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Unveiling the Construct of Design Thinking: An Exploratory Study

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Abstract

Design thinking does not have a consensually defined construct in the academic literature. This foundational fragility hinders theory building in the field. This study addresses this gap by providing a construct of design thinking following guidelines for developing theory-building instruments. We propose a non-normative, comprehensive construct composed of a conceptual definition and a subset of properties that portray tangible design thinking expressions. The proposed construct aims to provide a grounded foundation to support the advancement of design thinking theory building and testing.

Keywords: design thinking, construct, theory building, design theory, human-centred design

1. Introduction

Design Thinking is a widely known approach to innovation among management practitioners. It has been extensively adopted, even though it lacked a clear-cut unique definition (Johansson-Sköldberg et al., 2013). In a broad sense, design thinking was introduced as "*a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity*" (Brown, 2008, p. 2).

Throughout the years, many authors have incorporated addendums into the concept of design thinking. Design thinking has been portrayed as a distinctive and strategic approach to problem-solving that may be applied to virtually any business problem (Brown and Katz, 2011; Carr *et al.*, 2010; Liedtka, 2015) that drives multidisciplinary teams (Seidel and Fixson, 2013) in a user-centred (Verganti, 2008), empathetic and collaborative (Brown and Katz, 2011; Liedtka, 2015) quest to innovation (Liedtka, 2020). It was proposed as a balance between analytical and intuitive thinking (Martin, 2009), making use of an abductive logic for value creation (Dorst, 2010, 2011). Design thinking was described as both an organisational resource for innovation (Kimbell, 2011) and a contingent set of routine practices inspired by professional designers (Kimbell, 2012).

The variety of definitions and characteristics attributed to design thinking puts its concept at risk of becoming an "umbrella construct" with a loose meaning that might delay or even collapse design thinking theory development (Micheli et al., 2019). Even though a setpoint must be taken for theory development, we share Johansson-Sköldberg et al.'s (2013) belief that a search for a unique, normative definition of design thinking is counterproductive: design thinking is a context-dependent practice, and hence will inherently assume different meanings to different individuals and organisations. However, we believe that a non-normative, comprehensive construct is needed to advance theory development in the field of design thinking.

This work aims to contribute to the theory by providing a comprehensive construct of design thinking, along with other works that have contributed to construct clarity in design thinking (e.g. Auernhammer and Roth, 2021). We highlight that the term design thinking is employed here from a managerial perspective, differing from Johansson-Sköldberg et al.'s (2013) construct of designerly thinking, which refers to the study of how professional designers think and work. Our proposed construct provides a setpoint for theory development, as it presents a general definition of design thinking and its characteristics; a valid construct provides scholarship with a generalisable start point and measurable parameters to conduct long required empirical studies in topics such as: how does design thinking drives organisational change (Elsbach and Stigliani, 2018), its effectiveness and applicability (Micheli et al., 2019) and its influence on overall project performance. Our definition is careful not to undermine the inherent ambiguity of design thinking, a risk that was pointed in previous research (Johansson-Sköldberg et al., 2013).

The remainder of this paper is structured as follows: Section 2 presents the theoretical background discussing previous works that have begun a conversation about the design thinking construct. Section 3 details the study design. Section 4 discusses our proposed construct of design thinking and a thorough argument justifying its theoretical validation, as well as its relation to how design thinking is adopted in management professional practice. Finally, Section 5 presents the concluding remarks and recommendations for future works.

2. Theoretical background

From the early 2000s, when design thinking became popular among practitioners, many toolkits (IDEO, 2011, 2015) and practical guides (D.school, 2018) presenting prescriptive phased design thinking processes have been published. In their core, they follow the same overall logic on the pace of phases for problem-solving, even if they use different terms to describe these phases - which consist of need-finding, solution ideation, and solution implementation (Fleury et al., 2016; Johansson-Sköldberg et al., 2013; Micheli et al., 2019; Oliveira et al., 2021; Seidel and Fixson, 2013). We do not believe that design thinking might be reduced to this processual method, but we reckon that the process perspective has a pedagogical character and contributes to popularising the design thinking approach. Our understanding is that design thinking is a context-dependent approach and may be portrayed "*as a process, or as methods, a toolbox, a mental approach, a culture or a mix thereof*".

Aiming to contribute to establishing common definitions on design thinking scholarship, while not overlooking the inherent ambiguity within the concept – we understand design thinking as a summary of dynamic, contextual-dependent attributes rather than static and normative definitions, similarly to previous works in the design thinking literature (Carlgren, Rauth, et al., 2016; Dell'Era et al., 2020; Liedtka, 2020; Micheli et al., 2019).

Carlgren et al. (2016) state that design thinking is composed of both the idea of design thinking and the enactment of this idea. Following an empirical study, the authors propose a framework structure for design thinking based on five main themes - user focus, problem framing, visualisation, experimentation, and diversity -, which in turn are deployed in principles, practices, and techniques. This framework cherishes for concept flexibility and contextually understanding of design thinking "*as a process, or as methods, a toolbox, a mental approach, a culture or a mix thereof*" (Carlgren, Rauth, et al., 2016, p. 49). Similarly, Micheli et al. (2019) sweep the literature on design thinking in search of commonalities within the different uses of the term design thinking in academia. After the analysis and codification of 104 papers, the authors came to a validated summary of 11 attributes that represent, on an aggregate level, the different nuances of design thinking. Table 1 presents a summary of attributes and principles that are transversal to design thinking.

Building on this perspective, Dell'Era et al. (2020) define four typologies on how consulting firms provide design thinking to their customers based on a study of 47 Italian firms. Each "kind" of design thinking identified by the authors is embedded in a specific context and addresses a different challenge (Table 2). This study presents an application of how the description of design thinking in terms of attributes or themes is useful for capturing the nuances of how design thinking is observed in practice, deploying the conceptual attributes from an aggregate level to a practice level.

Table 1. Attributes and principles constituting of design thinking; adapted from Carlgren, Rauth, et al., (2016) and Micheli et al. (2019)

Attributes/Themes	Patterned principles
Creativity and innovation	Innovation; creativity; idea creation; discovery opportunities
User centeredness and involvement	User/customer involvement; human-centredness; working with extreme users; end-user profiling; empathy; non-judgment; social
Problem-solving	Problem-solving; wicked problem solving; constraints as inspiration; decision-making; challenge the norm; reframing; optimism
Iteration and experimentation	Iteration; experimentation; prototyping; reflexivity; reflective practice; curiosity; playfulness; energetic; learning-oriented
Interdisciplinary collaboration	Collaboration; stakeholder involvement; multidimensional team; conflict negotiation; interactive process; involvement of outsiders; participatory design; persuasion and communication; openness to differences in personality type and background; democratic spirit
Ability to visualise	Aesthetics; ability to visualise; elegance; style; thinking through doing; bias towards action
Gestalt view	Holistic approach; embracing complexity; integral intelligence; synthesis; systemic model; systems thinking
Abductive reasoning	Abductive reasoning; emergent; generative
Tolerance of ambiguity and failure	Acceptance of failure; ambiguity; handle uncertainty; risk-taking; tolerant of mistakes; openness to the unexpected; comfort with complexity and ambiguity
Blending rationality and intuition	Balance between declarative and modal logic; balance between exploration and exploitation; balance between intuitive and analytical thinking; balance between reliability and validity; divergent and convergent thinking; emotional and rational; integrative thinking
Design tools and methods	Ethnographic methods; personas; journey map; brainstorming; mind map; visualisation; prototyping; experiments

Table 2. Four kinds of design thinking; adapted from Dell'Era et al. (2020)

Design Thinking Typology	Creative Problem Solving	Sprint Execution	Creative Confidence	Innovation of Meaning
Addressed challenge	Inspire insights able to lead the development of creative and original solutions that can meet emerging users' needs	Accelerate the development process and reduce market uncertainty to quickly make and launch new solutions on the market	Promote new innovation mindsets to engage employees with a new set of approaches, practices, and methodologies able to stimulate innovation and change	Create new visions that represent radical reinterpretations of the strategic direction to follow
Contextual factors	Complexity and dynamism of user behaviours; demand for more sophisticated and personalised solutions	Tension towards execution and continuous updating; digital technologies empowering different experimentation strategies	Entrepreneurial opportunities for individuals; value of work-life balance and personal purpose in the job	Easy access to innovative ideas; abundance of alternative options

More recently, a few studies have analysed the adoption and enactment of design thinking from a capability perspective. Jeanne Liedtka (2020) conducted a multi-year cross-case study on several industries analysing how the social technology of design thinking contributes to shaping an innovator's experience. Coming from this understanding, the value of applying design thinking in organisations is untangled not only in the form of new product or service offerings but also as a social technology that enables a firm to continuously build capabilities for ongoing strategical adaptation; hence, the value of design thinking is also underpinned by the fact that it gathers a set of teachable practices that allow the development of dynamic innovation skills (Liedtka, 2020; Magistretti, Ardito, et al., 2021). Jeanne Liedtka (2020, p. 54) elaborates on what is social technology as follows:

> *"Although today we associate the term "technology" with digital or physical ways of accomplishing activities, historically technology had a much broader meaning. Derived from the Greek, meaning "science of craft," technology referred to the techniques, skills, and processes used to transform knowledge into practical outcomes. Focusing on the social technology lens cues us to innovation as a shared process and ties it to human emotions and the complex ways people intersect and solutions emerge."*

Hence, while there is a stem in the literature that cherishes for establishing clear yet flexible connotations for design thinking, these are yet to be consolidated into a formal construct. The remainder of this work aims to bridge this gap.

3. Study design

We have been engaged in several educational and corporate design thinking projects since the early 2010s and have previously published works in this field, including a recent systematic literature review on the adoption of design thinking in the healthcare sector. When trying to theoretically ground the phenomena we observe in educational and corporate practices, we often perceive a gap in the very foundation of the design thinking construct, which impairs our theory development process. Hence, we began building a construct of design thinking, aiming to set a starting point for design thinking ground theory which is valuable not only for our research but also for the design thinking scholarship.

This study followed Wacker's (2004) recommendation for developing formal conceptual definitions. Amongst the recommendation, the author presents that a construct is composed of a formal definition, which must be general and abstract to enable theory development, and specific properties (and measures) associated with this formal definition to enable theory testing. Based on a literature review of design thinking research, we apply Wacker's (2004) recommendation to establish a construct for design thinking which is composed of a formal definition and a set of associated properties.

The literature review that composes this study was an exploratory yet systematic review, with the aim to present a narrative that derives an exploratory construct. As part of other ongoing research deskwork, the authors conducted a search on Scopus database using the string '"design think*" in title, abstract and keywords, up to September 2021. Since the literature in design thinking has been growing considerably in the past years - for example, the Scopus search for studies with "design think*" in title, abstract, or keywords, up to 2018 yielded 3131 results. Only considering 2019, 2020 and 2021, the same search yielded 2439 documents -, we split our search between papers that were published before and after 2019, and selected the 100 most cited papers within each timeframe for title and abstract review. Our selection criteria included papers that contributed to design thinking theory or to connecting design thinking with other management theories. The selection process is presented in Figure 1; a supplementary file with selected paper details are available upon request to the authors.
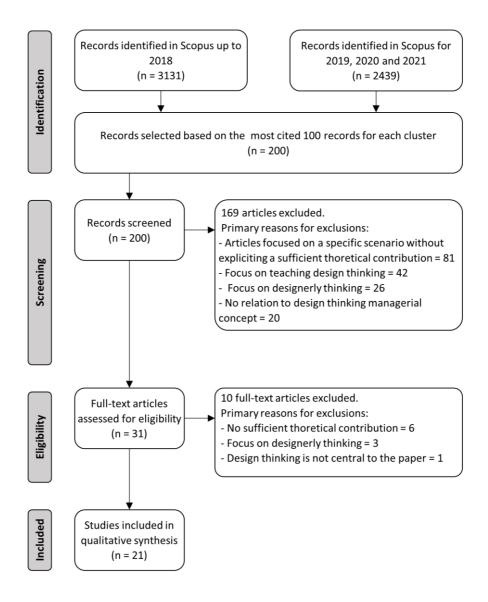
Figure 1. Systematic review process

4. Results and discussion

Coming from an explorative search of the literature, we deductively built a design thinking construct based on previous depictions of design thinking in scholarship. Previous works have focused on attributes (Carlgren, Rauth, et al., 2016; Micheli *et al.*, 2019), related capabilities (Liedtka, 2020; Magistretti, Tu, et al., 2021), and even the history of design thinking (Auernhammer and Roth, 2021; Johansson-Sköldberg *et al.*, 2013); here, our intention is to provide a summarised construct of design thinking which will ground theory building and theory testing following Wacker's (2004) recommendation to assure construct validity. In summary, we present the following formal definition of design thinking: "Design thinking is an abductive, human-centred approach for problem-solving". We present the properties derived from this formal definition in Figure 2, and we give a brief explanation about each of the properties in the following paragraphs.
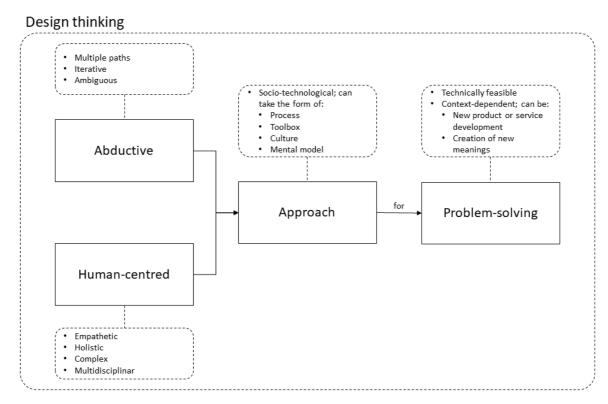
Design thinking

Multiple paths
Iterative
Ambiguous

Abductive

Socio-technological; can take the form of:
- Process
- Toolbox
- Culture
- Mental model

Technically feasible
Context-dependent; can be:
- New product or service development
- Creation of new meanings

Human-centred

Approach — for — Problem-solving

Empathetic
Holistic
Complex
Multidisciplinar

Figure 2. Design thinking construct

Scholarship has discussed how design thinking's modus operandi is explained in formal logic terms (Dorst, 2011). Design thinking does not stem from deductive or inductive reasoning; instead, it is founded in abductive reasoning. In other words, when applying a design thinking approach, one should not try to deduce expected outcomes on the basis of what is known about the mechanism (at least not at the forefront of design thinking approach); moreover, one should not induce the definition of a possible mechanism that will drive a desirable outcome (again, at least not at the forefront of the design thinking approach). Instead, the individual must face the problem in an abductive view, i.e., focusing on understanding solely what is the desired value expected from solving this problem; once the desired value is defined, the individuals involved in the design thinking approach will adopt a human-centered view and the applicable approach to design thinking to effectively design the mechanisms through which the desired value will be delivered. In other words, design thinking departs from a creative inquiry and flows into a creation of a system (Buchanan, 2019) that delivers value - whether this value is delivered through a new product (e.g. Langell et al., 2019), a service (Uehira and Kay, 2009), a reconfiguration of existing processes (e.g. Eines & Vatne, 2018), or the very creation of a new necessity (or meaning) to the customer base (e.g. Verganti, 2008).

Human-centeredness in design thinking is twofold: first, the very inception of design thinking is rooted in deeply understanding human behaviour and desirability (Auernhammer and Roth, 2021), as the value of design thinking relies on developing solutions for actual user needs. Accordingly, the codification of design thinking as a practice introduced a set of tools and methods (e.g. journey mapping, personas, shadowing) that aim at developing this deep understanding of human behaviour (Micheli *et al.*, 2019). Secondly, it holds a ludic character for individuals involved in the design thinking initiative, which fosters the development of a psychologically safe and stimulating environment for co-creation (Liedtka, 2020; Thompson and Schonthal, 2020). On a more aggregate level, data emerging from design thinking initiatives provide substance for individuals not directly involved in the initiative to review, collaborate, stimulate and discuss how to effectively integrate the insights emerging from the data into strategic planning (Knight *et al.*, 2020).

We present design thinking as an approach due to its multivalence in the structures in which it can be adopted (Carlgren, Rauth, et al., 2016; Johansson-Sköldberg *et al.*, 2013). The label of "design

thinking" has been put on structured step-by-step processes, toolboxes (IDEO, 2011, 2015), organisational culture (Kimbell, 2011), a way of working (Lloyd, 2019), and as a mental model that drives individual cognition into more desirable outcomes (Liedtka, 2015). Our understanding is that, due to its socio-technological (Liedtka, 2020) and infrastructuring character (Bjögvinsson *et al.*, 2012), even though design thinking may be consolidated in a set of teachable practices, its enactment might take different shapes depending on its environment.

The target outcome of a firm that adopts design thinking is to solve one or more problems. Design thinking adoption can steer problem-solving either by gathering knowledgeable individuals who can contribute for intentionally addressing a known problem in a targeted workshop with a sequence of preconceived activities, for example, or by empowering individuals to apply a human-centred and abductive lens into emerging problems, and hence enabling them to continuously solve problems with creative confidence (Dell'Era *et al.*, 2020). We highlight the need for continuous problem-solving due to the fact that in truly complex scenarios, it is doubtful that one will ever design "the" optimal solution, since this so-called optimal solution is ingrained in one's assumptions; hence, the process of problem-solving must be a continuous and intentional attempt to bring the entire scenario to a more desirable state, building on previously designed solutions (Dorst, 2019). Organizations need to deliberately reshape their cultures and overcome barriers - as presented by Carlgren, Elmquist, et al. (2016) - and evolve design capabilities (Björklund *et al.*, 2020) to assure this continuous movement, at the risk of pursuing an unsustainable pathway that will not deliver design thinking's full potential (Buchanan, 2015). Sustaining the adoption of design thinking beyond the short term is a challenge for organizations (Wrigley *et al.*, 2020); a structured way to overcome this challenge is to use a learning model to guide the design thinking implementation strategy (Beckman, 2020; Beckman and Barry, 2012).

5. Conclusion

This study contributes to the literature on design thinking by providing it with a construct. We intend to provide a theoretical foundation for future studies on design thinking and its approximation with other management theories (e.g. Liedtka, 2020; Magistretti et al., 2021).

As presented by Auernhammer and Roth (2021), enhancing construct clarity in design thinking aid the advancement of understanding the mechanisms by which design drives innovation. Providing a formal construct, we contribute to the body of research in design thinking by providing a baseline foundation for theory building, avoiding tautological, unclear and insufficient definitions. The properties presented in the proposed construct are of special value to long-required empirical studies in the field of design thinking, as pointed out by Elsbach and Stigliani (2018) and Micheli *et al.* (2019). The properties that compose the construct portray more tangible expressions of design thinking, which are essential to advance the building of research instruments to assess the adoption of design thinking in certain scenarios and respond to unanswered questions, such as: how does design thinking drives organisational change, what is the effectiveness of design thinking, whether design thinking is more suitable for certain industries, and design thinking's impact on project performance, to mention a few.

Like any other work, this study has its own limitations. The presented scope was limited to developing and discussing the proposed construct. Future studies could provide more structured and exhaustive reviews, as well as apply content analysis techniques - e.g. natural language processing, frame semantic analysis - to systematically advance the proposed design thinking construct in the literature. We also suggest that future studies apply and assess the construct aiming for external validity. Moreover, we urge future studies to further elaborate on each of the properties in the construct as to inform the foundations for future qualitative and quantitative studies; a thorough understanding of these properties will enable the validation of the construct and, moving forward, more assertive and objective assessments of the adoption of design thinking in certain scenarios.

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