Fundamental Research in Design, Lost Cause or New Approach?

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"I'd like to finish with three categories (derived from Herbert Read) with which I began, to make practical suggestions as to kinds of research which might suit, indeed grow out of, what we actually do [in design];

- *Research into art and design*
- *Research through art and design*
- *Research for art and design"*

Christopher Frayling, 1993

This quote, extracted from the RCA journal Research in Art and Design, describes three core forms of research into art and design. The first two are well known, representing design theory/studies and research through design/practice, but what of the third? Frayling described research for art and design as "thorny" and that it "needs a great deal of further research" (Frayling, 1993, p5). This "thorny" subject is researching art and design on a fundamental level, in essence researching for the progression and diversification of design and art instead of into it or through it. However, does this form of research represent a meaningful and independent aspect of modern design practice, and, indeed, should it?

This question came as something of an epiphany during my recent placement at Uscreates but as I considered the question in the context of my development as a designer it became clear that my perception of the role, or potential role, of research in design had suddenly changed. As a product design undergraduate and subsequently a junior designer, research was an outwardly focused tool for gathering information. My postgraduate studies in Interaction Design and my placements have shown me that design has extraordinarily broad applicability far beyond products, yet research has essentially remained a tool of design rather than a discipline of design aimed at expanding design itself.

This report aims to question and challenge the role of fundamental research in design, by considering contemporary opinions on design, whether fundamental design research exists in certain forms in contemporary design approaches and by creating discussion around ways in which we can progress fundamental design research.

Design Research - All Applied?

The concept of pure, basic or fundamental research is well known in many fields such as science and engineering but is rarely found in design (Frayling, 1993). Fundamental research is driven by curiosity, the desire to discover and explore without necessarily having a specific goal or outcome in mind. Fundamental research in other fields has led to the discovery of new technologies, explanation of phenomena and the creation and testing of new theories. Applied research, on the other hand, is characterised as being mission driven and aiming for a practical solution or setting out to study complex interactions between multiple factors such as people, technology and data (Shneiderman, 2016).

In the context of design, applied research benefits from the contemporary opinion of its own validity because it is trying to solve, better understand or critique the world's "wicked problems" (Rittel & Webber,

1973) with a plethora of top designers and scholars working in this field. Such work and individuals include Bill Gaver and his team who created cultural probes (Gaver, Dunne and Pacenti, 1991), Anthony Dunne and Fiona Raby with Speculative and Critical Design (2001), Ilpo Koskinen et al.'s work on constructive design research (2011) and the work of individuals such as Tony Fry (2010) and Carl DiSalvo (2012) around political design. What is interesting is that these examples represented different (and at the time, new) ways of designing and thinking about design. These individuals produced work that, arguably, contributed to the foundations of the field of design, by creating new methodologies and ways of thinking about design through, and because of, their applied research (Redström, 2017), yet they themselves, and the projects they embarked upon, do not reside in the realms of fundamental design.

Therefore, is there a need for a fundamental research in design? It appears that if the cog of applied design research keeps turning, the fundamentals of design will be advanced. But what if the original ambition or curiosity was to create alternative ways of looking at design and designing? Could an area of design research exist that aims to understand elements of design such as how design is different to other disciplines and why/how we design? What if this research designed experimental and conceptual works that don't aim to solve problems or change our understandings of interactions but to challenge and diversify contemporary design by means of proposing and testing novel approaches, movements, theories and mindsets? Furthermore, could the creation of a dedicated area for the study and research for design represent the creation of a research program (Koskinen et al., 2008) that aims to build upon design directly (Koskinen et al., 2011, p28)?

Research for Art and Design - Design for Design's Sake?

Design is considered by many to be a modern form of problem solving that employs different techniques and systems to attempt to creatively solve issues or meet needs for individuals, a populace at large or even the world (Cooper, 2017, p9). Therefore, is it the case that design only exists to solve or understand problems and is so interwoven into society because of this? There exist notable movements that challenge this 'mainstream' or 'affirmative' design such as critical or participatory design (Malpass, 2017, p8) that attempt to critique or alter how and what we create and start discussions around our assumptions and preconceptions. However, such approaches run the risk of being viewed as "design for the sake of design" (Malpass, 2017, p9) if they seem too introverted or without direct purpose. What if new initiatives in design, instead of being the result of a battle between the mainstream and alternatives, could be created in a dedicated, fundamental manner questioning the nature of design without necessarily challenging anything. If we assume this case, it could be argued that research for design is for the 'sake' of the design cause.

Furthermore, could a more fundamental perspective, that looks at design as the subject of study not as the object through which research is performed, respond to challenges put forward by current design scholars to find better ways to; disseminate knowledge and encourage peer review (Koskinen et al., 2008); build, test, discuss, critique and develop different theories in order to keep up with the plethora of physical examples that aim to do the same (Malpass, 2017, p6); aid in the discussion and understanding of the borderlines between design research and design practice (Koskinen and Krogh, 2015, p125); understand the past, present and future of design and create a "framework that can most effectively integrate the multiple voices, theories, arguments and claims" (Margolin, 2013, p405) in design?

Finally, by attempting to make better sense of this fundamental side of design and discussing it without the framing of a problem or issue, it could be possible to feedback into applied design and design practice in

unexpected, unintentional ways, if there is a means of translating between the two areas (Dorst, 2013, p14).

Where are All the Fundamental Design Researchers?
Occam's razor would indicate that the simple reason there is a lack of fundamental design research is that there is no call for it, no money for it or both. These issues are well known in other disciplines as it is notably problematic to directly prove the relevance and impact of fundamental research, meaning that the funding required is difficult to justify. This lack of funding has been highlighted by the European Union in a report discussing the future of design (European Design Leadership Board, 2012, p25).

In addition, designers are held traditionally as creators, crafters and builders instead of scholars, philosopher and academics and are therefore not "trusted" to perform such tasks (Brown, 2012, p124). This perception ties into the previous issues raised about the expectations, from individuals inside and outside the sphere of design, that design attempts to solve problems or show tangible results else it be considered 'a waste of time'. Therefore, currently, the nature and mindset of designers and design research have a propensity towards projects and works that are in keeping with the design status quo.

Ultimately, I am not suggesting that fundamental design itself doesn't exist. Rather, fundamental design is utilised on a case by case basis instead of existing as a definitive discipline.

Fundamental Elements in Current Design Approaches
Three contemporary design approaches used in design research, constructive design research, critical design and design thinking, do include research elements that can be considered fundamental. So, is fundamental design already integrated in design?

Constructive design research builds upon the concept of 'research through design/research through practice' whilst infusing the procedure with elements taken from science and engineering such as testing a theory or hypothesis and focuses specifically on building objects, not as solutions but as means to test and make sense of the subject of study and inspires itself from previous design movements, such as attempts to convert design into a rationalised discipline, without trying to reincarnate them (Koskinen et al., 2011). It is this theoretical testing approach that is the most pertinent to fundamental design research. Constructive designers have tested theories, such as the interaction rich camera (Koskinen et al., 2011, p51), that serves to discover instead of solve. Furthermore, emerging work from constructive designer discusses how research through practice can produce new theories, effectively considering design theory as something that is produced through doing and in an unstable flexible space, called "transitional theory" (Redström, 2017). However, constructive design requires that all forms of design and research are done ostensibly through creating objects. This runs the risk of alienating alternative design media.

Critical design aims to employ design and research as a means to create objects and literature to illustrate, critique and discuss: assumption, preconceptions, futures and itself (Malpass, 2017). This approach, which Dunne and Raby have explicitly insisted is design and not 'art' (Raby, 2008, p65), is interesting as it blurs the line between art and design and, arguably, fundamental and applied research as technically speaking it doesn't produce a solution to a problem nor does it create the basis of its projects through simple curiosity. It serves instead as a spark that ignites and accelerates discussion and debates. Furthermore, it has been questioned whether the work should count as accountable evidence in the research and design

process due to it granularity (Superflux, 2017). Critical design's original concepts, one that Dunne and Raby have said they were afraid would be lost by the nomenclature (Malpass, 2017, p5), which are to pursue the use of design beyond problem solving and asking "carefully crafted questions" (Dunne & Raby, 2001, p58) align with some of the core tenets of fundamental design research. However, the work of critical design tends to stop when a critique piece is created and falls short when it comes to the dissemination of knowledge, peer review and actual postulations and recommendations around how the matter it critiques could be altered or advanced.

Finally design thinking, an extremely popular term in today's non-design establishments, aims to understand, systematise (as much as possible) and recreate the process of innovation and describe the human-centred approach taken by designers (Di Russo, 2016). Design thinking is supported by several large corporate design powerhouses, such as Ideo, that produced 'tools' that aid aspiring or existing companies and individuals to improve or expand their abilities in design, research and problem solving (Ideo.com, 2017). Employing a design thinking ideology aids its practitioners to perceive the world of design as being able to produce knowledge and process instead of simply "new physical products" (Brown, 2009, p7). A design thinking approach could produce insights and adaptable frameworks to recreate conditions and techniques for driving fundamental design, similar to how these work for 'innovation'. Condensed versions of new concepts can be disseminated, by employing the same distribution of knowledge that has seen the success of new design thinking concepts reaching the masses. However, whilst this is design thinking's strength, it is perhaps also its weakness as it overly attempts to definitively create a constrained theory for design to be repeated.

A Way to Fundamental Design Research

Discussion Objects
To begin to define 'how' we should think of fundamental design research we must investigate it more deeply. The definition will only come by creating work around fundamental design that aims to test and push the initial ideas and ethos. Until then, and in order begin the discussion, I have created a number of 'discussion objects' that employ and repurpose existing tools and ideas to communicate my current thoughts.

A Foundation of Existing Approaches
Previously discussed design approaches, whilst not representing the entirety of the design spectrum, possess approaches, values and theories relevant to fundamental design research (see figure 1).
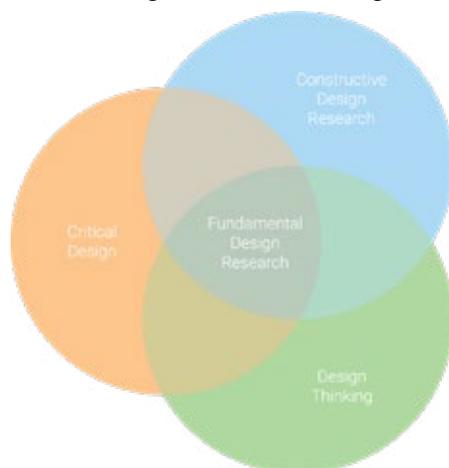

Figure 1
Venn diagram identifying the overlap of fundamental research approaches

In essence, fundamental research could use the theory testing procedure of constructive design, the lack of problem solving and broad mediums of critical/speculative design and the aim to create packages of information and tools of design thinking.

A/B/…C?

Extending the A/B concept from Dunne and Raby (2013) is also relevant to fundamental design research. The A/B table below, which served originally as a quasi-manifesto for speculative design, was designed to eventually feature more letters and isn't intended to have each new letter replace the previous ones but instead add a new facet to the debate. Here I have speculated on "C":

A	B	C
Affirmative	Critical	Quizzical
Problem solving	Problem finding	Problem removing
Provides answers	Asks questions	Provides alternatives
Design for production	Design for debate	Design for design
Design as solution	Design as medium	Design as discipline
In the service of industry	In the service of society	In the service of design
Fictional functions	Functional fiction	Fictional exploration
For how the world is	For how the world could be	For how the next world could begin
Change the world to suit us	Change us to suit the world	Change how we change us and the world
Science fiction	Social fiction	Design fiction
Futures	Parallel worlds	Alternative realities
The "real" real	The "unreal" real	The "possible" real
Narratives of production	Narratives of consumption	Narratives of approaches
Applications	Implications	Postulations
Fun	Humour	Hilarity
Innovation	Provocation	Heresy
Concept design	Conceptual design	Design of concepts
Consumer	Citizen	Designer
Makes us buy	Make us think	Make us progress
Ergonomics	Rhetoric	Fables

Table 1
My proposition for C

Problematising Sans Problems

Problem solving (figure 2) and problematising (figure 3) are well known elements of design. Both are relatively linear processes, in the sense that they aim to convert complexity to simplicity or vice versa. Fundamental design research, however, should look to produce new avenues of inquisitiveness perpetually, flowing between simplicity and complexity, aiming to pursue curiosity and experimentation to push design itself with either intentionally or unexpected results, ultimately without a 'problem' to drive it. With this in mind, I propose a loop that effectively aims to 'ruffle' or 'mess up' (elements of) design in the hope that the outcomes weave their way into the design world through testing and understanding called the 'dishevelling loop'.
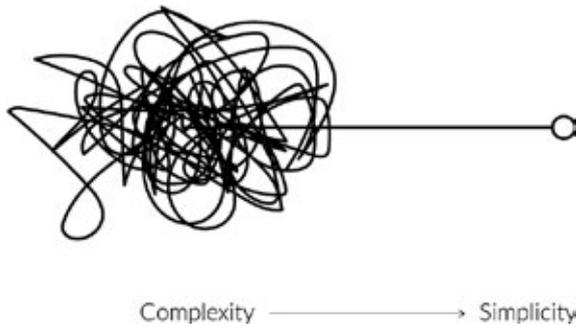
Figure 2
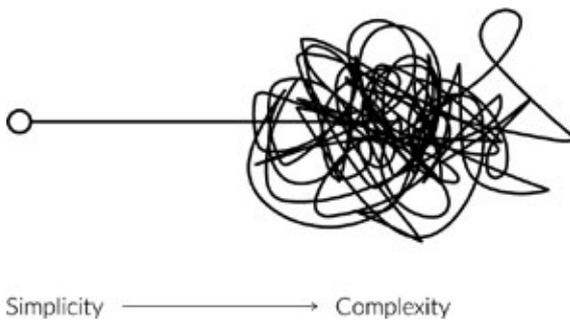Simplified representation of problem solving

Figure 3
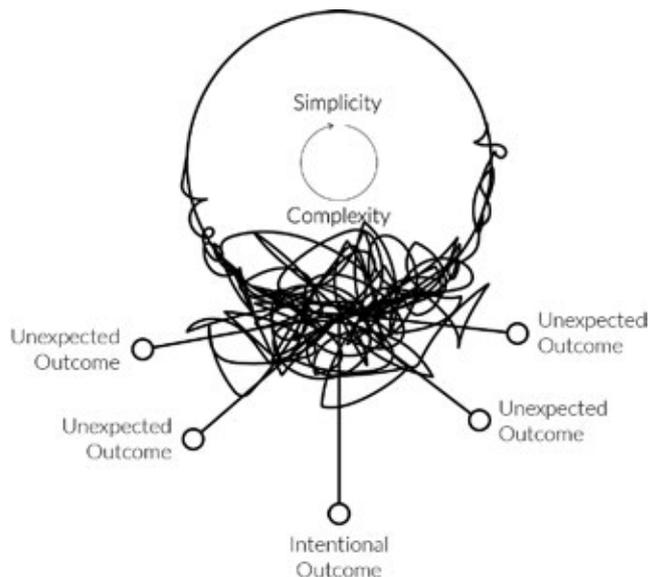Simplified representation of problematising

Figure 4
The dishevelling loop that creates new outcomes (international or otherwise)

Creating Relations

I believe that I am building a case for dedicated fundamental research in design. However, a major risk results from creating a fundamental research community, that they lock themselves away and produce work that: has no relevance or impact on the 'real' world; is difficult to understand and is written in an overly verbose manner; does not draw definitive conclusions; does not produce methods for the recreation or adaption of the work in other settings. Shneiderman points out that to avoid this there should be a balanced discussion between fundamental (in his case called basic) and applied research communities (Shneiderman, 2016, p27) as can be seen in the figure below (figure 5) taken from Shneiderman's work.

However, simply following this model, where individuals from each area work on projects together but ultimately return to their own areas, could lead to a gradual distancing of each section over time, losing the strength of the relation and the quality of output; which I have represented in figure 6.

Furthermore, most of the current use of fundamental design research is by applied research designers who tend to jump/dip into fundamental design as needed (possibly without realising it) (Figure 7).

With the integration of dedicated fundamental designers, it would be my hope that we could balance this out with individual designers from each area spending time in the other in order to keep them grounded (in the case of fundamental designers) or to help them consider and create other options (in the case of applied designers). This would hopefully lead to a stronger linked/anchored relationship between fundamental and applied research (figure 8). This idea represents more of an attitude instead of an actual mandate to change the design work one performs.
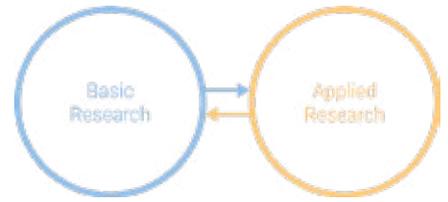

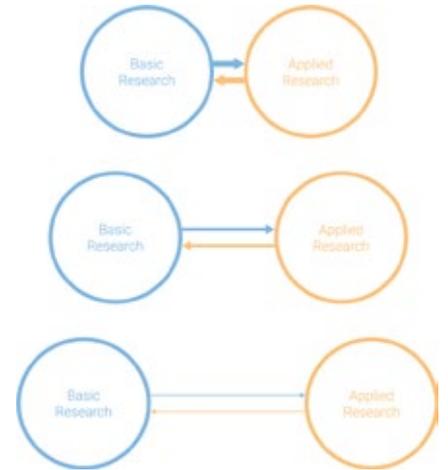**Figure 5**
The ABC (applied and basic combined) principle

Figure 6
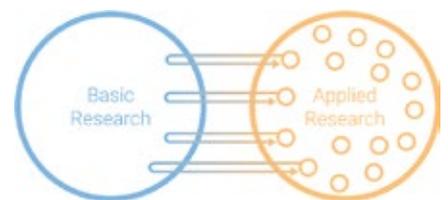The ABC spacing over time with weakening bonds.

Figure 7
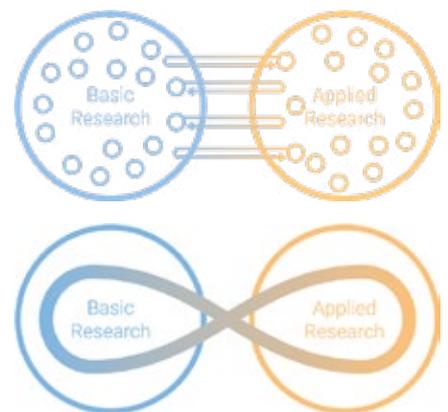The current design approach to applied and basic combined.

Figure 8
A balanced and strong relationship between basic and applied research on an individual and overall level

What Could Fundamental Design Research, research?

Leonard Bruce Archer, a designer and scholar who was possibly the first person to publish work with term "design thinking" in it (1965, p57), wrote several short papers discussing design as a discipline in which he describes design's difference to humanities and science amongst other topics (Archer, 1979). A diagram that he created demonstrated the different mediums through which humanities, science and design express themselves (language, notation and modelling) and what is produced when the different fields interact (and how that changes depending on the amount of influence from the fields) (Archer, 1979, p20). I have taken this work and reimagined it to identify the relations between three areas of design (mindset, theory and practice) and demonstrate different concepts (beliefs, values, skills, etc.) that fundamental design could use as topics of research.
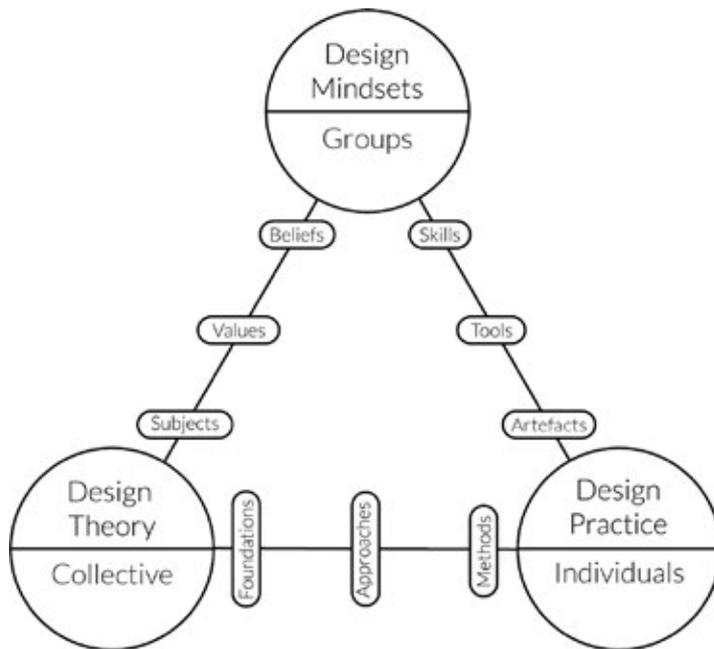
The Heart of Fundamental Design – Creating Design Catalysts

Fundamental design research could be a dedicated force that aims challenge, debate and diversify the mindsets, approaches and meanings of design. This process needs a starting point, a new idea, an avenue of research, a twist on an approach, something that incites research. These concepts could lead to bigger reactions, acting as 'Design Catalysts', themselves relatively small when compared to what they can create, alter or accelerate. Design Catalyst-ignited research could generate papers, prototypes and proofs that create meaningful 'bundles' of discipline knowledge such as abstracts, concepts, theories, thought pieces and methods (Koskinen and Krogh, 2015, p123). These bundles would then be debated to decide if they represent valid approaches to be added to the foundations of the discipline.

Catalysts designers would need an environment to test their work. Currently, three main concepts describe approaches taken by designers when creating and testing their ideas: Lab, Field and Gallery (Koskinen, Binder and Redström, 2008), each having its own purpose as the terminology hints. However, these approaches are more orientated towards applied research instead of fundamental (with the exception of perhaps the lab that bridges the two). The work and discussions around fundamental design would need a different environment, something similar to an Agora or other public places for discussion. Furthermore, this work could exist in the "design space" described by Johan Redström (2017, p2) which invokes the image of a diverse and varied environment of discovery.

Conclusion

This report deliberately raises more questions than it answers, discussing and illustrating the possibility of a new facet of the design discipline that studies the foundations of what design is, how it is approached and how it can be diversified. Notably I have avoided terms such as 'improve', 'optimise' and 'rationalise' as researching design fundamentally would aim to neither problematise nor problem solve but instead to ruffle, redirect and re-establish design and contribute alternative approaches instead of governing ones. Through studying contemporary design methods and mindsets, evaluating how leading designers do in fact produce fundamental design research work and by creating representations of what fundamental design research could be and do, I argue that there is a potential need for dedicated fundamental design research and provide a preliminary understanding of a new design approach. However, I do not protest to having it all right at this point. In fact, if for nothing else, I hope to employ this paper and subsequent work to 'throw myself to the lions' of the design community in order to hear and understand their criticism and to identify likeminded individuals willing to embark on this avenue of research with me. There is a mild irony that the first stage of fundamental design research is to fundamentally research itself, in the hope that it will be its own proof of concept. The fear here is that the concept is understood as attempting to produce design theory and generalist principles that try to define what design is whilst being detached from design itself, which is what some consider to be the purpose of more academic work. Instead, it should be seen as an approach that attempts to throw new ideas into the mix, catalysing new discussion, but is ultimately able to test out its own ideas, creating a loop between fundamental and applied research and effectively asking and answering its own questions. This would seem to contradict and yet uphold certain stances on how research in design should be conducted, claiming that we should embed the creation of theory into the results of our applied practice so that we are not choosing between theory and practice (Redström, 2017) as I am suggesting that it is vital that we maintain a strong bond between the two fields. However, the crucial difference of my argument is that both must be allowed to be, without permitting one of the areas to be absorbed within the other. Furthermore, I believe that we need a counter weighing approach that looks at theory and practice as separate, but linked, that can run alongside more amalgamated styles. We should aspire to allow individuals to contribute to design through a number of ways, including creating theory through practice but also practice through theory and even ways of translating between the two fields. After all, designers are recognised for their multi or trans-disciplinary abilities and it therefore stands to reason that we will be able to understand and contribute to design on a cross-design-disciplinary level.

This does not insinuate that any design work is relevant, but that relevant design work can come from anywhere, not just solutions to problems.

References

Archer, L. (1965). Systematic method for designers. London, Council of Industrial Design.

Archer, B. (1979). Design as a discipline. Design Studies, 1(1), pp.17-20.

Brown, T. (2009). Change by design. New York, Collins Business.

Brown, B. (2012). The State of Design. The Design Journal, 15(2), pp.153-167.

Cooper, R. (2017). Design Research: Past, Present and Future. The Design Journal, 20(1), pp.5-11.

Disalvo, C. (2015). Adversarial design. Mit Press.

Di Russo, S., (2016). Understanding the behaviour of design thinking in complex environments. Unpublished PhD thesis. Melbourne, Swinburne University.

Dorst, C. H. (2013). Academic design. Eindhoven: Technische Universiteit Eindhoven.

Dunne, A. and Raby, F., (2001). Design noir: The secret life of electronic objects. Springer Science & Business Media.

Dunne, A. and Raby, F., (2013). Speculative everything: design, fiction, and social dreaming. MIT Press.

European Design Leadership Board, Thomson, M. and Koskinen, T., (2012). Design for growth & prosperity: Report and recommendations of the European Design Leadership Board. EU.

Frayling, C. (1993). Research in Art and Design, Royal College of Art Papers, 1:1, (1993/4)

Fry, T. (2010). Design as politics. Oxford: Berg.

Gaver, B., Dunne, T. and Pacenti, E. (1999). Design: Cultural probes. interactions, 6(1), pp.21-29.

Ideo.com. (2017). Tools by IDEO. [online] Available at: https://www.ideo.com/tools [Accessed 1 Sep. 2017].

Koskinen, I., Binder, T. and Redström, J., (2008). Lab, field, gallery, and beyond. Artifact, 2(1), pp.46-57.

Koskinen, I. and Krogh, P.G., (2015). Design accountability: When design research entangles theory and practice. International Journal of Design, 9(1), pp.121-127.

Koskinen, I., Zimmerman, J., Binder, T., Redstrom, J. and Wensveen, S., (2011). Design research through practice: From the lab, field, and showroom. Elsevier.

Malpass, M., (2017). Critical Design in Context: History, Theory, and Practices. Bloomsbury Publishing.

Margolin, V., (2013). Design Studies: Tasks and Challenges. The Design Journal, 16(4), pp.400-407.

Raby, F., (2008). Zoom in zoom out: Z33 design & art projectscollected (pp. 63-65). Gent, Belgium: Z33 and MER Paper Kunsthalle.

Rittel, H.W. and Webber, M.M., (1973). 2.3 planning problems are wicked. Polity, 4, pp.155-169.

Redström, J., (2017). Making Design Theory. MIT Press.

Shneiderman, B., (2016). The new ABCs of research: Achieving breakthrough collaborations. Oxford University Press.

Superflux. (2017). Can speculative evidence inform decision making today? — Superflux. [online] Available at: http://superflux.in/index.php/speculative-evidence-inform-decision-making [Accessed 1 Sep. 2017].