TOWARDS A DT MINDSET TOOL EVALUATION: FACTORS IDENTIFICATION FROM THEORY AND PRACTICE

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Abstract

Several studies identify the Design Thinking mindset as the crucial aspect of the Design Thinking implementation in organisations. However, it is not clear how to measure the DT mindset in organisations, and its successful implementation. This paper aims at contributing at the development of a multidimensional scale of a Design Thinking mindset. This research in its first phase performs a structured literature review to identify what key elements define a Design Thinking mindset. We identified 40 characteristics clustered in 9 groups. The second phase of research identifies validated scales that could overlap with those groups and be used to measure them. Out of 9 factors, we managed to cover 5 factors with validated scales. A double panel of experts tested the validity of the survey: a first panel of 4 Design thinking experts and a second panel of 14 practitioners of different experiences of DT implementation. Results identify what elements of DT mindset should be measured, what domains (factors) could be measured with validated scales (from literature) and what domains will require ad-hoc development of new items from future research.

Keywords: Research methodologies and methods, Creativity, Design practice

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1 INTRODUCTION

In these years, the Design Thinking (from now on, DT) approach has acquired a key role in the innovation process of most organizations in the world (e.g. Kolko, 2015). DT is defined as a human centered and creative approach whose aim is to find solution for complex and strategic business (e.g. Brown, 2008, 2009; Lockwood, 2009). Literature has paid attention at developing and describing the approach per se, why it works (e.g. Lietdka, 2015), its diffusion (Carlgren et al., 2016), its tools and practices (e.g. Liedtka and Ogilvie, 2011; Carlgren et. al., 2016), its organizational implementation (xx). In our review of the literature, we could not find a structured contribution that clarifies how to measure the DT approach's impact on the organization's internal dynamics. Lack of measurement reflects a gap between what literature offers and what firms are looking for.

This study wants to raise attention towards this gap, and call for an academic intervention towards the development of a DT mindset measurement and evaluation tool. At the same time, it represents a first effort towards the development of a such a tool, by identifying its factors from state of the art.

The contribution unfolds in four passages: first, we identify the key characteristics that define a DT mindset. The identified set is: Experiment and Learning oriented, Ambiguity Tolerance, Empathy, Open Mindedness, Action Oriented, Collaboration and Communication, Holistic Thinking, Optimism, Creativity. Second, we define them recurring to an ample literature review. Third, for each factor, we performed a short literature review to understand if existing validated scales can provide a useful mean to measure it. At last, two panels of experts have tested the face and content validity of the survey: a first panel of 4 DT experts and a second panel of 14 practitioners from the same company of different experiences of DT implementation.

2 THEORY AND GAP

1.1 Lack of an adequate measurement of the DT value and the DT mindset

If the research in Design Thinking field is still young and not well detailed, the literature which aims to measure the approach's impact is even more shallow. Rauth et al. (2014) declare: *"While a measurable proof of the impact of Design Thinking is often seen as the Holy Grail in large organization, it is difficult to achieve in practice."* (p.57). Schmiedgen et al. (2016) performed a literature review to inquire what design thinking KPIs are used to measure performance, and list the reasons why the traditional means of performance measurement are often ill-suited. They conclude by stating that *"at this point is that there is no specific stand-alone Design Thinking KPI. [...] It is highly probable that there can be none capable of adequately determining the specific impact or contribution of design thinking in an organizational setting due to the complexity of the situation."* (Schmiedgen et al., 2016: p.166). Among the challenges of using DT in industry, Carlgren et al. (2016-b) list the difficulty of proving the value of DT. We can identify two recurrent reasons that seem to hold throughout the cases: first, once a product / service is on the market, it's hard to trace back DT contribution out of the whole process (DT is usually applied in the first part of the development project). Secondly, while DT projects usually prove their value in advancement of knowledge and conceptual enlargement, its value hardly fits with classical KPIs. At last, pushing a DT implementation by KPIs uncovers a risk: some companies who has been following this practice broke the DT process down into pieces, and, as a result, they had lost the value of the method itself.

Given the fact that is hard to measure a successful DT implementation, the question is what elements we shall consider. Shall we measure the use of a complete set of appropriated techniques and practices (e.g. Carlgren et al., 2016)? Shall we measure the implementation of organizational principles that have been proven to be important for DT implementation in an organizational context (e.g. Lockwood, 2009; Leavy, 2010)? Or shall we focus on successful reduction of cognitive biases (e.g. Lietdka, 2015) or on the development of innovative capabilities (e.g. Elmquist and Le Masson, 2013)? To address this complexity, we though to focus on the antecedent of performance and successful implementation of Design Thinking in itself. In fact, it is not possible to think that a successful Design Thinking implementation will be realized if the employee of the organization would not have properly acquired the Design Thinking Mindset. Given the fact that literature recognizes mindset as a crucial element for

adequately performing Design Thinking, as scholars and practitioners we are interested in obtaining an instrument that can measure the Design Thinking Mindset in an organizational context, which to our knowledge was never developed.

1.2 Mindset as a central element to implement Design Thinking

DT experts - both in literature and practice – identify mindset as one of the most important dimensions of the Design Thinking approach. In the practitioners' world, Companies, Consultancy organizations and R&D groups express the centrality of Mindset as a successful driver of the DT implementation. In the education world, both Practitioners and Academic journals support this vision and Schools and Universities are now developing ad hoc courses talking about DT mindset. The Design School of Stanford University through its manifesto "The Bootcamp Bootleg" define it as a set of "*vital attitudes for the Design Thinker to hold*" (p. II).

Scholars from Management, Engineering and Design advocate for the centrality of Mindset to a deep understanding of DT (Carlgren, 2013; Brenner et al*.,* 2016; Fraser, 2007). In their framing of DT, Carlgen et al. (2016) synthetize the role that mindset plays in the DT implementation by stating: "*Other concepts, such as Lean and TQM, also involve mindset changes but in the context of DT the interviewees emphasized the development of a different mindset from the outset. This will affect how DT is addressed in organizations, what actions might be planned, and how DT might be evaluated.*" (:53).

Despite the recognized importance of the topic, no clear alignment exists about Design Thinking mindset definition and its measurement. In literature, there is no clear agreement on what are the elements that define a Design Thinking mindset. A few articles developed ad hoc studies to identify those elements, but none of them reported how the resulting definition can be measured. After performing an extensive literature review on Design Thinking mindset, we can state that, to our knowledge, there are no validated scales able to measure the level of Design Thinking Mindset in organizations. In this research, we refer to "mindset" as the set of opinions, beliefs and behaviors that characterized an individual, a group, or an organization.

1.3 Methodology

Literature presents several definitions of DT mindset. For example, Brenner et al. (2016) declare that "*As mindset, Design Thinking is characterized by several key principles: a combination of divergent and convergent thinking, a strong orientation to both obvious and hidden needs of customers and users, and prototyping.*" (Brenner et al, 2016: p.3). Among the most famous DT mindset manifestos, we will mention the Stanford Design School Manifesto (Stanford, 2010). It lists 7 elements identifying a DT mindset. Those elements determine an efficient implementation of Design Thinking in practice and a better ability to innovate, and are: 1) show don't tell, 2) focus on human values, 3) craft clarity, 4) embrace experimentation, 5) be mindful of process, 6) a bias toward action and 7) radical collaboration. Although some elements are recurrent throughout the different definitions that can be encountered, there is no clear alignment around the precise set of elements that define a DT mindset. The reasons of this misalignment could be found in the fact that DT has emerged from practice, has been adapted through Companies, Schools (Engineering schools, Design schools and -in the latest years- Management schools), and has finally been studied from different scientific communities.

When referring to mindset, Schweitzer et al. (2016) express the absence of empirical research: "*Elements of the DT mindset are described in many ways throughout the literature, often based on circumstantial evidence rather than empirical research*" (p.5). This study is a first advancement to an empirical and theoretically-based development of a Design thinking mindset measure.

We perform a research in two phases:

We review literature to identify the elements that define a DT mindset;

We identify validated scales that could serve as measuring; we then validate the selected scales with a panel of experts and 14 practitioners discussing the main domains (factors).

1st phase - Identification of DT Mindset characteristics

The first step to develop a measurement is to identify what are the elements that define the DT mindset. For such an inquiry, we have performed a structured review of scientific literature. We looked for

contributions on an academic repository (Google Scholar) to identify all the papers dealing with DT mindset. To keep a solid selection of contributions, we decided to select only the papers that were published on scientific journals, and to avoid all the results related to books, conference articles, PhD theses, working papers or program-related papers - for examples programs related to some Schools. Of course, this is a strong selection criteria, especially considering that Design Thinking emerged from practice. Nevertheless, most of the scholars defining Design Thinking Mindset took a qualitative-exploratory approach by deriving the DT Mindset definition from practitioner's interviews (e.g. Carlgren et al, 2016) and most of the defining characteristics were inherited from the practitioner's world (e.g. Schweitzer et al, 2016).

A second criteria considers the fields of Management and Business, Design, Engineering and related areas (e.g. Decision Sciences, technology/IT-related fields). We decided to eliminate all the contributions that were extremely sector-oriented, e.g. articles published on Clinical and Medical journals, on Mathematical Journals, or on Educational journals. In case of doubt or misalignment among the authors, the journal sector was decided by recurring to the Journal description and aim of the Journal on the official webpage. For example, when deciding whether the *Learning and leading with technology* journal had to be considered a technology-related journal or an Educational journal, the final decision was taken from the official page (which in this case reported that the majority of the subjects related to the journal were from the Education area).

A note of attention in paper selection is necessary to distinguish among papers mentioning "design thinking" as the thinking processes of Design Science. This distinction is especially significant for journals with a long tradition of understanding design processes, where a meta-level of the process is usually studied with a cognitive, methodological or value-oriented focus. For example, in *Design Studies,* out the 19 papers presenting "Design thinking" in the titles, only 3 were explicitly mentioning "design thinking" as the method and not as the process of thinking in Design sciences. In those cases, we have only listed the papers that explicitly mention design thinking as a method.

We performed six sequential iterations of the keyword "Design thinking" coupled with "Mindset" or "Mind" in the title or in the corpus of the scientific contribution. Results were analyzed with the above-mentioned selection criteria and 22 papers were finally selected. The first iteration looked for contributions presenting the exact word "Design Thinking Mindset" in the title. From Google scholar, we obtained 2 results published in the *Journal of Design, Business & Society* (one extra result was discarded because it represented a conference paper "Leading through design" the *Design Management Research Conference*). The second iteration looked for contributions presenting the exact word "Design Thinking Mindset" somewhere in the article. From Google scholar, we obtained more than 90 new results, 13 of which are papers published in Scientific Journals. Among them we discarded the ones related to Mathematics (*Discrete & Continuous Dynamical Systems-Series S*), History of the ancient Near East (*Altorientalische Forschungen*) and Education (*Journal of Learning Analytics, Young Adult Library Services, International Journal of Teaching and Learning in Higher Education, Australian Educational Computing, Afterschool Matters, Decision Sciences Journal of Innovative Education*), and we obtained 6 new articles published in *Design Management Review, Design Studies, Management Today, Thinking Skills and Creativity*. The third iteration looked for "Design Thinking Mind" in the title (no results) and the forth for "Design Thinking Mind" in the contribution. This research identified 4 new papers, one discarded because related to the Medical sector (*Creative Nursing*) and Education Sector (*Learning & Leading with Technology)* and 2 papers published in *Design Management Review* and *Journal of Software: Evolution and Process*. The fifth iteration looked for "Design Thinking" and "Mindset" in the title and found no new results as the only new papers were related to Medical (*Clinics*) and Educational sectors (*Industry and Higher Education* and *Journal of Educational Psychology*). The sixth iteration looked for "Design Thinking" and "Mind" in the title. A last iteration expanded the research.

Each paper was read and analyzed with the aim of extracting a comprehensive list of DT elements, to understand how many times the element was listed. For this reason, in this first phase, we tried to minimize interpretation of contribution and we reported the element in the most objective way. The selected journals that proved to be out-of-context (for example because mindset was not considered as

a significant construct, or because design thinking was not the main topic of the paper but only cited) were discarded. In case of multiple characteristics, we split the items: for example "Curious and Creative" was split into two items (one Curiosity and the other Creative).

The resulting picture lists 40 characteristics (some of them overlapping because of similar labelling), mentioned 132 times from the 22 analyzed papers. The 40 characteristics are: Tolerance of Ambiguity; Open to the unexpected; Embracing Risk; Comfort with complexity and ambiguity; User centeredness; Co-develop value with user; Empathy / Empathic; Empathy & Human-centeredness; Social; Optimism; Optimistic and Energetic; Experimentation or Learn from mistake; Learning-oriented; Unconstrained thinking; Experimental intelligence; Inquisitive and open to new perspectives; Curious; Playful and Humoristic; Creative; Consciously creative; Mindful of process; Holistic view; Integrative thinking; Eager to share; Collaborative geared; Team Collaboration (Communication and knowledge sharing); Visualisation for collaboration; Open to Diversity / Willing to integrate diversity; Embracing diversity; Open to differences /diversity (personality and background); Democratic spirit; Open Mindeness; Non-judgmental; Visualisation-driven/-oriented; Biased toward action; Thinking through doing; Prototyping; Desire to make a difference; Modelling behaviour (optimism/ team working/ solution oriented); Critical Questioning (Intellectual curiosity/ beginners mind).

To cluster the 40ies characteristics, authors had to reach consensus. While clustering, we often had to check what the original authors meant with the label. We obtained 9 clusters from the initial 40 DT Mindset characteristics:
1. Experimentation and Learning-oriented [Experimentation or learn from mistake; Learning oriented; Unconstrained thinking; Experimental intelligence; Inquisitive and open to new perspectives; Curious / Intellectual curiosity; Playful and Humoristic; Critical Questioning - "beginners mind"]. (e.g. Carlgren et al, 2016; Clark and Smith, 2008; Schweitzer et al, 2016).
2. Open Mindeness and Diversity [Open to Diversity / Willing to integrate diversity; Embracing diversity; Open to differences of personality and background; Democratic spirit; Open Mindeness; Non judgmental]. (e.g. Fraser, 2009; Fraser, 2011 Yeager et al, 2016).
3. Ambiguity tolerance and Risk Embracing [Tolerance of Ambiguity; Open to the unexpected; Embracing Risk; Comfort with complexity and ambiguity]. (E.g. Carlgren et al, 2016; Fraser, 2007; Razzouk and Shute, 2012).
4. Empathy and User Centeredness [User centeredness; Empathy/Empathic; Empathy & Human-centeredness; Social; Co-develop value with user]. (E.g. Liedtka, 2015; Howard et al, 2015; Fraser, 2011).
5. Action-oriented behavior [Biased toward action; Thinking through doing; Prototyping Visualisation-driven/-oriented; Desire to make a difference; Optimism; Optimistic and Energetic]. (E.g. Carlgren et al, 2016; Liedtka, 2015; Fraser, 2011; Schweitzer et al, 2016; Howard et al, 2015).
6. Radical Collaboration [Eager to share; Collaborative geared; Team Collaboration; Communication and knowledge sharing; Team working; Visualisation for collaboration]. (e.g. Howard et al, 2015; Clark and Smith, 2008; Razzouk and Shute, 2012).
7. Holistic thinking and problem framing [Mindful of process; Holistic view; Integrative thinking; problem exploration; problem framing] (e.g. Carlgren et al, 2016; Howard et al, 2015; Schweitzer et al, 2016.)
8. Creative [Creative; Consciously creative]. (e.g.Carlgren et al, 2016; Schweitzer et al, 2016).

Definition of DT Mindset characteristics

For each cluster, a brief definition emerging from a wider literature review is reported below.

Experimentation and Learning-oriented. Carlgren et al. (2016) define the experimentation activity as *"a bias towards testing and trying things out in an iterative way, and moving between divergent and convergent ways of thinking."* (: p.47). The most important outcomes are not cost saving nor production improvement, but the obtaining of information and knowledge *"Design Thinking's field experiments are not pilots in which revenues (or their lack) are the only outcomes evaluated. They are true field experiments in which specific assumption concerning value creation, execution, defensibility, and*

scalability are evaluated" (Liedtka and Ogilvie, 2011). Martin (2010) refers to this element with "validity-orientation" – defined as an effort of "*exploration and search for a new formula that might be more relevant in the future*" – as opposed to a reliability-orientation that "*favors exploitation and reliable replication of a proven success formula in the present*" (:41). Close to Experimentation, there is the characteristic of Curiosity. Stanford (2010) confirms this aspect declaring the need to be curios along all the Design Thinking process. It shows also some advice in order to improve your creativity: *"don't judge; Question everything; Be truly curios; Listen. Really" (p.6).*

Open Mindedness and Diversity. Everything in Design Thinking have to be developed with an Open Mind. If not, it's not possible to reach the full potential of the approach. This entails being open to new ideas, new people and new ways of doing things. Elements of openness include prices of all types that have a clear mission to create value (economic and human) for stakeholders. (Fraser, 2011: p.71). Having an open mind means also make errors and accept positively comments/ opinions to our own work. Only in this way it is possible reach high results. (Grots and Creuznacher, 2016).

Ambiguity tolerance and Risk Embracing. 'Ambiguity Tolerance' and 'Risk Embracing' are the more difficult to manage characteristics and to recognize in the innovation context. McLain (2009) defines Ambiguity as "*the timely absence of information needed to understand a situation or identify its possible future states. Ambiguity is therefore a lack of information beyond risk or uncertainty which requires an awareness of all possible outcomes.*" (McLain, 2009: p.977). Usually ambiguity is presented as a barrier to understating. It could bring to stress situation and frustration if this state of uncertain is stable for long time (Beckman and Barry, 2007). In the Design activities, Ambiguity is accepted as natural part of the explorative process where information come out spontaneously and are not predefined. Therefore, an expert Design Thinker should be able to adapt himself to every not clear situation, even when he's developing a product, a service or an experience (e.g. Fraser, 2009; Hassi and Lasko, 2011). As well as designers, organizations have to tolerate and to manage this ambiguity. The objective is to find the best trade-off between the available information and the possible risk of the unclear situations. That's why the prototype phase is essential in the Design Thinking process.

Empathy and User Centredness. Empathy is the tool able to recreate abstractly a given situation and how individuals perceive it. (Köppen et al., 2015). The ability to "put yourself in someone else's shoes" is essential if you want to understand desires, hopes and problem of the users. Through empathy, the Design Thinker should be able to see with eyes different by own ones. Only in this way it's possible study objectively what are the causes -and the consequences- of a given circumstance (Grots and Creuznacher, 2016). A user-centred mindset is an integral, necessary and distinguished element of Design Thinking (Goldman et al., 2012: p.17). This one gives the maximum priority to the user's need in the design phase. *"In designing something, we create value with people and for other people"* (Fraser, 2011: p.72).

Action oriented behavior. An orientation toward action -or 'bias toward action'- means *"choosing action-oriented behavior over discussion and conceptual or analytical behavior. It is a preference to get out into real world and engage users, do prototyping and test ideas as a manner of getting a team unstuck or inspire new thinking."* (Schweitzer et al., 2016: p. 10). From a technical point of view and from an external eye, this characteristic is strictly related to the quick prototyping and testing phase of Design Thinking. In fact, this is rather a deeper principle that . Its implementation spans from cognitive processes to cultural effects (sometimes described as Optimism). Some authors have referred to it with "Optimism" or "Energic", referring to it as to the secret ingredient which transforms every problem in a challenge. "*Design Thinkers never see problems as problems, but as challenge producing a chance to create change from them*" (Grots and Creuznacher, 2016: p.190);*"Design thinking is associated with enjoying problem solving and findings"* (Hassi and Lasko, 2011: p.58). When referring to Optimism those author recall a behavior that faces problems in a direct way, embracing an active role with the willing of finding a solution to it, rather considering them as something to avoid.

Radical collaboration. "*Design Thinking only works in teams. Collaboration is essential for innovative outcome*" (Meinel and Leifer, 2015: p.7). Literature affirms an open and frequent communication facilitates the information sharing and improves the quality of any result (es: Hassi and Lasko, 2011; Goldman et al., 2012). Simons et al. (2011) take this concept to the limit defining the term "Radical Collaboration". Following this perspective, besides the team discussions about the information and the experiences given by each member, there is a will to investigate them personally. Doing that, people extremely amplifies information given by the environment, obtaining a "domino effect" which puts all the participants at the same level. (Simons et al., 2011). Radical collaboration as a characteristic defining design has deep roots holding in design methodology studies. Bucciarelli (1994) defined design as "fundamentally a social process", Hatchuel (2001) states that understanding and designing of the social interactions is part of the design process itself. The shape of the "solitary genius" has been substituted by heterogeneous team where collaboration and knowledge sharing led to better innovative solutions.

Holistic thinking and problem exploration. Design Thinkers see and understand the connections, the interactions and the dynamics of complex context. A holistic approach enable the capacity to simultaneously manage user's needs, problem's context, social and cultural aspects in which the solution will be used (Hassi and Lasko, 2011; Razzouk and Shute, 2012). In precedent literature of design methodologies, Hatchuel (2001) listed the differences among problem solving process and design process. The first difference is that the design process includes the (unexpected) expansion of the initial concepts. This situation recalls for the paradox concept from Dorst (2011), and is now referred in the DT literature with problem framing.

Creativity. The term "Creativity" describes the individual's ability to develop ideas or products judged by others as new and adequate (Amabile, 1983). In literature, the Design Thinking approach has been defined several times as a creative process, and it's required as a strategic element for the success of a company or a discipline. It also improves the added value creating process (Kelley and Kelley, 2012). Authors declare people need to rediscover their creativity rather than to learn how be creative. This is possible thanks to the practice of our 'creativity confidence'. This one is defined as the natural ability to generate new ideas and having the courage to test it. Creative people have not to be afraid to do the first step or losing the control of the process (Kelley and Kelley, 2012).

3   2ND PHASE. IDENTIFICATION OF AVAILABLE VALIDATED SCALES FROM LITERATURE AND VALIDATION WITH EXPERTS PANEL

For each of the identified characteristics, we looked for validated scales that could cover the identified constructs. In order to represent as best as possible the multidimensional nature of Design Thinking, for each identified cluster (DT Mindset characteristic), we looked for validated scales or validated scales-factors that could measure it. We started the review with a particular focus on the innovation literature. When we could not identify coherent scales, we resorted to psychometric literature. A great help came from Brooke Dobni's (2008) scale, as it represents an organizational innovation culture measure, and was used to cover some of the DT Mindset identified characteristics. Among the identified validated scales, the authors reached consensus: the following table summarizes the final decisions.
Out of the eight DT Mindset characteristics, the authors identified five validated factors. For the remaining characteristics, the scales identified have been considered as non-appropriated, since those scales were too generic or too specific to be considered as overlapping in this study.

The resulting items considered five factors, to which a socio-demographic section was added, for a forty-four items partial scale. A panel of 4 design thinking experts and 14 practitioners of different experiences in Design thinking participated to a focus group for face and content validity, to check content coherence among items and design thinking mindset.

The table below summarizes the second phase results.

Table 1. Comparison between DT.Mindset theory and Psychometric Scales

DT.Mindset Characteristics (References)	Scale Identified	Judgment from experts panels and practitioners focus group.
Experimentation and Learning oriented (e.g. Carlgren et al, 2016; Clark & Smith, 2008; Schweitzer et al, 2016)	None	*to be developed*
Open Mindedness and diversity (e.g. Fraser, 2009; Fraser, 2011; Yeager et al, 2016) Ambiguity Tolerance and Risk Embracing (e.g. Carlgren et al, 2016; Fraser, 2007; Razzouk & Shute, 2012)	Curiosity (Kashdan et al., 2009)	*Optimal* Kashdan et *al.* (2009) scale has the objective to measure individuals' curiosity. It's a composed scale: open mindedness (called "Stretching" – 5 Item) and curiosity toward the unknown (called "Embracing" – 5 Item). This two dimensions are mutually interconnected and are seen as efficient and appropriate to measure the characteristics of "Open Mindedness and Diversity" and "Ambiguity Tolerance and Risk Embracing".
Empathy and User centeredness (e.g. Liedtka, 2015; Howard et al, 2015; Fraser, 2011)	Value Orientation (Brooke Dobni, 2008)	*Acceptable-* The factor selected shows the attention run by the organization to create value with stakeholders. It is the scale most consistent with the characteristic of Empahty.
Action oriented behavior (e.g. Carlgren et al, 2016; Liedtka, 2015; Schweitzer et al, 2016)	None	*to be developed*
Radical collaboration (e.g. Howard et al, 2015; Clark & Smith, 2008; Razzouk & Shute, 2012)	Organizational Consituency (Brooke Dobni, 2008) 13 items	*Optimal-* As well as measuring the level of collaboration and communication, it also measures those implicit value that improve the organizational engagement
Holistic thinking and problem exploration (e.g. Carlgren et al, 2016; Howard et al, 2015; Schweitzer et al, 2016)	None	*to be developed*
Creativity (e.g. Carlgren et al, 2016; Schweitzer et al, 2016)	Creativity & Empowerment (Brooke Dobni, 2008) 6 items	*Acceptable-*the author had identified the behaviours that make creativity an effective tool, and this scale can be accepted as a scale for Design Thinking Creativity.

4 DISCUSSION, LIMITS AND NEXT STEPS

Even if this study is at the initial stage of development, we believe it gives some important contribution to existing literature. First, it is defining Design Thinking Mindset from a meta-analysis of all the definitions currently available in literature. Second, through a literature review, the authors identified the available scales from innovation literature that match the Design Thinking Mindset characteristics, highlighting gaps that need to be designed. Future research will address the design and test of new measurement instruments that correspond to one or more of the three characteristics that do not have existing measures and verifying their validity and consistency, as well as the general validation of the scale.

As a final result of this study it is proposed a survey whose objective is the measurement of the implementation level of the Design Thinking Mindset in organization. This instrument is composed by five sections and use a seven point-Likert scale.

The final survey can be used for diagnostic purpose. To date, it's appropriate to measure mental characteristics influenced by the effective implementation of Design Thinking. In the future, the tool may also be used for longitudinal studies. To do this you will have to submit the survey to the firm at two different circumstance.

At first, for detecting an initial organization profile not influenced by the approach and -at a later time-after having carried out a notable number of Design Thinking projects and have been long influenced by the approach.

By doing so, it's possible to take two "snapshots" of the organizational mindset that allow to develop a comparison before and after the implementation of Design Thinking. If the comparison's result is a change of mentality according to DT.Mindset characteristics, then it is possible to say that the Design Thinking has had a significant impact on the way people work.

The measurement activities are only the first step and opens the door to a much wider dimension of research whose aim is to exponentially increase the applicability of the Design Thinking approach.

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