



Design for Complex Situations: *Navigating ‘Matters of Concern’*

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Design is increasingly being deployed within complex situations where networks of diverse organisations and actors seek to navigate contested futures that are subject to organisational, social, political and economic debate. Here, design supports collaborative exploration resulting in creative compromise that develops actionable, designed, opportunities. Using a case study from 2015-2019 in the context of careers guidance public policy and the practices in UK Secondary Schools, this paper reviews the participatory design practices and the challenges that came from working in a complex and contested space. Analysis highlights that design practices and artefacts can act as a mechanism that enables a public to identify and grapple with issues that matter to them while also navigating controversies that produce their own policy position. A design-content model is discussed and extended in the context of the case study’s finding leading to a contribution about the different roles that may be offered by design in complex situations as contributing to a *matter of concern*.

Keywords – Matters of Concern, Design Things, Infrastructuring, Complex Situations.

Relevance to Design Practice – This research is about design that aims to contribute within complex and contested situations. Using a case study in the context of public policy for careers guidance in UK Secondary Schools, the research highlights practices that appear important and challenges that emerge as designer-led participatory design transitions to user-led meta-design.

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Introduction

There is growing interest in design applied within complex situations. There are a number of significant theoretical discussions and tools helpful for conceptualising the challenges, participation models and contributions of practice in this area. However, examples of practical interventions in complex situations and the development of distinctive practices are under reported. This paper contributes to addressing that gap. Using a case study, some of the difficulties of conducting design for complex situations are discussed and the challenges for *non-designers* operating in design arenas are explored.

Creative shaping and authorship of social, material and technical systems and environments is not a new concept to Design Research and has been discussed and debated at length (Simon, 1956, 1968; Papanek, 1984; Jones, 1991; Buchanan, 1992; Lawson, 2006; Cross 2006, 2011; Ehn, 2008; Binder et al., 2011; Kimbel, 2011, 2012; Manzini 2015; Norman & Stappers, 2016; Dorst et al., 2016; Dorst, 2017). While the professional situation of practice for designers has always been associated with high levels of uncertainty and ambiguity (Cross, 2006; Michlewski, 2008, 2015) requiring abduction (Dorst, 2015a, 2015b) as the dominant form of logic, there is recognition that designers and design-led approaches are being utilised in consideration of complex systems where attributes that cannot be observed in simple systems such as nonlinearity, uncertainty, emergence, scale, and self-organisation, are present (Norman & Stappers, 2016). The sphere of design for complex situations requires the most serious attention of design research if design practitioners are to further their ability to contribute, in collaboration and in parallel with other change

agents in other competency fields, to addressing some of the most serious and concerning issues about how life is lived and organised and the impact that different forms of living produce.

Addressing the Design History Society and making the case for an expanded notion of design, Latour (2008) posed the challenge to the design community: “How can we draw together matters of concern so as to offer to political disputes an overview, or at least a view, of the difficulties that will entangle us every time we must modify the practical details of our material existence?” (p. 12) and “where are the visualization tools that allow the contradictory and controversial nature of matters of concern to be represented?” (p. 13). These are indeed good and helpful questions but Stephan (2015) was correct, they do not go far enough, as ‘representation’ is only a partial contribution that design might make in drawing out *matters of concern*. Stephan affirmed that:

...Latour’s *matters of concern* concept can be extended to put design in a position where it can actually contribute to setting the agenda for these debates. Designers have always conceptualised new life forms and proposed practical alternatives. These design projects then enter the discourse arena, not in the symbolic form of arguments—visualised or otherwise—but as materialised artefacts. (p. 214)

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To explore design's interaction with a *matter of concern*, a case study is used to demonstrate how design supported different actors and organisations to engage meaningfully in a complex situation. The case study, produced from data generated between 2015-2019, is situated as part of the Gatsby Foundation (n.d.a) *good careers guidance pilot* with a particular focus on the aspect of careers guidance relating to 'experiences of workplaces'. The study sits in the context of public policy for careers guidance and its practices in UK Secondary Schools and has been constructed through three phases: (1) participatory design practice (framework design); (2) participatory design practice (framework implementation); (3) semi structured reflective analysis.

This paper presents key literature exploring the concepts of *matters of concern*, Design Things, and Infrastructuring to develop a conceptual framework through which data resulting from the participatory design practice is analysed. The case study's context is introduced and methodology described before presenting findings that highlight challenges and indicate valuable practices in the context of design for complex situations. The paper concludes with a description of different forms of contribution that the practices of design for complex situations can make in developing *matters of concern*. It also raises a warning regarding inadequate understanding about, and tools to grasp and work with, influential political, economic and organisational ideas and practices.

Theoretical Lenses

This section presents three theoretical lenses—Matters of Concern; Design Things; and Infrastructuring—that will then be explored and discussed through the case study.

Matters of Concern

Latour (2004 & 2008), contrasts *matters of concern* with *matters of fact*. According to Latour *matters of fact* are associated with the Modernist narrative of emancipation, detachment, modernization, progress and mastery. *Matters of concern*, however, result from

a post-modern narrative of attachment, precaution, entanglement, dependence and care. Ripley, Thun, and Veliko (2009) provide the interpretation that *matters of fact* are developed without consideration of desire and exist without context in pursuit of the indisputable. This, they contrast, with *matters of concern* which are "centred in desire" and "gather context(s) into themselves disputing the possibility and efficacy of indisputability" (p. 6). This distinction is not intended as simply highlighting the social construction of scientific facts, for Latour (2004) the effort is not to get away from facts but to get closer to them, renewing empiricism. Latour is interested in critical theory and the development of a new descriptive tool that deals with *matters of concern*, not to debunk but to protect and to care, to add reality not to subtract it, not to get away from facts but to get closer to them. This is constructive, rather than deconstructive; an approach that assembles the subject as richly diverse, historically situated, infinitely complex and engaged with its own inherent contradictions and controversies. *Matters of concern* gain definition as a consequence of open-ended gathering; through the active participation of material and non-material, human and non-human, ideas, forces, players, things, objects, and are persistent because they are supported, cared for, and worried over. Conscious assembling attempts to resolve disputes and navigating controversies gives the *matter of concern* form.

In order to clarify the position of the authors in this paper about *matters of concern* it is useful to consider how it aligns to other recognised understandings of design and design practice. When design engages in a *matter of concern* it is not like design as problem solving. As Dorst (2017) highlights, "it seems that as long as the design goals are explicit, clear and stable, and a set of comparable solutions can be generated, design can be treated very much like problem solving" (p. 19). To engage in a *matter of concern* the conditions are not stable; the situation is complex, contested, open and dynamic, goals are unclear or lack definition. However, nonlinear sequences of practice and the ambiguous and underdetermined nature of design problems have been examined and discussed in detail (e.g., Buchanan, 1992; Cross, 2006). In the context of wicked problems and problematic situations the value of design-abduction is argued—"how to think from consequences (e.g., a need to be addressed, or a value to be attained) back to causes (the designed objects, systems, services) and working principles (the way things work, as well as the way they need to be used/enacted to achieve functionality)" (Dorst, 2015a, p. 24). Frame Creation (Dorst, 2015b), is positioned as an approach that allows design and non-design practitioners to produce solutions to today's open, complex, dynamic, and networked problems and DesignX (Friedman et al., 2014; Norman & Stappers, 2016) aims to produce solutions for problems inherent in complex socio-technical systems. However, our position is that when design engages in a *matter of concern*, it is not intended as a problem-solving activity or an activity that will produce solutions to problems it identifies; many of the practices and approaches will be similar but the orientation is different as are some of the outcomes.

For design, an orientation towards *matters of concern* is a move from the notion of a *problem-definition* | *solution-development* imperative, commonly found in many descriptions

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of design practice and design thinking (Brown, 2009; Design Council, 2005), and the view that, the “[designers] goal is to generate a matching problem-solution pair” (Dorst & Cross, 2001, p. 435). According to DiSalvo (2009):

Problem-definition often is a self-serving, self-perpetuating activity to solidify the current position and extend the reach of professional design practice. Problem definition, as commonly conceived, implies the identification of a matter that can and should be addressed by design. (p. 60)

When design engages in a *matter of concern* it does not do so under the presumption of twinning design-led problem-definition and design-led solution-development; design may stop at the discovery and articulation of disputed issues. Other change agents in other competency fields may be better suited to progress from the identified dispute.

When design engages in *matters of concern* the application of the *tactic of tracing*—“the activity of revealing, of exposing the underlying structures, arguments, and assumptions of an issue” and “to follow and record the presence and movement of an artifact, event, or idea” (DiSalvo, 2009, p. 55) and the *tactic of projection*—“the representation of a possible set of future consequences associated with an issue” (p. 52) are relevant. Does design have a role to play beyond *tracing* and *projecting*? A matter of concern is not resolved by design, but it can be clarified and articulated through design engagement. While resolution is not a goal, perhaps design can contribute to the richness of the *matter of concern* by helping different constituents to see the complexity of their situation more clearly and act thoughtfully while creatively navigating contested issues. As an epistemic praxis as opposed to a form of experimentation (Ammon, 2017) design can illuminate the challenges, contradictions and possibilities of adapting our relationships, actions and material conditions and its specific artefacts, resources, tactics and strategies can draw in and engage audiences in debate about contested aspects of plausible futures and their consequences. How might design effectively use the skilful application of tracing and projection to help groups navigate and act within their complex situation, not in a conceptually linear move from difficulty to response, but to fold in new narratives, artefacts, infrastructure, interventions, actions and their consequences into the richness and dynamics of the *matter of concern*?

Design Thing

For Latour and Weibel (2005), a *thing* is an assembly, a gathering intent on dealing with the disputes and controversies related to a *matter of concern*. Ehn (2008), extending this thinking in the context of Participatory Design, focuses on Design Things and strategies for making them public. In the context of practices that encourage democracy, empower the resource-weak and support the engagement of a heterogeneous public, Ehn, presents Design Things as a valuable conceptualisation of design. Design Things, are dynamic social-material environments which enable a shared object of concern to be engaged with as an object of

design. To grasp the notion of Design Things it is helpful to consider two other concepts that Ehn develops; design-games, and *representatives* of the design object. *Design-games* are the coordination and efforts of participants to engage with an object of design. *Representatives* of the object of design, produced through design-games, take form that can be experienced (e.g., sketches, models, prototypes). *Representatives* of the object of design (1) gradually evolve as more refined descriptions of the object of design and (2) are a public thing that support communication and participation in design-games. Ehn suggests that Design Things have the potential to extend design into political processes and public debates. However, he highlights that this demands platforms or infrastructure—which need to be designed and implemented—through, or within, which a public, characterized by heterogeneity, can engage not to solve conflict but to constructively deal with disagreements.

Citing Dewey’s book *the public and its problems* and the assertion that publics are not a priori existing masses, DiSalvo (2009) explored the role of design in the construction of publics. His claim is that “it is the actions and effects of others communicating issues and their consequences, that prompt a public to come into being” (p. 51). The concepts of a Design Thing and Publics are compatible. Warner (2002) argued that a public is a social space amongst strangers, unbounded in quantity, reflexive and self-organising in quality and formed through temporal participation with a discourse that addresses them. A Design Thing, therefore, can be conceived as a socio-material environment developing discourse, related to a *matter of concern*, about how things might be through which publics form by participation. An orientation to Design Things is a significant shift from the paradigm of design-led problem-definition and design-led solution-development. In situations where the *right* actions are unclear and contested, a Design Thing, as a heterogeneous assembly gathered in design-games, supports expression about and participation with the *matter of concern* and the *taking of action* or *making of action*. A Design Thing, therefore, materialises a negotiation where compromises are embedded. From the perspective of a participant (individual or organisation) *representation* of the object of design and the taking or making of action might be perceived as a solution for them in their context at that time, but it is not for the *matter of concern*. For the *matter of concern* the expressions, artefacts and actions fold into the envelope of the *matter of concern* and enrich it as political actions and as political things.

Infrastructuring

Infrastructuring relates to the concepts of *meta-design* and the notion that design takes place before use and during use. Challenging the production of media that treats humans as passive consumers, Fischer and Scharff (2000) present their conceptualisation of meta-design in the context of interactive systems, stating that, “meta-design characterizes activities, processes, and objectives to create new media and environments that allow users to act as designers and be creative” (p. 396).

Tonkinwise's (2004) notion of *unfinished things*, which, in part, builds on Jones' (1983) idea about *continuous design and re-design*, captures the challenge for designers in enabling meta-design and facilitating design-after-design:

What is at issue is not whether designers are capable of designing nothings rather than things, that is to say, services rather than products, but rather whether designers are capable of designing things that are not finished. It is less a matter of designing a different sort of thing than a matter of a thoroughly different form of designing, one that is perhaps better described as form of 'continuous design' or 're-designing.' (Tonkinwise, 2004, p.28).

Redström (2008), in his conceptual exercise *RE:Definitions of use* moves attention from who does what in the design process to what people do in the design process, highlighting the importance of users engaging in design development work and also the importance users continuing to adopt and adapt things through and in their use.

The work of Ehn (2008), Björgvinsson et al., (2010), Hillgren et al., (2011), Dantec and DiSalvo (2013), Parmiggiani and Karasti (2018), and Botero et al. (2019) have explored the concept of Infrastructure in their respective Participatory Design contexts. Often cited by these authors as the source for the concept is the work of American sociologist Susan Leigh Star (1988 & 1996). According to Star (1996), "infrastructure is something that emerges for people in practice, connected to activities and structures" (p. 112). Infrastructure is relational, the question is not what is an infrastructure but when is an infrastructure.

An infrastructure occurs when the tension between local and global is resolved. That is, an infrastructure occurs when local practices are afforded by a larger-scale technology, which can then be used in a natural, ready-to-hand fashion. It becomes transparent as local variations are folded into organizational changes, and becomes an unambiguous home—for somebody. (p. 113)

Infrastructuring comprises the strategies, processes and practices of developing effective infrastructure. According to Ehn (2008), "the challenge and object of design for professional design at project time is the design of such potential public things that as infrastructuring can become objects of design in use" (p. 96). This is a central issue for those concerned with Social Innovation, Transition Design, DesignX, Frame Creation and innovation broadly which demand extensive collaboration over time and among many stakeholders and relates to systems of replicability, adaption, localism, and scalability as well as to the concepts of democracy, sustainability and resilience. For Dantec and DiSalvo (2013), Infrastructuring, is a practical and political *unfinished thing*; practical in helping publics navigate and contest issues; political in the production of narratives and resources that "allow others to develop attachments to their issue and agenda" (p. 256). In their work, they claim that:

Infrastructuring enables a public's members to identify and address issues in an ongoing manner, creating a socio-technical response that relates the current context of the public to the future context the public is trying to attain. Infrastructuring thus can be viewed as one of the key components to sustaining a public over time. (p. 258)

While design-for-future-use as infrastructuring and design-for-use as practical system design are different—one opens up questions and possibilities, while the other narrows possibilities through practical design moves—the two can complement each other and coexist as a means of expressing the attachments between publics. (p. 257)

A *matter of concern* is a subject recognised and engaged with in the context of interdependence. It is a subject located in a situation that is complex, contested, open and dynamic. Developing a Design Thing requires that an object of design is identified from the broader *matter of concern*. As a constructed socio-material environment a Design Thing aligns participants and resources to engage with disputes and controversies related to a *matter of concern* while creating through design-games *representatives* of the object of design. The creation of a socio-material environment, a Design Thing, supports design-games abstract from use (participatory design). The practice of infrastructuring extends the supportive function of the Design Thing to bind the design-games abstract from use with the design-games of designer/users during use (meta-design). The practice of infrastructuring supports a continuity of design practice beyond the traditional boundaries of *the design project* offering to a public new means to give shape and expression to the worlds they imagine and the struggles they seek to overcome.

This research uses a case study to examine the transition between participatory design and meta-design. It seeks to develop our understanding of infrastructuring that aims to help different constituents to see the complexity of their situation more clearly as a *matter of concern* and to act thoughtfully while creatively navigating contested issues with *Representatives* of an object of design.

Good Careers Guidance —A Case Study

The Good Careers Guidance case study, presented below, seeks to further our understanding about design and action in *matters of concern* as influenced and influencing publics and policy. The case study highlights drivers, practices and tensions that appear important in navigating the controversies inherent in a complex situation such as this. The paper's case study leads to a discussion about the levels of design content produced by design for complex situations and the relationship between policy (its intent, metrics and administration) and infrastructuring to support ongoing re-design.

Background—Establishing a Matter of Concern

In the UK between 2010-2014, careers guidance for young people changed significantly. Through the Education Act 2011 the UK government terminated the annual £200 million funding allocation for the national network of Connexions centres (a dedicated careers guidance service for young people) and shifted the statutory duty to secure independent careers guidance for all students in Year 8 through 13 (approximately 12 to 18 years old) from local authorities to individual schools (Department for Business, Innovation & Skills, 2014; Department for Education,

2013, 2014; House of Commons Education Committee, 2013). Until 2012, schools in England had a statutory duty to provide work-related learning (interpreted by most schools as a work experience placement), but the Wolf report (2011) led to a shift in emphasis, suggesting that work experience would be more effective if delivered to those 16-18 years of age. As a result, the government removed the statutory requirement for work related learning for pupils pre-16 years of age. This was arguably the biggest change in policy in 40 years and was intensely debated (Career Development Institute, 2015).

In 2013, The Gatsby Foundation commissioned Sir John Holman with setting out what Secondary Education career guidance in England would be like if it were *good* by international standards. The Good Career Guidance Report (Holman, 2014) summarized key literature and provided pragmatic actions that could improve career guidance in England based upon an analysis of English and International schools. The Gatsby Foundation (n.d.b) hold the position that:

Every young person needs high-quality career guidance to make informed decisions about their future. Good career guidance is a necessity for delivering technical education reforms and is a vehicle for social justice: those young people without social capital or home support suffer most from poor career guidance.

Holman proposed a set of eight benchmarks for Secondary Education providers to use as a structure for improving their careers provision. The eight Gatsby Benchmarks of Good Career Guidance are (Holman, 2014):

1. A stable careers programme
2. Learning from career and labour market information
3. Addressing the needs of each pupil
4. Linking curriculum learning to careers
5. Encounters with employers and employees
6. Experiences of workplaces
7. Encounters with further and higher education
8. Personal guidance

There are disagreements and different perspectives about: how young people should learn about the diversity and changing landscape that is the world of work; how young people are best prepared to make educational choices that will affect their future options; how young people are best prepared for the practices and cultures of the world of work; when and how this learning should occur; who (which organisations and people) is responsible and who pays the bill; how success is evaluated and what the metrics are? Furthermore, rapid technological advancements and social change are drastically transforming the labour market (Hooley, Watts, and Andrews 2015; Independent Skills Taskforce 2014) making the task of navigating highly complex pathways through post-compulsory education, work and training even more uncertain and complex. Policy makers, government support agencies, third sector organisations and private companies, schools and colleges, teachers, employers, pupils and parents are all involved in the various elements of defining and administering the policy environment, the regional infrastructure and the

organisational mechanisms for delivering and benefiting from good careers guidance. This is a complex and contested situation of broad societal concern: by definition, a *matter of concern*.

Context—The Formation of a Design Thing

This case study relates to good careers guidance in secondary level education in the UK and is situated in the context of the 2015-2019 North East Gatsby Good Career Guidance Benchmarks pilot (Gatsby, n.d.a). In 2014, when the benchmarks were proposed, there was no effective national and regional support for schools and this complex situation contained sets of historical political ideas, agendas and policies and legacies of previous institutional efforts, struggles, and successes both lurking in the dark and propagated as solutions-in-waiting. The Gatsby Foundation worked with the North East Local Enterprise Partnership (NELEP—one of the UK's regional development agencies) to manage the pilot across 13 schools and 3 colleges within the region. The pilot, monitored across four-years, sought in Part 1 (2015-2017) to test how schools and colleges can move from their starting points to a position of achieving the benchmarks and in Part B (2017-19) to measure performance. To stimulate experimentation in addressing the Gatsby Benchmarks an Innovation Fund was established for the pilot schools and colleges. This funding helped to facilitate a participatory design collaboration between one school (henceforth referred to as Pilot School 1), that was Ofsted Outstanding in 2014 with approximately 850 pupils, and a university based multidisciplinary team (referred to as The Design Team). The focus of that collaboration, targeted by Pilot School 1 because of its perceived difficulty, was to develop innovative solutions to *experiences of workplaces*, one of the eight benchmarks.

Benchmark 6: Experiences of Workplaces—Every student should have first-hand experiences* of the workplace through work visits, work shadowing and/or work experience to help their exploration of career opportunities, and expand their networks. By the age of 16, every pupil should have had at least one experience of a workplace, additional to any part-time jobs they may have. By the age of 18, every pupil should have had one further such experience, additional to any part-time jobs they may have. **As far as is possible, schools and employers should ensure these are positive experiences.* (Holman, 2014, p. 26)

This collaboration allowed a Design Thing to form to engage with disputes and controversies related to good careers guidance in sets of specific circumstances where the object of design was the benchmark *experiences of workplaces*.

Methodology

—Participants, Practices and Methods

This work adopts a methodology consistent with the principles of case study research utilising a single-case study with focus placed on the complexity within a particular set of circumstances and conditions to understand the activities and outcomes that emerged (Stake, 1995; Flyvbjerg, 2013). The case study uses mixed methods

to produce understanding about the challenges and characteristics associated with design for complex situations. Figure 1 presents an illustration of the project timeline and key activities related to the context of the Gatsby Good Careers Guidance pilot, the participatory design practice project and the construction of the case study. The case centres on data generated through the efforts of a group of people to develop thinking and a new approach that allows schools, within their different socio-economic and organisational contexts, to provide meaningful experiences of workplaces for all pupils. As a case study the authors divided the research activities into three phases. Phase 1, covers the first three stages of the funded design project and captures participatory design practice (Björgvinsson, 2012). This practice, led by The Design Team utilising their design and business expertise, drew on the educational expertise of the collaborators and the knowledge and experience of the pilot network to produce an understanding of the *matter of concern* identifying and responding to creative tensions as they arose (Sterling et al., 2018). Figure 2 provides photographs illustrating the studio, workshop environments and the resources produced to support the *work investigations framework* (the output of the design project). A summary of the data gathering, generating and analysis methods for Phase 1 is presented in Table 1.

Phase 2 of the case study covers the final two stages of the funded design project and extends beyond them as pilot schools learnt from the experiences of implementing their plans and running their initiatives. The authors consider this phase as a continuation of a participatory design practice, but significantly it

marked a transition of expertise and leadership. Phase 2 began with a period of work whereby the 'work investigations framework' was tested and refined. This process involved working separately with three of the pilot schools to use the framework to develop a bespoke initiative and implementation plan. Phase 2 captures the action research of the Pilot School 1 careers lead during 2017 and 2018. A summary of the data gathering, generating and analysis methods for this phase is presented in Table 2.

Phase 3 of the case study covers the final analytical element. The primary method for the phase is a semi-structured reflective analysis (Gibbs, 1988). Supporting this analysis were four semi-structured interviews. The first three interviews were with the careers lead at each of the three pilot schools that participated in Phase 2. These interviews sought to understand: a) how these practitioners had continued a form of design practice; b) if and to what extent the adaption or continued use of the *work investigations framework* had informed their practice; and c) what challenges or drivers (new or continuing) were influencing change. The fourth interview was with the pilot's co-ordinator and developed a reflective commentary on the value and shortcomings of the *work investigations framework*. The final reflective analysis was a structured review whereby the two lead academics examined their own experiences, the practitioner transcripts, and the project documentation thematically using the conceptual lenses of *matter of concern*, *design things*, and *infrastructuring* to identify key practices and challenges that emerged. The results of this analysis are presented in the Findings section.

Table 1. The methods used in the phase 1 in the case study.

Primary Method	Supporting Methods	Support Materials	Scale	Case Study Evidence
Participatory Design Practice (Björgvinsson, 2012)	Literature Review (Hart, 1998)	Publicly available material	Review of UK school-based careers guidance policy, practice and critique (2010-2016)	Key themes, ideas and debates and a collection of best and innovative practices
	Expert Interviews & thematic analysis (Flick, 2009)	Semi-structured survey	15 interviews with individuals with expertise in careers guidance and/or Gatsby Benchmarks. Each 20-60 minutes in duration	Interview transcripts and findings
	Co-creation workshops	Adapted Design Thinking, Service Design, & Co-creation tools and resources	1. 30 pupils (approx. 14yrs-old) – 4hrs 2. 15 school & careers support service staff (4 pilot schools represented) – 3hrs 3. 20 pupils (approx. 15yrs-old) & 5 careers experts – 4hrs 4. 35 careers leaders from the 16 pilot schools – 6hrs	<ul style="list-style-type: none"> • Researcher notes from each workshop • Workshop outputs & The Design Teams analysis and interpretation • Collections of ideas, challenges, and concerns produce by those tasked to lead careers guidance and those intended as recipients of that guidance
	Design-led Innovation Practice (Bailey & Spencer, 2019)		Studio-based team of 6 student on a Multidisciplinary Innovation Masters programme	<ul style="list-style-type: none"> • A set of frames translating the ambiguity of the situation into design briefs (Bailey et al., 2019) • Project material raw and curated as a process log and report on key findings, insights, ideas and proposals
	Formal Progress Reviews	<ul style="list-style-type: none"> • Project outputs • Pilot progress reports • Pilot School 1 updates 	Multidisciplinary design team (6), Pilot School 1 lead, Pilot Facilitator, Researcher, 2Project Academics	Researcher meeting notes
	Reflective Critical Review	All project materials to date	Academic leads and project researcher	Commentary on the strengths and limitations of the design-led innovation practice and the co-creation workshops

Table 2. The methods used in the phase 2 in the case study.

Primary Method	Supporting Methods	Support Materials	Scale	Case Study Evidence
Participatory Design Practice (Björgvinsson, 2012)	Co-production	Work Investigations Framework	Individual sessions with three different pilot schools 2-3hrs per session	<ul style="list-style-type: none"> Initial implementation plans Researcher reflective notes
	Reflective Critical review	All project materials to date	Academic leads and project researcher	Commentary on the strengths and limitations of the Work Investigations Framework
	Action Research (McNiff, 2013)	<ul style="list-style-type: none"> Practitioner annual plans and reviews World-of-Work Week initiative 	<ul style="list-style-type: none"> 2017: 'experiences of workplaces' initiative (yr10 & yr12). 2018: 'experiences of workplaces' initiative (yr10 & yr12). Principal Investigator and Pilot School 1 Lead 	Notes from a semi-structured reflective discussion

Table 3. The methods used in the phase 3 in the case study.

Primary Method	Supporting Methods	Support Materials	Scale	Case Study Evidence
Semi-structured reflective analysis	Semi-structured user interviews	Interview transcripts	PI & design project academic lead	Findings documenting practices and challenges that emerged during the case study
	Document review	<ul style="list-style-type: none"> Research reports and reviews Design project reports and logs 		

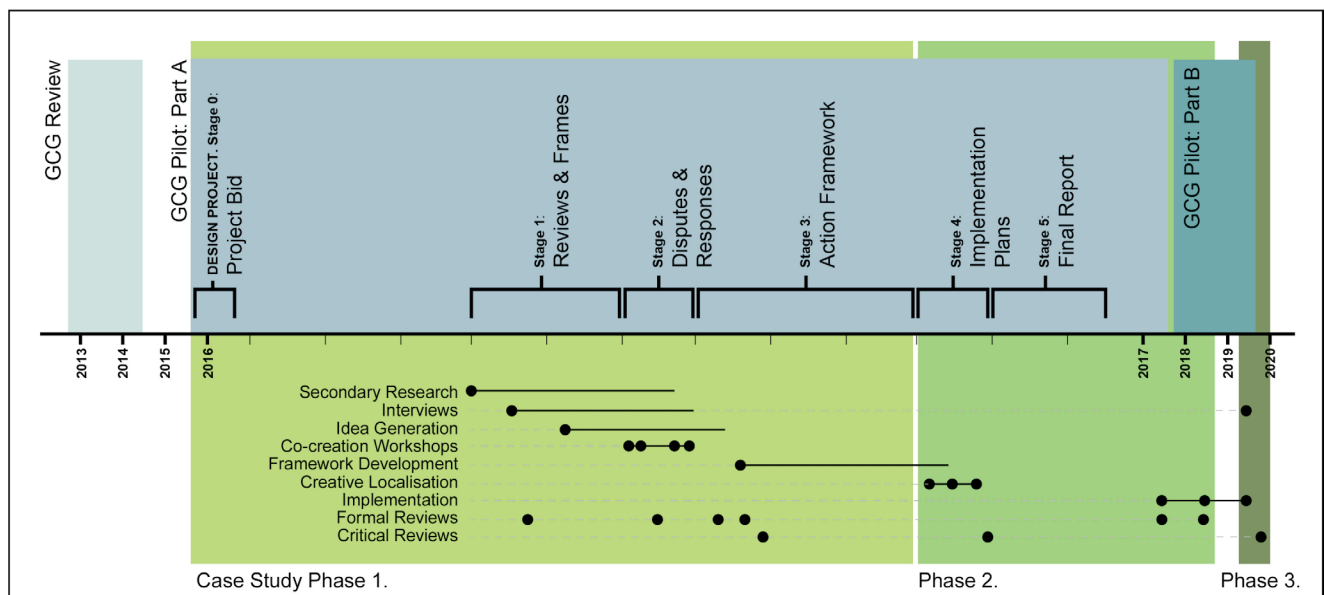


Figure 1. The research process used in the case study of Good Careers Guidance.



Figure 2. The photos in the case study: a) The design project team in their studio; b) Pilot project careers leaders in workshop 4; c) Pupils, staff and the design team during workshop 3; d) Development of the work investigations framework resources; e) Examples of the work investigations framework resources.

Findings

Transitioning from Design-games Abstract from Use to Design-games During Use

This finding relates to the experiences of individuals, expert in their own fields but inexperienced in design practice, as they engage in a Design Thing from participatory design into meta-design. The finding highlights some of the difficulties that can arise during the progression from design-games abstract from use (participatory design) to on-going design-games during use (meta-design). The finding also highlights how in this case study the knowledge and *representatives* of the object of design began to act as infrastructuring supporting the confidence of practitioners as they continue design-games during use.

In the beginning; Dec 2015. Pilot School 1's careers lead (Careers Lead 1) reported in 2019 that initial positivity about their engagement with The Design Team came from the belief that there was now no need to worry about Benchmark 6; they had commissioned solutions. The task for the careers lead was to engage with the process to ensure that the solutions were affordable and to develop an action plan in parallel.

Unpicking complexity and re-framing; July 2016. Data demonstrated that some Pilot School 1 participants believed that *solutions* that had been generated and resources that had been identified—which could have been evaluated, costed, implemented, managed and successful—were being dismissed. There was the perception that challenging and questioning the purpose and mechanisms of the benchmark was generating greater uncertainty and that this was unwelcome. This was a transition point. A transition from a set of design-games as participatory design with a broad set of stakeholders to more focused design-games with very specific careers leaders within a set of pilot schools. At the end of July 2016, a *representative* of the object of design, an initial work investigations framework, was presented. Emotionally, this was a low point; communication between Careers Lead 1 and the Principal Investigator was tense. Reflecting on the July 2016 presentation in July 2017, Careers Lead 1, reported that the presentation had confirmed their fears. Solutions had not been produced and how much work would be required by them to develop something useable and presentable to their school's leadership was unclear. The intention was that this *representative* would be refined by The Design Team before conducting creative sessions using the framework to co-produce an intervention and implementation plan specific to a school's context. However, that intent did not ease the tension or anxiety.

Engagement with the matter of concern's controversies; Oct. 2016. In individual sessions with 3 pilot schools The Design Team worked through a refined version of the work investigations framework to explore a set of controversies (see below). In these design-games the creativity of lead practitioners was encouraged as they explored basic, bold and ambitious versions of initiatives across different year groups as progressive pathways. Initiatives were refined as positive and negative impacts for different stakeholders were considered and compromises were identified and initiatives further adapted in order to act and deliver immediately and again in the following year with the logistics and

resources currently available. The controversies that these sessions explored, deliberately focused on a number of conceptualisations about the benchmark that the design work had identified, while developing context specific proposals and an action plan. The controversies were:

1. Workplace experiences are a central feature, provide source material, but are not the goal.
2. Workplace investigations are not driven by career aspirations.
3. Workplace investigations do not need to be individual pursuits.
4. Workplace investigations may use aspects of work shadowing, work visits or work placements but these are located in a broader endeavour.
5. Raising career ambition and increasing social mobility is not a goal of workplace investigations.
6. Digital visits are a legitimate means to experience workplaces.
7. Schools are workplaces and can be included within workplace investigations.
8. Learning about the world of work must be naturalised within curricula across all years.

According to Careers Lead 1 these sessions were pivotal. They acknowledged the limitations of The Design Team's expertise, gave recognition to the expertise of school-based careers leaders and demonstrated the value of working together in a structured but creative manner. In 2017, Careers Lead 1 described these sessions as being "positively pushed to think deeply and creatively about the value and organisation of educational experiences outside of curriculum—which is not often done in schools!" Confronting the set of controversies in a supported and supportive manner seemed to unlock a realisation within the practitioners. This appears to be the point where ownership of a new design-game was realised, accepted and most importantly valued by the practitioners.

Initial delivery; July 2017. Pilot School 1 ran their groupwork-based intervention—a *world-of-work week*—with all their year 10 pupils in 2017. In semi-structured reflective discussion in July 2017, after attending the pupil presentations at the end of their world-of-work week, Careers Lead 1 drew attention to the anxiety and antagonism they had felt in July 2016 after the mid-point presentation. With the euphoria of a highly successful delivery and an apology, Careers Lead 1, described how they now champion the approach of the work investigations framework as a public design thing. This practitioner described four reasons for this: (1) it develops new ways to see workplaces, where they are and how to access them; (2) it supports the development of a number of visions for work investigations based on: (a) the complexities of work and enterprise; (b) emerging forms of work and inaccessible or transitory workplaces; (c) developing workplace case studies year on year; and (d) collaborating with other schools to enhance an investigation's scale and depth; (3) it encourages sequencing of learning across all year groups and gradual embedding within curriculum; (4) it helps to develop a roadmap to move towards your visions based on gradual adaption and re-design of a careers guidance programme. The evidence suggests that aspects of the work investigations framework became important in supporting on-going engagement with the object of design and in promoting its value for other practitioners in their contexts of practice.

Embedded practices; July 2019. During interviews with the three pilot schools (Case Study Stage 3.) evidence emerged that suggested that for two of the three schools an on-going design process based on the work investigations framework was now an established aspect of their annual routine. As one participant put it: “[Our] vision is constantly evolving. I don’t think there is an end-point. That’s what we learnt during Gatsby, it’s a constant cycle of review/implementation/review/re-design” (Pilot School 2, 2019, 21st May). In the third pilot school interview there was little evidence of the framework influencing practice. It is not clear why this is; however, a number of personnel changes took place in the careers role in that school and this discontinuity may have been significant. In all three schools what was apparent were year-by-year challenges and opportunities influencing practice. For example, a significant increase in pupil numbers in Pilot School 1 led to a re-conceptualisation of delivery arrangements; for Pilot School 2 the opportunity to access funding linked to Science, Technology, Engineering, and Mathematics (STEM) subjects and work re-orientated their intervention for a year. Interestingly, when these challenges and opportunities arose, the practitioners from Pilot School 1 & 2, stated that they felt more confident in creatively responding to them because of the experiences they had when participating with The Design Team.

Finding Summary. This finding is about the transition from design-games abstract from use (participatory design) to on-going design-games during use (meta-design). The finding highlights how challenges, concern and anxiety emerged for stakeholders as they related design-games abstract from use into their own professional contexts. It also highlighted how in this case study highly specific design-games with individual practitioners and their school context were critical for those practitioners to assume ownership for the object of design and their own meta-design practice. This finding draws our attention to how fragile the connection can be between design abstract from use and design during use. The relationship between the two is not a pre-figured *chain* linking one design-game after another. This finding suggests that enabling effective transitions between design-games abstract from use to design-games during use requires careful consideration and perhaps nurturing of the designer/user’s readiness.

Infrastructuring Has form that Makes a Contribution to a *Matter of Concern*

The collaboration and The Design Team did not set out to create infrastructuring. In 2015 when the project was devised the call for help really was as crude as, “We need help. We recognise that the way we think about Benchmark 6 is not going to work. If we can’t find a new way of thinking about Benchmark 6 we’re not going to be able to achieve it” (Pilot School 1, December 2015). The output of The Design Team, a work investigations framework, materialised a different way of thinking about the benchmark and afforded to schools flexibility in how to achieve it. This framework acted as infrastructuring; it is a design artefact, with characteristics similar to service design blueprints, that the participating pilot schools engaged with to make sense of their own context and design their own intervention plan for how

their pupils would have meaningful experiences of workplaces. However, what appeared hidden was the thinking structure that underpinned the design resources that supported engagement with the framework. The case study analysis sought to synthesise the data to create a representation of that thinking structure. The authors believe that this thinking structure represents the form—the shape—that underpins the infrastructuring. It is the structure and shape of a frame that provides a practical way of seeing the object of design in the *matter of concern*. The form of the infrastructuring, in this case, emerged through four actions and is summarised in Table 4. in relation to the form of Benchmark 6 as defined by the Gatsby Charitable Foundation (Holman, 2014).

Action 1. Identifying multiple perspectives on a situation. Resulting from a number of the early interviews with school and careers leaders it became apparent that they perceived that their task [as schools] was not to challenge or nuance the benchmark but to develop the plans, relationships, and processes to operationalise and deliver effectively. This perception was further clarified during the first two co-creative workshops that explored different stakeholder positions and developed idealised user journeys. The following concerns and imperatives were identified:

School management—How much time and how much resource is required to achieve this benchmark? Are these costs really justified for the educational and development benefits of our pupils?

Careers lead—What do pupils need to do to prepare, experience, and learn about workplaces? How many businesses do we need to develop and maintain relationships with to achieve the benchmarks; what technology and regional support is available; how do you optimise and make this aspect of careers guidance efficient, effective and integrated into school practice and curricula? How do I cost something, when I don’t know what that something is?

Regional businesses—what is required; what is our role; what flexibility is there; how do we make the experience ‘meaningful’; will this effort help develop a talent pool?

Pupils—why should I do this, why should I care or try, how will I know if I have been successful?

Regional development agencies—what networks and knowledge management, and events would support all schools; what common barriers are schools facing and how might these be addressed?

Action 2. Positioning the worth aimed for. Shifting the central challenge from logistic or operational concerns The Design Team adopted learning outcomes, a pedagogical device, through which to conceptualise the desired pupil outcomes associated with *experiences of workplaces*. These learning outcomes were used creatively to engage participants. These initial pupil learning outcome proposals are as follows:

Pupil learning outcomes: (1) Be able to produce an understanding of the complexity and variation within a workplace and locate that within the context of the world of work; (2) Grasp and apply critical questioning in order to interrogate and depict a workplace; (3) Locate personal competencies, values and ambitions within an understanding of the world of work to inform personal development planning.

Action 3. Debating conceptual challenges. Three types of conceptual challenge were created that underpinned creative exploration within and after co-creative workshop 3 and 4. The sets of challenges were formed as a response to the pupil learning outcomes and to elements perceived by The Design Team as under considered or ignored by participants. The following were the initial sets of challenges:

Example Workplace Challenges: (1) Which workplaces are transitory, temporal, predominantly digital, or difficult to access; (2) In different sectors, how is work, workplaces and work cultures changing; (3) What different enterprises (and their workplaces) unite to deliver commonplace goods and services (e.g., coffee to go, fish and chips, refuse collection, shower gel); (4) How might local outlets/operations be a window into a more complex enterprise; (5) When and for whom are different parts of the public environment a workplace?

Example Educational Challenges: (1) What support and experiences will allow all pupils to have meaningful experience of workplaces; (2) How will learning be facilitated to equip pupils to access and understand the variety, variation and change within the world of work; (3) What within the world of work should a pupil attend to initially to grasp important aspects of workplaces; (4) How will pupils be effective in positioning themselves and their future self(s) within the context of the world of work?

Example Delivery Challenges: (1) What type of visit to a workplace could be digitally mediated; (2) What media currently exists that depicts in detail specific workplaces; (3) What would pupils do with different timespan workplace visits; (4) How might a number of schools coordinate to engage with employers and share information and workplaces?

Action 4. Proposal building. Focusing upon particular conceptual challenges provided new contexts within which to imagine. Contextual factors like number of pupils, total time available to pupils and staff, local and regional industry informed the production of proposals in the form of experience journeys for pupils, staff, employers and employees. Operational concerns like time to prepare, time/cost to develop, time/cost to manage and deliver, level of employer engagement, cost and use of available digital products and support services gave detail as proposals were refined.

Finding Summary. Infrastructuring, in this case study, was developed through four actions: identifying multiple perspective on the situation; positioning the worth aimed for; debating conceptual challenges; and proposition building. These actions gave form to the infrastructuring that supported ongoing re-design. Reviewing the Gatsby Good Careers Guidance report (Holman, 2014) and the case study data analysis found a differing logic structure between the framing of the benchmark as constructed by Gatsby and The Design Team (presented in Table 4). The authors speculate, that the benchmark as communicated by Gatsby formed a thinking and acting structure, explicitly linked to political agendas. While this did not determine the actions of schools it was instructive and directional and held significant consequences for how creative effort and resources were applied. This finding suggests that for the participants in this Design Thing the differences between these two positions co-existed. It is possible that this co-habitation generated tension influencing experiences and behaviours as different design-games progressed.

Discussion—Creative Compromise as a Critical Design Practice

Young, Cooper and Blair (2001) present a world-views model of levels of design content, which describes: (D1) design at the level of product configuration and detail [design within a context]; (D2) design at the level of systems thinking [designing context]; and (D3) design at the level of policy formation and ideology [design of context]. Young (2008), further develops a model of design that integrates levels of design content with design process phases (discovery, generation, synthesis, and enterprise). Young’s claim is that, although design teams rarely get the permission to operate at a level other than D1, “the model demonstrates that the best designs do and always have begun at the D3 level in order to have a meaningful affect on issues at policy and strategy forming levels of decision-making” (p. 573). It is unclear, however, what knowledge and practices support effective engagement in the complexity of D3 content, how a variety of D3 content influences D1 outputs and how this in turn has a meaningful affect on issues at policy and strategy forming levels of decision-making. Siodmok (2017), in the context of the UK’s Policy Lab, relates this world-view model the content of policy design mapping

Table 4. Contrasting logic structure between the Design Team and the Gatsby Benchmark (source: created by authors).

The Design Team	Gatsby Good Careers Guidance Benchmark
Worth of the Initiative Pupil Learning Outcomes - as positions	Political Agenda Helps to meet labour market need and develop work readiness skills Promote social equality & social mobility by raising careers ambition
Areas of Controversy Work Investigations with experiences of workplaces - as opportunities	Evaluation Metrics First-hand experiences of workplaces for all pupils
Value Delivery Teaching approaches to deliver learning outcomes - as challenges	Delivery Mechanisms Work visits; Work shadowing; Work placements
Logistics of Delivery Resource allocation – as compromise and operational management	Delivered Value for Pupils Help to explore careers opportunities and expand networks

Reform: ethos, values, rules and principals to D3; Perform: roles, relationships, experiences and platforms to D2; and Form: artefacts, details and touchpoints to D1 (see Figure 3).

The case study in this article took place within a dynamic public sector policy development environment, some of which was visible, much of which was not. In this situation it is possible to think about The Gatsby Foundation as a policy development organisation and the pilot schools as policy implementation organisations. Gatsby were developing (in partnership) the design of context. The schools in the pilot were attempting to deliver against that policy by developing relationships, networks and interventions and the systems, platforms and practices that supported them. In running their interventions and programmes to meet the benchmark ‘experiences of workplaces’ schools, teachers, pupils, employers and employees gave form to material touchpoints; some of which may have been prefigured, some of which may have emerged as needs were realised. However, this might be a limiting way of viewing the situation.

The findings of this case study suggest that the Design Thing helped schools also to develop the design of context. This development of D3 content was the outcome of a series of synchronous design-games abstract from use and a series of asynchronous design-games during use. The design-games were structured to provide agency to participants. They afforded the creative exploration of individual and collective situatedness and the pressures and conflicts within and between their constituents. Responding to the same issue—good careers guidance—different designs of context can co-exist and influence each other

(this is reflected in Finding 2 and Table 4). Identifying sets of stakeholders’ perspectives and associated tensions and challenges relating to the school’s delivery of *experiences of workplaces* appears to support the production of D3 content as reflexive of their context’s constituents. Gatsby has a different constituency and their D3 content responds to that. The interactions between D3 content as produced by Gatsby and by schools can perhaps be conceptualised as an arena of creative compromise; the interaction and engagement in this space required this study’s participants to recognise a range of controversies (a set of which is presented in Finding 2). Navigating those controversies, by developing D2 content—the design of systems and services—was useful to explore attachments and to clarify participants’ stance with regard to D3 content—the creation of purpose and meaning. This practice, the authors have termed creative compromise: the production of a design of context in relation to other, arguably more authoritative or influential, policy. The practices of participatory design provided the means and structure for an arena of creative compromise supporting a public to engage in a policy debate and producing an articulation of their values and principles as embodied in the systems and interventions they developed. This is more than one *side* acquiescing or conceding, it’s about creating something new as a consequence of compromising. The Design Thing produced an [re]orientation; constructing and structuring the meaning and the importance of different components of the situation. If, over time, established thinking re-inserts its influence is not clear. It is also not clear what consequence this has for ongoing re-design practices.

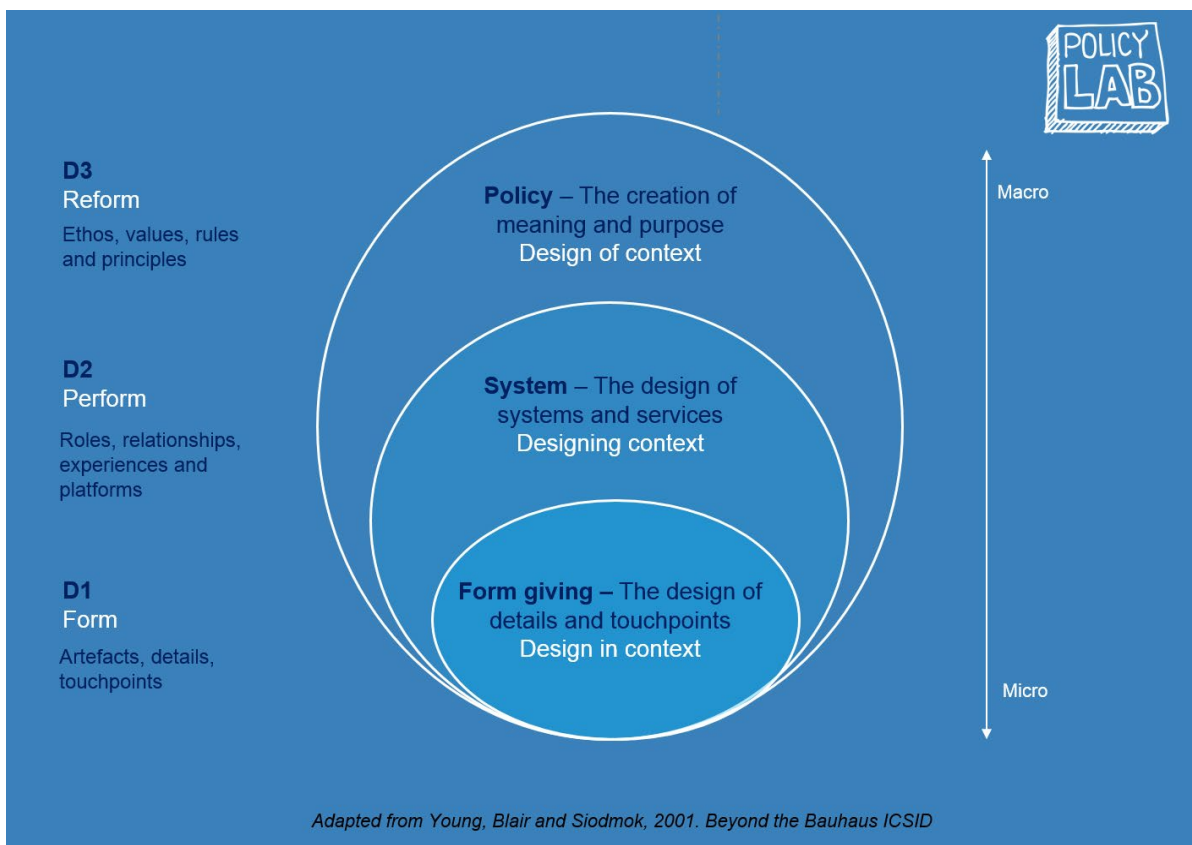


Figure 3. A levels of design framework for understanding design practice in policy (Siodmok, 2017).

This case study produced design content across the levels of D3, D2 and D1. In this case D1 content was a handbook aimed at practitioners (teachers) and a report shared with Pilot School 1, the North East Enterprise Partnership and the Gatsby Foundation. These artefacts communicated a policy position, a framework for understanding *experiences of workplaces* as a series of workplace investigations, templates for teachers to translate the framework into specific service interventions and implementation plans, and a set of examples intended to both illustrate the use of the templates and to provide creative examples. These materials and the participatory design practices helped different secondary schools to design localised interventions, and while theoretically these could be used by any school, realistically the package of support is not attached to a pathway that allows this to readily happen and the materials were never utilised independently from the expertise of The Design Team as facilitators and co-producers. Finding 2 suggests that the content and practices of the Design Thing acted as infrastructuring; ongoing practices of re-design were developed within two of our participating schools. These design artefacts are objects of articulation of a creative synthesis of knowledge. They represent new knowledge for and about the *matter of concern*; as public things they should be viewed not as solutions but as contributions to the subject that can be adopted, adapted and challenged in a continual practice of evaluation and re-design. However, it is unclear which *representative* of the object of design were most influential and why.

Latour (2004) expressed the need to develop a new descriptive tool that deals with *matters of concern*. Perhaps, these practices, as design for complex situations, indicate a continuing development of appropriate tools for dealing with *matters of concern*. Although, these practices go further than a descriptive tool for visualising complexity. This study has shown that design can set the agenda for debates related to a *matter of concern* as Stephan (2015) suggested. This agenda setting however would benefit from a more detailed consideration of scope and duration to further understand the dynamics of emerging and pre-existing content related to the design of context. While engaging with *matters of concern* we may not develop notions of good design or the best designs, like Young (2008), but may instead develop notions of how sticky, infectious, resilient, or even how political design content is over different spans of time. It could be argued that, as groups (in this case study these were schools) produce their own design of context, setting the agenda for debates relating to an issue of societal concern, this may position them in conflict with policy from authorities where compromise is problematic or not achievable. Creative practices may offer a means to help navigate such conflict in these situations, but how these entangle with organisational and policy controls is an area for further research which may, in-turn, help further develop the knowledge, practices and tools for navigating and contributing to *matters of concern* with design.

Implications and Further Research

The formal pilot evaluation (Hanson et al., 2019) highlights that schools and colleges can achieve *good* careers guidance; and it is *good* that is aimed for as the standard. But what about better?

Perhaps the strategy at the level of National policy is to define *good*, produce the infrastructure, knowledge, requirements and metrics that encourage stability and require all to meet the level of good, recognising where schools extend and demonstrate good practice and sharing it. Broadly, this aligns to Bentley's (2014) description of a linear policy cycle—which he claims must be challenged—where, “implementation then follows on from policy decisions as an equally rational, step by step administrative process, culminating with evaluation, which in turn informs future policy deliberations” (p. 39). In the context of Good Careers Guidance, the linear policy cycle limits the value of social, organisational and content innovation that can be produced by the 1000s of experts involved in delivering within the system. How might a stable national careers system be established that also encourages learning from creative exploration promoted at a local and regional level?

Examining the enabling conditions that support continuous and discontinuous innovation in public sector organisations, Bessant (2005), highlighted the challenge of being both organised to deliver and monitored against continuous improvement and efficiencies and adapting to discontinuous environments requiring innovation disruptive to the smooth running of the operation. A challenge, in the context of the Careers Strategy and Good Careers Guidance in the UK Secondary Education system is, how do you provide the enabling conditions, present simultaneously, that supports both continuous improvement and efficiency and the ability to monitor the broader environment for discontinuities and support active experimentation? What limitations are imposed on ongoing re-design practices of non-design professional practitioners by a system that encourages organisations to aim to satisfice early and utilise their energies and resources to stabilise and build efficiencies? These questions indicate a valuable pathway for further research into the practices of Design for Complex Situation and Design for Policy.

Conclusions

In the context of Good Careers Guidance and the practices of Secondary Education providers, this paper has been about the controversies that emerge as influential during an investigation of a *matter of concern* and the infrastructuring that attempts to create an environment for alternative, and perhaps better, approaches to emerge.

Design has always revelled in the task of probing and challenging the flexibility of matters of fact concerning an object, its context of use, its value chain and the economic model within which it emerges. Challenging those *facts*, those assumptions, those positions and transforming the object, how it comes to be in the world, and its potential meaning in the world, is a core ability found within Design. A shift from matters of fact to *matters of concern* is not simply a shift in focus from the specifics of an object to the details of context, nor does it imply turning our backs on services, artefacts, or objects in pursuit of [apparently] more worthy challenges. This is not about the merits of different forms of design and the challenges they aim to address. The authors suggest that the challenge for design in shifting from matters of fact to *matters of concern*, is three-fold:

1. To consciously gather and be informed by the infinitely complex contradictions and controversies responding with acts and artefacts of design that are clear about how they explore contested futures.
2. To develop new arguments through the acts and artefacts of design to contribute to discourse of established groups related to a matter of concern.
3. To establish influencing conditions for an arena of compromise, as a platform for talent development and political discourse, that increases participation and enterprise exploring the shifting of controversies and vitality of narratives.

Perhaps, a characteristic of design for complex situations is the dynamic environment it creates while navigating *matters of concern*. A dynamic environment generated between: the opening up enabled by infrastructuring—to develop the conditions for continuing design; the closing down power and dominance of established concepts and practices—to support the enabling conditions of efficient and effective resource management; and the whims and wills of people conflicted between making something better or good enough or simply moving on to the next important or interesting challenge. In this context, understanding of the dynamics and the forces influencing a particular complex situation and those that are generated and exerted by design work and practice might not be easy to grasp. There is a danger that with calls for fresh thinking and the enthusiasm of members of the design community to explore new areas of practice that the credibility of the community is damaged because of the application of inappropriate practices and ineffectual outputs. With this warning there is also an opportunity. The opportunity exists to critically examine evidence to consider the credibility of design as a capability that illuminates complexity while supporting different conflicted constituents to navigate their situation through creative compromise.

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