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What does design research do?

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Abstract: This paper examines the aims, approaches, and impact of a selection of 62 contemporary design research projects in the UK. Whilst there is general acknowledgment that design research can contribute to the social, cultural, environmental and economic fabric of a nation, there is little evidence (to date) that articulates clearly the specific impact(s) of design research. This work, conducted over a four-year period (2017 to 2021), involved working with over 2,000 design researchers. Building, maintaining, and articulating impact is vitally important in the current research funding climate in the UK where there are significant pressures for governments and organisations to prioritise what are deemed to be essential components of a functioning society. As such, this paper aims to highlight the power and impact of UK-based design research across social, economic, cultural, and environmental contexts that contribute to a diverse and rich national landscape.

Keywords: design research; impact; funding

1. Introduction

Recent discussions around funding research in the UK have focused largely on issues such as whether the public receives “value for money” and if the research conducted has any “public benefit” Bate (2011). Impact resulting from design research (like many other disciplines) can sometimes be difficult to demonstrate, however, and often takes years to become fully realised. Generally speaking, it appears easier for the public to grasp the value of scientific research (in sectors such as medicine and biochemistry) whose aim may be to find vaccines for certain viruses or develop new materials and processes for addressing environmental issues.

Furthermore, the design processes undertaken to develop innovative products and services typically involves a multitude of disciplines and actors, which makes it difficult to isolate design as a function and clearly define all the contributors and beneficiaries from this type of work. Quantitative measures of impact, usually in solely economic terms, is inadequate and often inappropriate to capture the “...messy, debatable and unquantifiable but essentially human dimensions of life, such as history, beauty, imagination, faith, truth, goodness, justice



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and freedom" (Bate, 2011: 6). As such, there is a clear need to identify and adopt alternative ways of assessing and articulating the value of design research.

To address the challenge of identifying appropriate methodologies and evidence methods for assessing the value of design research in particular and arts and culture more widely to individuals and society, Crossick and Kaszynska (2016) have articulated the need for using a wide range of both qualitative and quantitative methods, drawn from social sciences, economics, as well as medicine, and adopting multi-criteria analyses that span the depth and breadth of multi-faceted areas of research, such as design.

Design researchers, it has been claimed (Nesta, 2017), are well equipped to tackle the complex social, environmental, economic, and cultural challenges the world faces (Nesta, 2017). This is due in no short measure to their varied skillsets in creative thinking, critical awareness and analysis, synthesis, and visualisation. It is also widely acknowledged that design research plays a key role in the manifestation of new products, services, systems, and environments, which go on to make a significant contribution to a nation's economy (Design Council, 2018). Furthermore, design research contributes to other disciplines in and beyond the creative industries and supports industrial competitiveness, innovation, knowledge, skills, and social policy (Press, 2011). Many forms of contemporary design research in the UK focus on activating change in social, cultural, economic, and environmental contexts. Design research projects contribute new and useful knowledge and understanding in a range of contexts. For example, the contribution that design research projects make in improving health and well-being has been extensively studied and includes the design of better healthcare environments and designed interventions to enhance social inclusion. All of this knowledge and understanding benefits design researchers and others through the development of more effective research methodologies and tools that enrich peoples' lives and ways of working both in the UK and further afield (Crossick and Kaszynska, 2016; Author, 2018).

Furthermore, new frameworks for collaboration are encouraging designers to work as cultural intermediaries between researchers and practitioners in different fields, cutting across disciplinary and methodological boundaries (Sanders, 2006). Whilst interdisciplinarity is highly valued and common amongst design practice and research as is the innovative way in which designers work with other researchers in different disciplines – such as scientists, ergonomists, psychologists, sociologists, to name but a few – the question of how design research draws value from other subject areas whilst also generating value of its own remains a critical issue of debate for the academic design community (Borja de Mozota *et al.*, 2016). Given the rapidly changing context in which design operates, it has become increasingly difficult to clearly assess and articulate the multi-faceted value that design research can generate. Furthermore, although the value of design has been object of several studies (Danish Design Centre, 2001; Rae, 2013; Westcott *et al.*, 2013; Cooper *et al.*, 2016; Design Council, 2007; 2018), such research mostly focuses on the strategic role of design in managing businesses and organisations, and in this context the term 'value' is used mostly in quantitative terms in relation to economic competitiveness. Rather than focusing solely on economic as-

pects of design, this paper adopts a more holistic approach and aims at interrogating the different types (*i.e.*, social, cultural, economic, and environmental) of value that design research can create towards enacting positive change.

2. What is design research?

One of the founding fathers of design research in the UK, L. Bruce Archer, described design research as the systematic inquiry into a particular subject, issue or problem area with the primary goal of finding or generating new knowledge and/ or understanding of, or in, the composition, structure, purpose, value, and meaning in manufactured things and systems (Archer, 1981). In this paper, design research is widened to include the following concerns:

- Design research is concerned with the physical embodiment of man-made things, how these things perform their jobs, and how they work.
- Design research is concerned with construction as a human activity, how designers work, how they think, and how they carry out design activity.
- Design research is concerned with what is achieved at the end of a purposeful design activity, how an artificial thing appears, and what it means.
- Design research is concerned with the embodiment of configurations.
- Design research is a systematic search and acquisition of knowledge related to design and design activity (Bayazit, 2004).

More recently, design research has been viewed as a creative and transformative force that can help to shape our lives in more responsible, sustainable, meaningful and valuable ways (Author, 2023). It has also been said that design (research/ practice) is the best tool we have available to us in making sense of the increasingly complex and challenging world we live in (Sudjic, 2009). Similarly, it is clear that design research occupies an increasing number of domains and this plurality is evident given the wide range of conceptual, methodological, technological and theoretical approaches in contemporary design research. Looking to the future, however, it might be argued that this plurality brings a number of issues for design research including:

- How will we ensure that design research is useful and enacted in order to be useful?
- How will we ensure that design research comprises not only an understanding of historical, cultural and social perspectives, but also be critical and challenging of these perspectives?
- How will we ensure that design research is enduring and that it avoids the trap of only focussing on current “hot” topics?
- How will we ensure that design research is well-structured and that it reflects a profound evolution in our vision(s) of the world and our way of inhabiting it?

- How will we ensure that design research is thoughtful and serious about what it is doing?
- How will we ensure that design research is clear and ensure it brings clarity to its myriad of processes, methods, activities, roles and values?

At its best, design research is self-explanatory and it is viewed as a highly desirable asset in various forms of professional practice. For example, the rapid and widespread expansion of user-centred and participatory design research approaches in service design, design for social innovation and co-design has seen a trend to use design as a transformational tool that has brought greater focus on design, requiring design researchers to be more open and co-operative in how they work, demonstrate their talents with both quantitative and qualitative research methods, and to highlight their ability to analyse and synthesise data and communicate findings in objective and compelling ways.

For Binder and Redström (2006), design research is similarly a venue for knowledge production that is directed by the professional interests of design communities (e.g., product design, service design, fashion design, etc.). To them, such research may be conducted by designers as part of their work, or it may be led by academic institutions that aim at expanding knowledge of ‘what’ can be designed and ‘how’ designing can be done. Binder and Redström (2006) raise a number of supplementary questions relating to design research including:

- How will design research ensure it is relevant and ensure credibility of its results?
- How does the knowledge produced relate to design itself?

3. Design research in the UK

The foundation of the Design Research Society in the 1960s marked the beginning of formal research pursuits in the UK by the likes of Bruce Archer, John Chris Jones and others. It is only in the last decade and a half, however, that significant opportunities to fund and develop design research have become more widespread. The establishment of the Research Assessment Exercise – RAE (later replaced by the Research Excellence Framework – REF) in 1986 and the creation of the Arts and Humanities Research Council (AHRC) in 2005 has opened up considerable funding opportunities for design research.

On the other hand, in the current climate where governments are applying strict austerity measures in relation to public funding, it is becoming increasingly relevant for them to reconsider what sectors are ‘worth’ investing public money in. In the UK, the ‘Report of the Machinery of Government Committee’ – also known as the ‘Haldane Report’ published by the Ministry of Reconstruction (1918) in the aftermath of the Great War – set out a series of principles for evidence-based policy making. Just over a century later, the Haldane Report offers us an excellent opportunity to reflect and make comparisons with how research funding has been utilised over the last century. The Haldane Report set out a number of principles to ensure that excellence is the main criterion for investing in research conducted in the

best interests of the country with decisions on which research projects to fund made by experts. Over 100 years later, the Haldane Report is still relevant today due to the complex economic, social, and political challenges we currently face, and given that such funding bodies are increasingly concerned with measuring the impact and value of research. For instance, the results of the REF are used every year to allocate around £1.6 billion to higher education research institutes in the UK (Higher Education Funding Council for England, 2015). Given that 20% of this funding is allocated on the basis of impact, there is a need for robust, fair and transparent assessment processes (Policy Institute at King's, 2016).

In the current climate of austerity, there are pressures for governments to prioritise what are deemed to be essential components of a functioning society, such as the national health service, national defence against terrorism attacks, advanced research into non-carbon resources, infrastructures for public transport, affordable housing, and general education. Given these priority areas, Bate (2011) shows that governments' funding for research in art and design is decreasing, since the 'value for money' or 'public benefit' of such research has been difficult to demonstrate. It is generally easier for the public to grasp the value of scientific research (in sectors such as medicine, biochemistry, and others) whose aim may be to find treatments for certain diseases or develop new materials and techniques for solving environmental issues. On the other hand, the value of design research can be difficult to articulate because it often entails intangible outcomes which are difficult to measure in quantitative terms, and whose impacts often take a long time to become manifest. Furthermore, the design processes undertaken to develop innovative products and services often involve a multitude of actors and hence it becomes difficult to isolate design as a function and clearly define all the contributors and beneficiaries from this type of work. With this in mind, while governments are obviously accountable for how taxpayers' money is spent, Bate (2011, p. 6) argues for the need to adopt alternative ways of assessing the value of research in the arts and humanities. Indeed, quantitative measures in economic terms are often inappropriate to capture the "...messy, debatable and unquantifiable but essentially human dimensions of life, such as history, beauty, imagination, faith, truth, goodness, justice and freedom". To address the challenge of identifying appropriate methodologies and evidence methods for assessing the value of arts and culture to individuals and society, Crossick and Kaszynska (2016) have clearly articulated the need for using a wide range of both qualitative and quantitative methods, drawn from social sciences, economics, as well as medicine, and adopting multi-criteria analyses that span the depth and breadth of multi-faceted areas of research, such as design.

4. Methods/Approach

This research was part of the author's four-year Design Leadership Fellowship funded by the Arts and Humanities Research Council (AHRC) that aimed to champion design research across all sectors of UK society. In so doing, the author developed and organised multiple activities that facilitated meaningful and impactful engagement with a wide range of researchers in design and other disciplines across the length and breadth of the UK. This included a

series of Next Generation Design Research workshops, Does Design Care...? workshops that explored notions of care, and two Design Research for Change showcase exhibitions at the London Design Festival in 2018 and 2019.

During this time, the author met and worked with over 2,000 design researchers and researchers from other disciplines working on a range of design-led projects that aimed to help drive industrial competitiveness, innovation, knowledge, skills, and shape new social policy across the UK in sectors such as healthcare, urban planning, engineering, computing, business and so on. From these interactions with design researchers all over the UK, it was clear that design research plays a key role in the social, economic, environmental, and cultural fabric of the UK.

In an effort to examine and understand better the significance of design research in the UK, this research asked the principal investigators of 62 self-identified design research projects a series of questions about what their design research does. The 62 self-identified design researchers were asked to tell us more about their design research project by completing an online form (questions below). The intention was to conduct this research via a series of face-to-face interactive workshops across the UK, but the covid lockdown restrictions at this time made this impossible. All design researchers were informed at the outset that the cases of **What Design Research Does...** we collected would be transformed into a set of cards that would, in turn, be distributed across the UK and overseas for others to learn from. Respondents were asked to try and keep their responses fairly concise (less than 150 words in response to each question) as there is limited space on each card. The researchers were asked the following questions:

1. Project title.
2. Who leads (or led) the project (Principal Investigator PI Name)?
3. Please provide us with one sentence that explains the project.
4. Does your project have a website? If yes, please provide the URL.
5. What were the key issue(s)/ challenge(s) that your design research project set out to address?
6. What design research methods/ approach(es) did the project use?
7. What did you make, design or deliver (e.g., outputs - products, tools, films, etc)?
8. What were your key results/ findings?
9. What impact has your design research had?

An example of one of the double-sided What Design Research Does... cards is shown in Figure 1. Here, it can be seen that each card comprises a project title, the lead investigator's name, project website, one succinct sentence that explains the project, the key issues addressed, the research methods and/or approach taken, the outcomes, key findings and/ or results, and the impact of the project – i.e., economic, social, environmental and/ or cultural.

Can't Wait to Learn: Digital Tablet Desk

David Swann, Sheffield Hallam University
warchildholland.org/projects/cwtl/

Co-designing a low-cost digital tablet desk for e-learners

Key Issues Addressed:
 Article 28 of the UN Convention on the Rights of the Child states that every child has the right to a formal education. In 2011, War Child Holland instigated the Can't Wait to Learn programme (CWTL) to develop culturally sensitive educational games for children who have never seen a teacher as a result of armed conflict. A CWTL trial in rural Sudan (2015) identified an unmet user need. The absence of traditional classroom furniture compelled young learners to hold a tablet device for prolonged periods while floor sitting. The primary objective of the design research was to co-design a low-cost digital tablet desk for floor-sitting e-learners that improved their visual gaze angle and sagittal head tilt to reduce stress on their cervical spine.

Research Methods and/or Approaches:
 An ergonomic study involving 57 school pupils analysed their gaze and head tilt in four positions: a neutral gaze, holding a tablet, using elevated tablet with a leg length of 350mm and 250mm. Research findings informed the iterative development of design propositions that were evaluated with young learners and CWTL facilitators in Sudan and Chad: single and dual-user desks, alternative seating configurations and differing methods for securing tablet devices.

Outcomes:
 The output is a design specification for a frugal and ergonomically sound Digital Tablet Desk that is sympathetic to the challenges posed by local manufacture.

Key Findings and/or Results:
 Data analysis identified that every pupil who held a tablet device exceeded the maximum downward gaze threshold of -35° as specified by the ISO Ergonomic Standard 9241-5. Additionally, the study discovered that elevating a tablet by 300mm improved their head tilt by 12° and reduced cervical spine load by 4.7kg - a 30% reduction.

Impact:
 As technical partner of WarChild Holland's award-winning Can't Wait to Learn programme, the research contributes to their future scale up plans in Chad, Burkina Faso and beyond.

What Design Research Does...









Figure 1 What Design Research Does... Cards Example

An Excel spreadsheet was created (Figure 2) that listed each of the 62 responses. Each of the 62 **What Design Research Does...** projects were then analysed taking a content analysis approach (Crowley and Delfico, 1996), which was chosen because of its ability to process large amounts of data with relative ease in a systematic manner. Content analysis is a useful research tool used to determine the presence of certain words, themes, or concepts within qualitative data (*i.e.*, text). Content analysis allows researchers to quantify and analyse the presence, meanings, and relationships of words, themes, or concepts.

Projects	SOCIAL	ECONOMIC	CULTURAL	ENVIRONMENTAL
Designed with DeMEntia				
Theatre of the Imagination				
Rewild My Street				
Hidden Florence: Geo-located historical walks in a context-aware environment				
Designing a Sensibility for Sustainable Clothing (S4S)				
3 x 4: Exploring metaspace platforms for inclusive future cities				
Living Design: The effective use of design for sustainability in maker enterprises				
VisitorBox: a toolkit to support ideation of novel visiting experiences				
Creating Sustainable Innovation through Design for Behaviour Change				
Can't Wait to Learn: Digital Tablet Desk				
Kos: Material Witnesses				
Woven Concrete: developing weaves for use in textile/concrete hybrid wall panels				
The Value of Disruptive Design Interventions in Informal Dementia Care Contexts				
Fashion Alternatives to Fur and Exotic Animal Materials				
Let's Go Walkeez				
Housing Design in Later Life				
Design Futures				
Microbial Storytelling				
Smart Non-woven Textiles for Adaptive Insulation				
Life-Saving Lullabies				
AMRSim: A Microbial Reality Simulator				
Evolvable Walking Aids				
Information Design and Architecture in Persuasive Pharmacy Space: combating Anti-Microbial Resistance (IDAPPS)				

Figure 2 What Design Research Does... Impact Analysis (Selection)

Adopting a content analysis approach, figures 2 and 3 show that the greatest number of the 62 design-led research projects have a social impact focus, followed by cultural impact and economic impact. Conversely, projects with a primary focus on environmental impact number less than one in five (20%). Social impact cases, here, includes a project that aims to transform urban streets for greater levels of wildlife and a project that aims to support individuals with recovery and rehabilitation after a stroke. In recent years, design has taken a social turn (Fuad-Luke, 2014; Shen and Sanders, 2022) that has seen design research and practice expand from being solely focused on forms of creative designer/ maker activities. This social turn has been towards greater roles in co-designing complex issues where design researchers and practitioners adopt multiple identities such as facilitators, activists and observers.

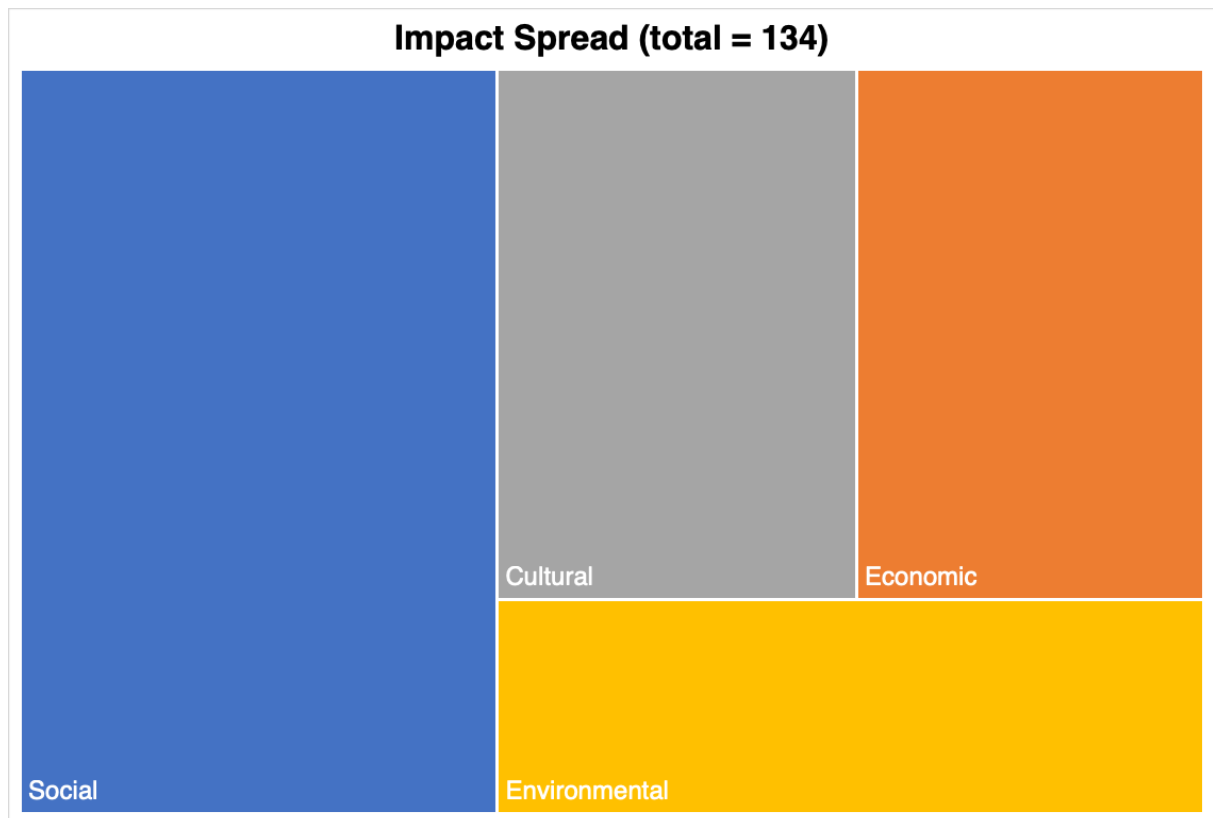


Figure 3 What Design Research Does... Impact Spread (Total = 134), Number of Projects = 62

Cultural impact includes projects that support innovative visitor experiences in museums and the creation of places of worship as catalysts for connecting communities. Economic impact projects include ones that have developed asset-based approaches to support young people to self-organise and ones that aim to build community care assets and agencies. Projects with an environmental impact focus include the creation of decorative alternatives to fur and exotic animal materials and the design and development of environmentally-friendly architectural products.

Figure 4 breaks down this impact further into more detailed categories highlighting the combinations between one kind of impact and another. For example, in Figure 4 it can be seen that there are more projects with a combined socio-cultural focus such as designing creative material culture in suburban faith communities to support enhanced community belonging than any other combination followed by projects with a socio-economic focus such as re-thinking office design to enable growing numbers of older people to participate in the 21st century knowledge economy and projects with an econo-environmental focus such as “Living Design” that explores the effective use of design for sustainability in maker enterprises.

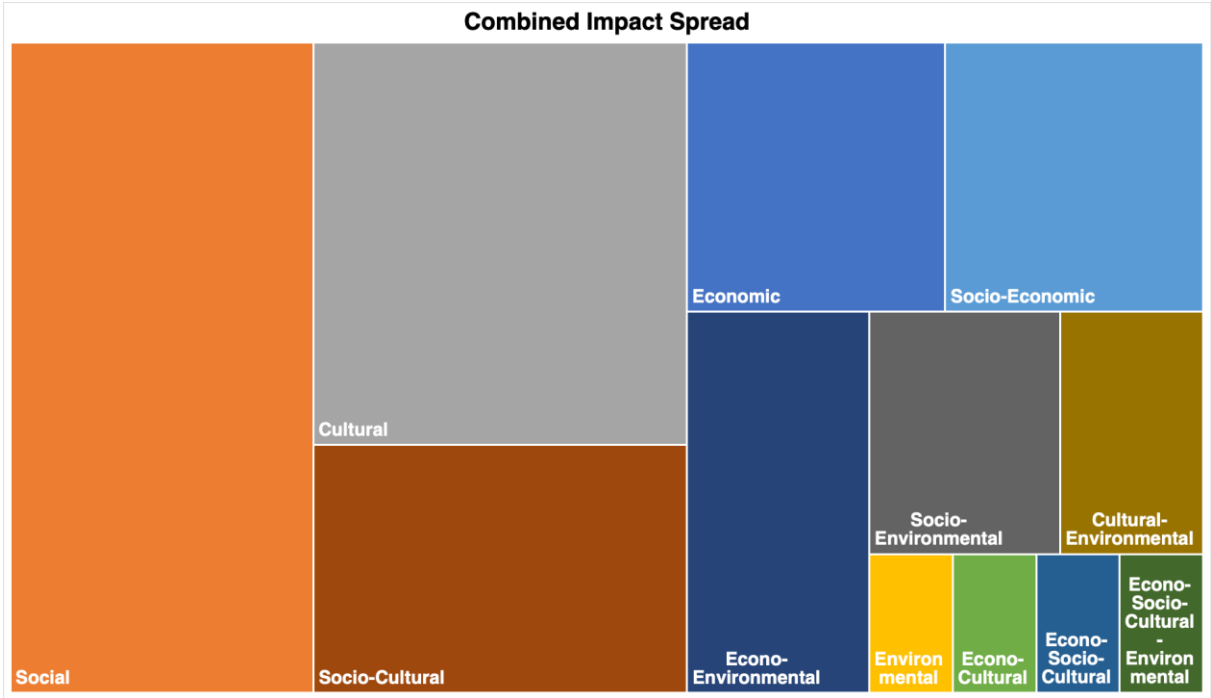


Figure 4 What Design Research Does... Combined Impact Spread

The combined impact of the 62 design-led research projects can be further broken down into more specific themes across the four major forms of impact namely social, economic, cultural, and environmental. This provides greater details into the context, specific aims, approaches, and methods and tools utilised in the 62 projects. For example, social impact can be broken down into a further 37 themes shown in Figure 5. Here, we can see that the specific themes relating to policy-making, dementia, and anti-microbial resistance are the most prominent in terms of social impact. This includes design-led projects that aim to impact and enhance policy-making through greater citizen involvement, designing and developing disruptive interventions for informal dementia health and social care, and raising awareness of the risk of infection-related (Anti-Microbial Resistance) in veterinary medicine.

Social Impact Themes						
Policy Making	Ageing	Co-Design Tools	Place-Making	Workhome Design	Urban Growth	Gender-Based Violence
	Solidarity	Self-Organisation Skills	Social Design Process	Behaviour Change	Domesticity	Community Life
Dementia	Communication Tools	Community Belonging	Communal Living	Post-Conflict Cities	Sustainable Communities	Craft Communities
	Collaborative Exchange	Inmate Resilience	Equality & Wellbeing	Social Services	Sustainable Urban Development	Woodcraft Groups
Anti-Microbial Resistance	Ageing & Dementia	Community Skill-Sharing	Healthcare	Inclusive Cities	Community Empowerment	Gender & Disability

Figure 5 Social Impact Themes

In terms of economic impact, 20 specific themes are found in the 62 design-led projects (Figure 6). These themes predominately relate to issues such as the creative economy, entrepreneurship, employment and skills, the informal economy, and knowledge work. An interesting dimension here is the turn towards reuse and repair and maker enterprise cultures.

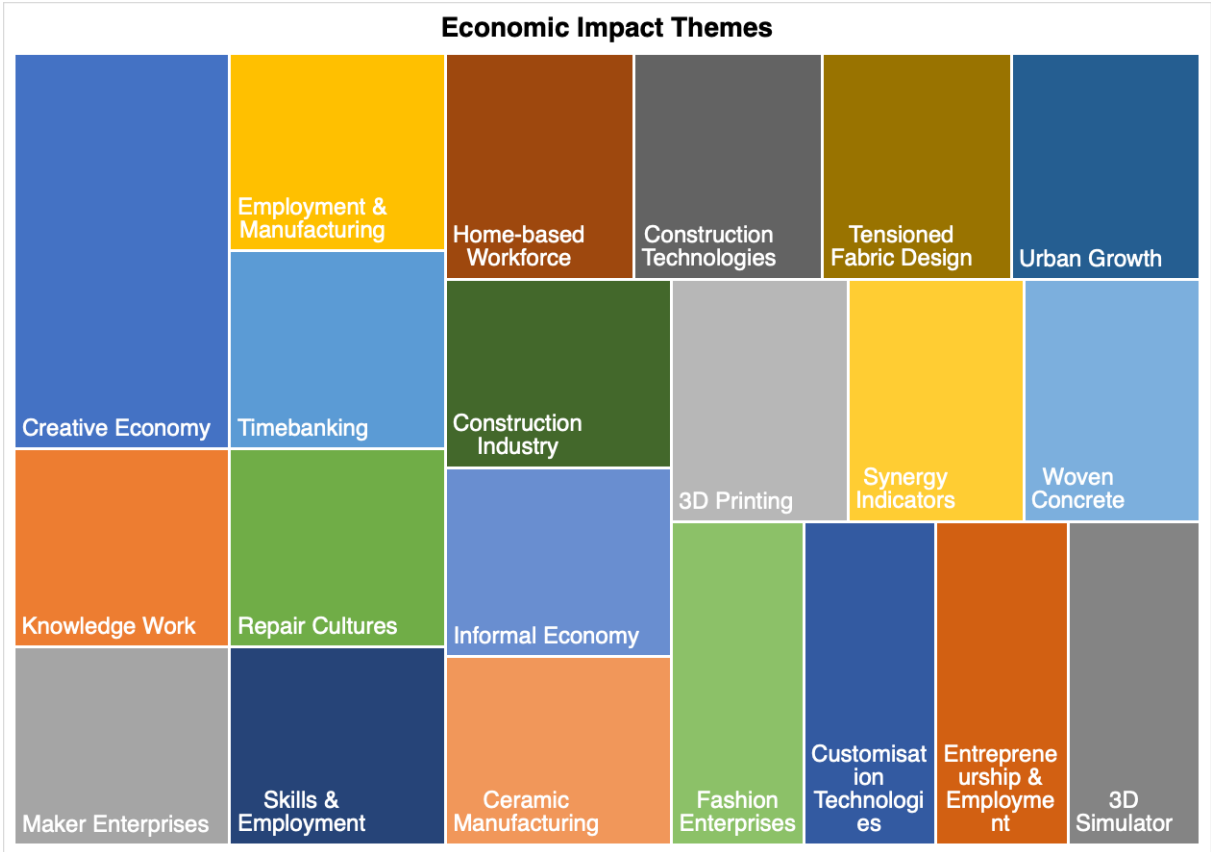


Figure 6 Economic Impact Themes

Cultural impact can be decomposed into 24 themes (Figure 7), which includes three predominant themes – archives, heritage experience, and traditional ecological knowledge. These three dominant themes include archival projects that cover research that examines British Design in an effort to reveal research competencies by connecting archive content and archival research focusing on a specific Victorian architectural practice (Culshaw & Sumners) and its impact on Liverpool’s built environment. Other predominant cultural impact themes include heritage projects such as the Virtual Reality of medieval culture of Cairo (virtual heritage), community-led heritage regeneration in India (heritage regeneration), enhancing the authenticity and sustainability of visitor heritage experiences and toolkits to support novel visiting experiences (heritage experience), and preserving and protecting cultural heritage from climate change impact (heritage protection).

Environmental impact across the 62 design-led projects covers themes such as sustainability, product longevity, and urban ecology. Figure 8 highlights the 12 themes in this type of impact with issues such as sustainability (general), sustainable fashion, and beekeeping being the most prominent themes. This includes projects that seek to achieve economic as well as environmental sustainability in designer/ maker enterprises and developing future sensibilities for sustainable clothing.

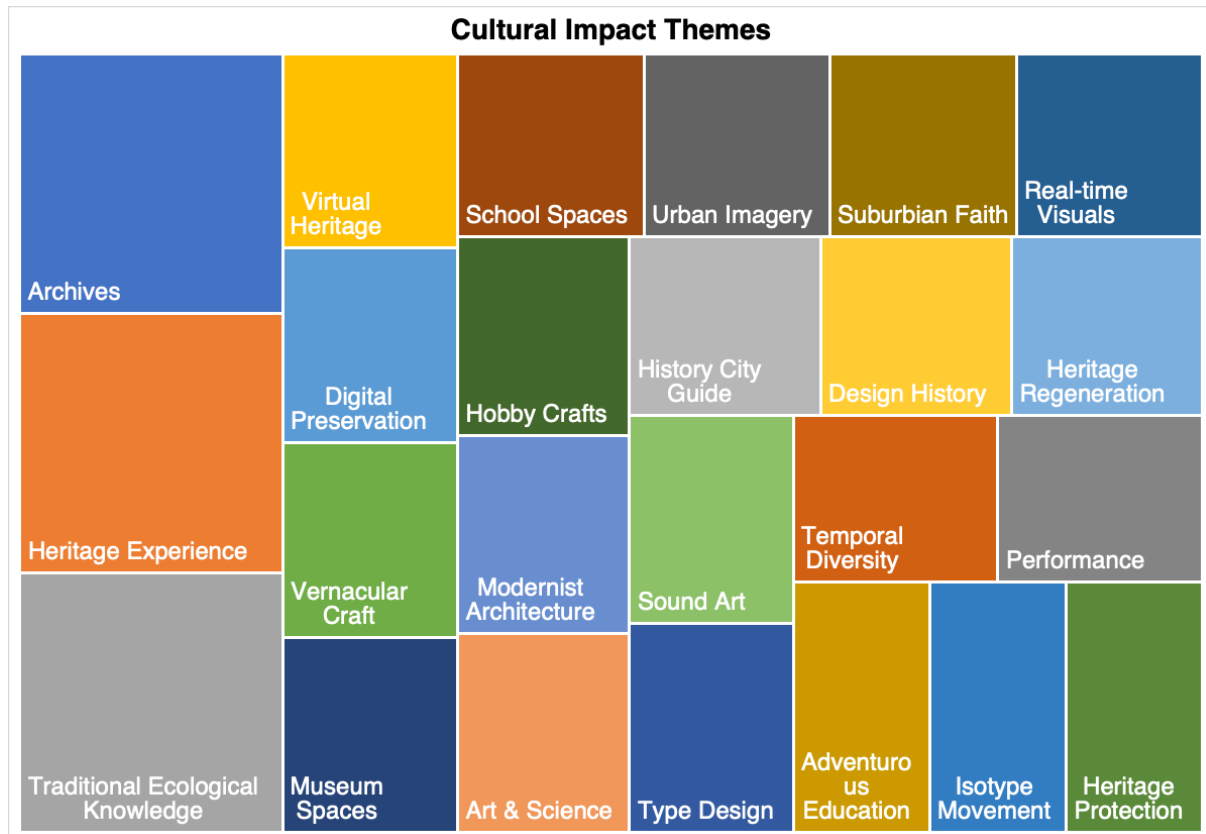


Figure 7 Cultural Impact Themes

5. Conclusions

Design has always been deeply concerned with all parts of contemporary life – with the economic situation as well as the ecological; with traffic and communication; with products and services; with technology and innovation; with culture and civilisation; with sociological, psychological, medical, physical, environmental and political issues and with all forms of social organisation (Rams et al., 1991). Given its complexity, design has thus meant working on history, on the present, and on the future and balancing technological and humanistic aspects of culture (Author, 2024). In short, design sets out to try and make the world a “better” place for human life – and increasingly more-than-human life (Coulton and Lindley, 2023) - and habitable, as well as to generate a better quality of life within natural and artificial environments.

The capability of design research to engage with a wide variety of different forms of knowledge across the social and physical sciences, the arts and humanities and transform this into new visions of the future through new products, processes, systems, services and policies means design acts as a facilitator of knowledge, an implementer of actions and is a key agent in shaping our futures.

The 62 design-led projects featured in this work show clearly that design research can solve problems – from the molecular to the multinational and that design is an inherent part of human activity and creativity. Design research can also be disruptive; it doesn’t simply build

on what has gone before; it overhauls, starts again, rethinks and remoulds; it returns to first principles to avoid assumptions (both good and bad) of earlier iterations, and in so doing, it finds answers to questions that perhaps have not even been asked.

This is why design research is so important, and why it is such a force for change. Design research, in a variety of guises, supports industrial competitiveness, innovation, new knowledge, skills and social policy. Through collaboration with researchers and practitioners across disciplinary fields, design researchers generate knowledge which is applied in other sectors such as healthcare, urban planning, engineering, computing, business and many others. Design research is a creative and transformative force that can help to shape our lives in more responsible, sustainable, meaningful and valuable ways. It has been said that it is the best tool we have available to us in making sense of the increasingly complex and challenging world (Sudjic, 2009).

In conclusion, this paper provides a rigorous examination of 62 contemporary design-led research projects in the UK and clearly maps out the social, economic, cultural, and/ or environmental impact in each one. This is important in the current research funding climate in the UK where there are pressures for governments to prioritize what are deemed to be essential components of a functioning society, such as the national health service, national defence, research into non-carbon resources, infrastructures for public transport, affordable housing, and general education.

Design researchers, it has been claimed (Nesta, 2017), are well equipped to tackle the complex social, environmental, economic, and cultural challenges the world faces (Nesta, 2017). This is due in no short measure to their varied skillsets in creative thinking, critical awareness and analysis, synthesis, and visualisation. It is also widely acknowledged that design research plays a key role in the manifestation of new products, services, systems, and environments, which go on to make a significant contribution to a nation's economy (Design Council, 2018). Furthermore, design research contributes to other disciplines in and beyond the creative industries and supports industrial competitiveness, innovation, knowledge, skills, and social policy (Press, 2011). Many forms of contemporary design research in the UK focus on activating change in social, cultural, economic, and environmental contexts. Design research projects contribute new and useful knowledge and understanding in a range of contexts. For example, the contribution that design research projects make in improving health and well-being has been extensively studied and includes the design of better healthcare environments and designed interventions to enhance social inclusion. All of this knowledge and understanding benefits design researchers and others through the development of more effective research methodologies and tools that enrich peoples' lives and ways of working both in the UK and further afield (Crossick and Kaszynska, 2016; Author, 2018).

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