonnie Dean</u>	<u>Bristol and Bath Science Park</u>
<u>Anna Traylor</u>	<u>The Design Programme</u>
<u>Huw Robson</u>	<u>The Design Programme</u>
<u>Conor Mullan</u>	<u>Think Research</u>
<u>Nigel Austin</u>	<u>Cayder</u>
<u>Glenn Smith</u>	<u>Maplebird</u>
<u>Philip Norman</u>	<u>Robosynthesis</u>
<u>Matt Kane</u>	<u>Triggertrap</u>
<u>Stephen Kitson</u>	<u>Foilum Optics</u>
<u>Mark Probert</u>	<u>New Icon</u>

6.2.14

Research Councils

<u>Emma Wakelin</u>	<u>AHRC</u>
<u>Jerome Ma</u>	<u>ESPRC</u>

Individual Interviews

<u>Ben Terrett</u>	<u>Head of Design, GDS</u>
<u>Sir Mark Jones</u>	<u>Former Director, V&A</u>
<u>Susannah Haslam</u>	<u>Creative Exchange, Royal College of Art</u>
<u>Jennifer Gray</u>	<u>Independent Maker</u>

Design Commission Members

Peter Aldous MP	House of Commons
Alice Black	Design Museum
Lord Michael Bichard	House of Lords
Jeremy Davenport	Imagination, Lancaster University
Julian Grice	JG Consulting
Laura Haynes	Appetite/Design Business Association
Wayne Hemingway	Hemingway Design
Graham Hitchen	Directional Thinking
Emma Hunt	Huddersfield University
David Kester	Thames & Hudson
Catherine Large	Creative & Cultural Skills
Jeremy Lindley	Diageo
Kieran Long	V&A
John Mathers	Design Council
Jeremy Myerson	The Helen Hamlyn Centre for Design, Royal College of Art
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John Thackara	Doors of Perception
Baroness Janet Whitaker	House of Lords
Sarah Wigglesworth	Sarah Wigglesworth Architects
David Worthington	Holmes and Marchant Group

Digital Inquiry Steering Group

Alice Black	Design Museum
Jeremy Davenport	Imagination, Lancaster University
Julian Grice	JG Consulting
Clive Grinyer	Cisco
Graham Hitchen	Directional Thinking
John Mathers	Design Council
David Worthington	Holmes and Marchant Group

Secretariat (Policy Connect)

[Naomi Turner](#)
[Geoff Killy](#)

[Special thanks to Jocelyn Bailey and Anna Rzepcynski](#)

The Design Commission

The Design Commission is a research group that contributes to the work of the All Party Parliamentary Design and Innovation Group. It is composed of parliamentarians from all parties and leading representatives from business, industry and the public sector. Its purpose is to explore, through a series of investigative inquiries, how design can drive economic and social improvement, and how government and business can better understand the importance of design.

For more information see:

<http://www.policyconnect.org.uk/apdig/design-commission>



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**Designing the Digital Economy: Embedding Growth
through Design, Innovation and Technology**
May 2014

For further information please contact
Naomi Turner, Group Manager

Design Commission
Policy Connect
CAN Mezzanine
32-36 Loman Street
London SE1 0EH

020 7202 8588
naomi.turner@policyconnect.org.uk

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