DESIGN THINKERS' PROFILES AND DESIGN THINKING SOLUTIONS

ABSTRACT.

The term design thinking has emerged as a critical success factor in the literature in order to foster innovation and to deliver a solution for an unmet need with a customer centric approach. Design thinking is generally defined as an analytic and creative process that engages a person in opportunities to experiment, create and prototype models, gather feedback, and redesign. Several characteristics (e.g., visualization, creativity) for design thinkers will be identified and if these profiles are related to the type of innovations or outcome delivered. The literature has not been conclusive in explaining how the profiles of design thinkers influence on particular design thinking solutions. The main idea is that the ways professional designers tackle a problem to reach an innovative solution is related with the designers' profile. Even though the design thinking process is a teamwork effort, this paper aims to consider the importance to include the complementary profiles in order to deliver a more effective and creative solution with a customer centricity approach. In order to study the relationship between design thinkers and type of innovations this research used a focus group and a survey. The research sample was identified as those who were involved in design thinking projects in the last two years in two Innovation Hubs located in Mexico. The findings are important to researchers and practitioners trying to accelerate business innovation and to society trying to make change happen based on the problems under consideration recommending specific designers' profiles to participate effectively in specific projects.

*Keywords***:** Design Thinking, Design Thinkers' Profiles, and Business Innovations

INTRODUCTION.

Based on studies from Fisher (2014) and Kennell (2015) published in Fortune and Huffington Post, about 10% of innovative ideas for new goods and services succeed. According to Mark Payne, a consultant responsible for successful innovations at Coca-Cola, Starbucks, Samsung, GE, P&G and others, many ideas fail because companies put "the 'wow' before the 'how'", wasting time and money pursuing unworkable plans that should have not gotten off the prototyping phase. In a 2010 performance assessment study, the Product Development Management Association (PDMA, 2010) identified that of all initial ideas, only 18% complete the process and achieve a level of defined success, supporting the high failure rates suggested. In order to sense and deliver the "job to be done" (Johnson, Christensen, & Kagermann, 2008) to solve an important problem or fulfill an important need for the target customer, the right methodology and people should be chosen.

The first step is to find a strong methodology focusing on customers' unmet needs, those internal or external customers to an organization. Based on the literature and on success stories of archetypal innovative organizations like IKEA, Apple or Google, Design Thinking is chosen as this methodology. The term design thinking has emerged as a critical success factor in the literature in order to foster innovation and to deliver a solution for an unmet need with a customer centric approach (Parker & Heapy, 2006). Design Thinking is generally defined as an analytic and creative process that engages a person in opportunities to experiment, create and prototype models, gather feedback, and redesign.

The second step is to identify suitable profiles for the different innovation processes, from ideation to launching. The literature identifies broad bundles of skills and characteristics for innovators, such as entrepreneurial, strategic thinking, creativity, project management, communication, analytical, team-orientation or generative leadership, suggesting that one bundle of skills or styles may be appropriate.

Research has not focused on the diversity of roles required at each stage of the innovation process. Strategic consideration for individual skills may require assessment and matching, coaching, training, and team assembly to complement the innovation requirements.

Profile dynamics may indicate that greater efficiency exists in a multidisciplinary and diverse team composition, allowing each specialized stage to match the specialized skills required.

The right skills strongly influence the business innovation by facilitating the process, obtaining resources (Valle & Avella, 2003), and increasing efficiency through the assessment and implementation of the most appropriate strategy (Elenkov, Judge, & Wright, 2005).

The importance of understanding the team dynamics based on their personal characteristics, skills and capacities for a particular innovation phase is essential for the success of business innovation.

The problem observed is that despite increased research concerning Design Thinking, important questions remain inconclusive in explaining how the profiles of Design Thinkers influence particular Design Thinking solutions (Verganti, 2009). The role of Design Thinkers' personality as an innovation process has not been sufficiently explained.

The aim is to prove that the way professional designers tackle a problem to reach an innovative solution (i.e. iPod, Amazon, Windows) is related to the designers' profile, which have to fit to work together. Specifically how being analytical, empathy, creativity, openness, and other people characteristics are important when integrating a team for business innovation purposes, and particularly if the leading role of particular skills may be important for specific process, from empathy, definition, ideation, prototyping to testing processes.

Further, exploring "profiles" of design thinking initiatives helps uncover whether and how certain innovation outcomes may be influenced by the teams' composition during a design thinking project.

Despite the fact that there are multiple conceptions of what design thinking is and perhaps not surprising given the multiple disciplinary lineages that undergird the phenomenon of design thinking. While some consider design thinking to be the current management trend (Abrahamson, 1991), others claim that the emergence of design thinking is due to the changing nature and complexity of the problems that organizations are facing (Boland & Collopy, 2004). Tim Brown, CEO of IDEO, suggests that "what we need are new choices—new products that balance the needs of individuals and of society as a whole; new ideas that tackle the global challenges of health, poverty, and education; new strategies that result in differences that matter and a sense of purpose that engages everyone affected by them.

But why look to design thinking? Almost two decades ago, Cross, Christinaans, and Dorst (1994) wrote about designers' specific abilities to "produce novel, unexpected solutions, tolerate uncertainty, work with incomplete information, apply imagination and forethought to problems, and use drawings and other modeling media as a means of problem solving" (p. 41).

Historically, design was one of the last steps in an innovation or product development process, a downstream activity focused on improving the appeal of a product just prior to launch. Today, however, more organizations are pulling design thinking further upstream, as they seek to utilize designers' skills and processes to help create solutions to complex problems or to build processes or whole systems that optimize results, improve situations, and even enhance lives.

The unique nature of design thinking as collaborative, creative, and customer-centered has vast potential in organization development, aiding organizations as they face tough challenges and bringing intrinsic values to enhance organizational life (Brown, 2009).

Nevertheless, despite increased research examining design thinking, important questions remain related to the reasons why and the ways in which organizations are seeking design and the value that design is providing to organizations.

THEORETICAL FRAMEWORK.

The origins of design thinking are often linked to the design method movement five decades ago, when research on the methodology and science of design emerged. The movement advocated a systems view of design projects and introduced methods that emphasized a rational or scientific approach to designing (Rith & Dubberly, 2006).

During the design methods movement, researchers sought to understand the processes and methods by which designers went about solving design problems. Rith and Dubberly (2006) in their work studied the influence of Rittel's work, describing what he called "first generation" of design theories as those leveraging the fields of operations research and cybernetics, focused on the mechanistic and reductionist aspects of the design process. To Rittel, the science of design has three tasks: First, to further develop the theories of design, to learn more about the reasoning of designers. Secondly, it should pursue empirical inquiries into how plans come about, and what the effects of plans are in comparison with what they intended. Finally, on this basis, it should look for tools to support designers in their work. The human mind is fallible. Methods should be sought to amplify its abilities, even if it's only to keep us from falling prone to our idiosyncrasies (Rith & Dubberly, 2006).

Cross describes the origin of the second generation of design thinking: "Where the first generation of design methods was based on the application of systematic, rational, scientific methods, the second generation moved away from attempts to optimize towards recognition of satisfactory or appropriate solutions" (Cross, 2007, p. 2). This second generation of design theories and methods was an important step in moving design beyond the mechanization of decomposing a problem into smaller problems to be solved, they design and looked at engaging more of a "participatory process in which designers are partners with the problem owners" (Cross, 2007, p. 2).

Over the past few decades, researchers have continued to explore design methods and "how designers think." In the design community, David Kelly of IDEO noted: We moved from thinking of ourselves as designers to thinking of ourselves as design thinkers. We have a methodology that enables us to come up with a solution that nobody has before". In recent years the term "design thinking" has appeared in connection with specific organizational topics such as strategy (Brown 2009); innovation (Verganti, 2009); and management and organizations (Boland & Collopy, 2004; Brown, 2008).

This outgrowth of design thinking into areas outside design may have to do with the complexity of problems contemporary organizations face, including strategy development and implementation, innovation and growth, and whole system transformations.

Design Thinking in Strategy

Recently, Liedtka (2004), examined strategy thinking as a process of design. The researcher stated that design becomes a shaping process in which the designer begins with a generative conversation that explores an array of 'what ifs' before settling on a particularly promising one for further inquiry, exploring the metaphor of strategic thinking as an individual's conversation with the local environment arguing for a model of strategic thinking that is both iterative and interactive, both planned and opportunistic, both creative and analytic.

By the same time, design leaders such as Brown (2005) have argued that design thinking is at the core of strategy: "In order to do a better job of developing, communicating, and pursuing a strategy, you need to learn to think like a designer" (p. 5). In Strategy as Design, Liedtka (2004) identifies several shared qualities of strategy and design. Both are synthetic or customized and often unifying disparate demands and requirements; they are abductive—inventive, future-focused, and concerned with what might be.

Design Thinking in Innovation

According to Brown (2009), "Design thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success" (p. 18). Nussbaum (2005) noted how businesses are embracing design thinking as an enabler to be more innovative, differentiated and efficient. This demand has led to several universities and institutions offering masters and other professional programs to teach the design skills required by corporations that are in need of innovation expertise. The Institute of Design (Illinois Institute of Technology) has been teaching design thinking and strategy for years, and in the past decade it started offering a Master's program to provide "a background in design method in user observation and research, prototyping of new services and products, creating systems of innovation, visualizing alternative futures, and linking user innovation to organizational strategy" (Nussbaum, 2005, p. 1).

RESEARCH QUESTION AND RESEARCH MODEL.

Despite increased research examining design thinking, important questions remain, related to the reasons why and the ways in which organizations are seeking design and the value that design is providing to organizations.

The paper aim to explore the following research question:

> How and what do particular designers' profiles emphasize certain operational practices and deliver certain innovations?

The proposed research model is (see Figure 1):

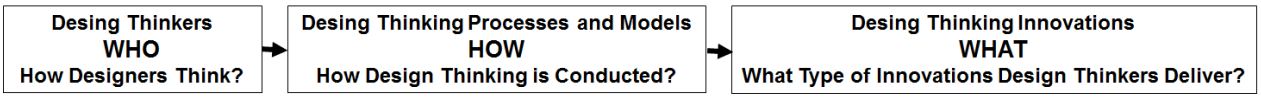

Figure 1. Research Model

1. Examine characteristics of design thinkers: identify key characteristics (behaviors and attitudes) present in individuals who participate in design thinking. Who is the design thinker?

2. Examine design thinking processes and models as a team: explore key characteristics (behaviors and activities) present in the design thinking process. How is the design thinking process?
3. Examine the solutions resulting from a design thinking initiative: characterize the final outcome of the process (business model, service, process, or product). What is the design thinking innovation delivery?

Designers and Design Thinkers (Who)

For years, design theories were questioned and developed increased curiosity as to "how designers think" (Lawson, 1980). Various techniques were employed specifically to observe the designer's mind: one-on-one interviews with designers, observing designers at work to study their protocol; conducting laboratory experiments, creating tests with controls; and trying to simulate the design process (Lawson, 1980).

Research attempts to describe "how designers think" by understanding the thought process of designers in action include the work of Bruce Archer, who stated, "There exists a designerly way of thinking and communicating that is both different from scientific and scholarly ways of thinking and communicating, and as powerful as scientific and scholarly methods of enquiry when applied to its own kids of problems" (1979, p. 17).

Significant contributions to understanding how designers think were made by Donald Schon. Schon's book The Reflective Practitioner (1983) identified the processes of thinking and action that design and other practitioners bring to problem situations. He captured the work by designers during their "reflection-in-action" as they move to reframe problems.

Design Thinking Process/Models (How)

Based on the design thinking adoption, models have been instrumental in deciding how design thinking has been defined, discussed, and challenged. Several popular models of design thinking (see Table 1) have received attention as a methodology for problem solving (i.e. Stanford d.school, Brown, Martin, and Liedtka & Ogilvie Design Thinking Models).

Table1. Design Thinking Model Commonalities

Design Thinking Model		Discover					Create	Build			
Liedtka & Ogilvie	2011	Visualization	Jouney Mapping	Value Chain Analysis	Mind Mapping	Brainstorming	Concept Development	Assumption Testing	Rapid Prototyping	Customer-Creation	Learning Launch
Brown	2009	Inspiration					Ideation	Implementation			
Martin	2007	Generate Ideas					Predict	Test		Generalize	
d.School	2004	Empathize			Define		Ideate	Prototype		Test	Produce

According to the Liedtka and Ogilvie Design Thinking Model (2011), the process framed 10 key steps of design thinking (visualization, journey mapping, value chain analysis, mind mapping, brainstorming, concept development, assumption testing, rapid prototyping, customer co-creation and learning launch) according to four key questions: What is? What if? What wows? What works?

Similar features to other design thinking models include gaining an understanding of current state (what is), that process comes in the form of mind-mapping exercises. Brainstorming, concept development, prototyping, and co-creation are all key characteristics of design thinking identified in other models (see Figure 2).

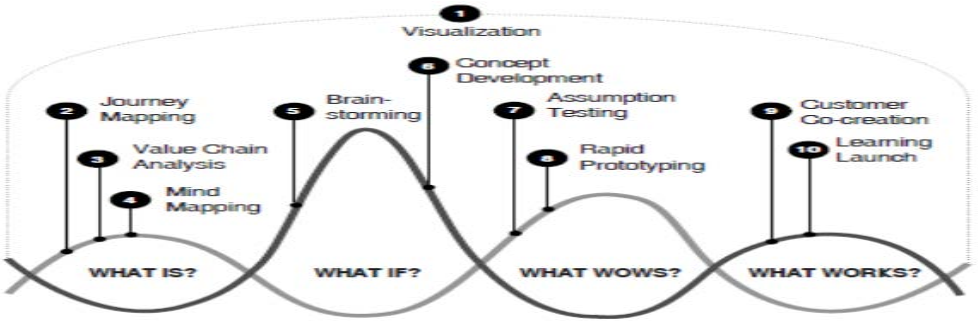

Figure 2. Design Thinking Process (Liedtka & Ogilvie, 2011)

Brown (2008) considered the design thinking process as a system of 3 phases: inspiration, ideation and implementation, while he emphasizes the circular mode of the spaces and the possibility to loop backwards if needed (Figure 3). In Brown's concept, inspiration as the beginning of the design thinking process represents the recognition and understanding of a problem and opportunity. Subsequently in the space of ideation several ideas are generated, which provide possible solutions to the problem. The following space of implementation employs the idea execution and the learning from the process.

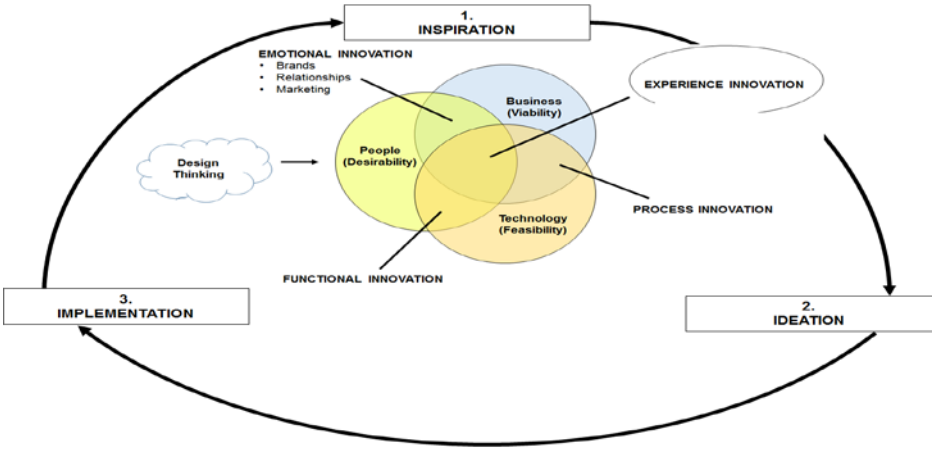

Figure 3. Design Thinking Model (Brown, 2009)

According to Martin (2007) "the cycle" of design thinking combines the generation of new ideas with their analysis and an evaluation of how they apply. A designer uses abduction to generate an idea or a number of ideas, deduction to follow these ideas to their logical consequences and predict their outcomes, testing of the ideas in practice, and induction to generalize from the results (see Figure 4).

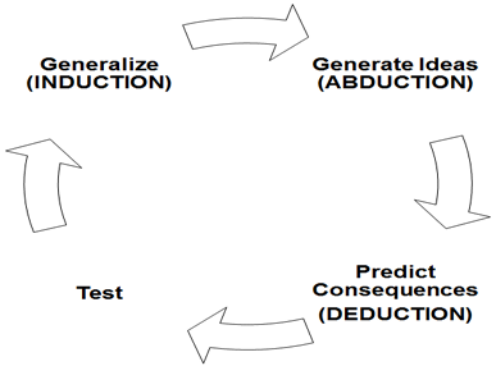

Figure 4. Design Thinking Cycle (Martin, 2007)

Based on Stanford's Design Thinking Methodology (2004), the approach as a didactic process model that is used for design education (see Figure 5). The main task of the model is to balance flexibility as well as sequentiality. The model is arranged in a linear manner but considers forward and backward linkages. In the phases of understand and observe the analysis of problems is essentially important for the following process of problem solution and is neglected in a lot of approaches. Within this approach great value is set upon this phase of the problem solution and big space within the process is acknowledged to it. Thereby especially empathy, the ability to put oneself in the situation of other people and to "change the perspective" is emphasized. In the following phase of point of view gathered data is organized and insights are defined. In the phases of ideate and prototype creative solutions are ascertained and corresponding prototypes are produced. Especially brainstorming and modeling characterize these phases. In the last phase of test the prototypes are implemented and tested in real application. Corresponding modifications are made if there is any demand on correction.

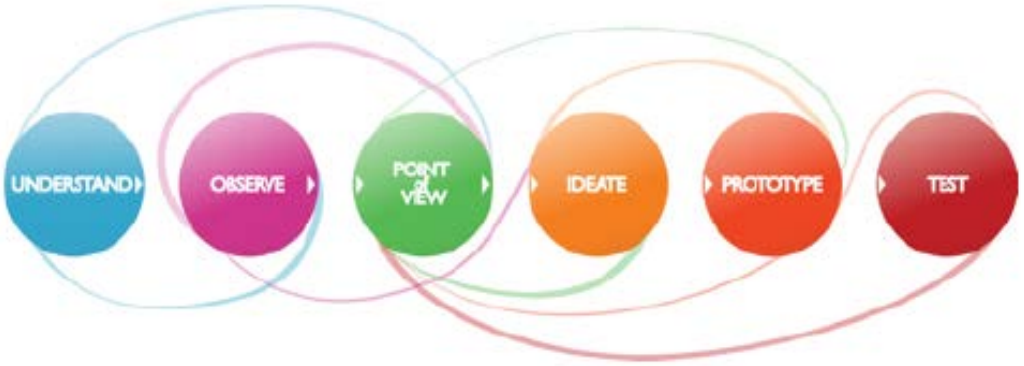

Figure 5. The Design Thinking Methodology at Stanford's d.School (2004)

Design Thinking Solutions (What)

Boland and Collopy (2004) describe products (goods/services as artifacts) and "the tangible result from a design process – a product, process, communication, or technique that we have designed" (p. 267). This tangible result is often described as the (design) solution that addresses the (design) problem.

The discussion of "what is created by designers" is evolving as the range of problems that designers confront expands and diversifies. For example, in the past, design was a downstream step to address packaging or other aesthetic features of a product prior to launch.

This last phase of exploration into the design thinking study is a look at "what" is created as a result of design thinking: solutions to problems.

The intent of examining the "what" was to assess how the outcomes of design thinking initiatives were considered in various types of projects and in different types of organizational contexts.

RESEARCH METHODOLOGY.

The paper initiated with a qualitative approach working with a focus group to identify designers' characteristics in each phase of the design thinking process for business innovation. For the focus group, a three round of activities were conducted with 8 design thinkers and experts to identify the profiles for each stage of the Design Thinking methodology.

The focus group results allowed to design a survey instrument was used for this paper, as a complementary quantitative approach, considering Kerlinger and Lee's research (2000) who described this type of research to study large and small populations (or universes) by selecting and studying samples chosen from the population to discover the relative incidence, distribution, and interrelations of sociological and psychological variables.

For the quantitative side an online survey was sent to all the teams participating in innovation projects during 2015 and 2016 using the AXTEL's Innovation Hub to explore on the influence of the teams' composition on the innovation outcomes (products, business models, branding, customer experience, etc.).

Axtel (see Figure 6) is a Mexican technology company offering "Innovation as a Service" for innovative companies. Data was collected from forty-one individuals from both communities.

Figure 6. ALESTRA's Innovation Hub (2016)

The practices of design thinking identified in the literature were utilized in the survey instrument, which consisted of 14 questions. The first question asked respondents to briefly describe a recent experience in which design thinking was applied. The purpose of this first question was to have respondents identify a single design thinking initiative that would serve as the basis of the remaining questions on the survey. This provided a single design thinking initiative that could be thoroughly described and then analyzed by the remaining questions associated with it.

The second question asked respondents to identify how many people were involved in the design thinking initiative. In survey questions 3 and 5, respondents were asked to identify how frequently operational practices of design thinking were present in their initiatives.

Survey questions 4 related to the overall success of the initiative: Question 4 asked respondents to label their design thinking initiatives as either successful or unsuccessful.

Questions 6-8 were designed to probe various aspects of the design thinking initiatives, such as the amount of time allocated to the project, the purpose, and the level of complexity of the design thinking initiatives. The next section of the survey asked respondents to identify personal characteristics such as occupation (Question 9), personality skills (Question 10), level of expertise with design thinking (Question 11), gender (Question 12), and age (Question 13). Data from Question 16 was used to provide additional description to design thinking initiatives, particularly the level of experience an individual has with design thinking. The other questions in this section provided demographic information on the characteristics of the sample and on personal characteristics of design thinking practitioners.

The final question (Question 14) of the survey was open-ended; it was included in an effort to capture more detailed descriptions of the design thinking initiatives, asking the respondents to describe briefly what worked, what didn't work and what you would have done differently with the last experience you mentioned at the beginning of the survey.

DATA ANALYSIS.

The targeted research sample was identified as those who recently had been or currently are involved in a design thinking initiative in two innovation hubs, Alestra and Egade in Monterrey, Mexico. People involved in diverse design thinking projects were contacted by email, sending them the online survey. Demographics regarding gender, age and occupation are shown in Table 2.

Table 2. Demographics

Gender	Frequency	%
Female	12	29.27
Male	29	70.73
Total	41	100.00

Occupation	Frequency	%
Corporate Consultant	17	41.46
Designer	5	12.20
Design Consultant	4	9.76
Professor	3	7.32
Student	12	29.27
Total	41	100.00

Age Range	Frequency	%
<22	0	0.00
23-30	3	7.32
31-40	15	36.59
41-50	12	29.27
51-60	9	21.95
61-70	2	4.88
71-80	0	0.00
>80	0	0.00
Total	41	100.00

An important consideration for this paper was to identify operational practices of design thinking, and respondents were asked to identify how frequently certain operational practices of design thinking were present in their initiatives (see Table 3).

Table 3. Operational Practices of Design Thinking

Operational Practice	N	Min	Max	Mean	Std. Dev.
Analytical thinking	39	2	5	4.10	.821
Emphasis on the context in which the design would be used	40	2	5	4.45	.783
Developed end user/customer understanding through Ethnography	39	1	5	3.49	1.315
Personal reflection	38	2	5	4.26	.828
Creative Thinking	39	3	5	4.46	.600
Empathy with those for whom the design was developed	40	2	5	4.50	.679
A positive perspective	40	3	5	4.38	.774
Asked tough questions	40	2	5	4.15	.949
Reframed the needs of the end user/customer	40	3	5	4.15	.770
Abductive thinking	30	1	5	3.80	1.157
Inclusiveness - emphasizing participation	40	2	5	4.15	.949
Collaboration	40	2	5	4.30	.939
Used constraints to formulate solutions	39	2	5	3.85	1.040
Developed transformational or radical solutions	39	2	5	3.72	.972
Intense focus on the needs of the end user/customer	40	1	5	4.33	.997
Built Prototypes	38	1	5	4.00	1.185
Tested Prototypes	38	1	5	3.76	1.422
Created inspirational solutions	39	1	5	4.00	1.026
A sense of optimism	40	3	5	4.50	.641
Expanded our capacity to create the results we truly desired	36	1	5	3.81	.889
Nurtured new and expansive patterns of thinking	37	2	5	4.05	.880
Held creative tensions - managed the gap between vision and reality	38	1	5	3.95	.985
Maintained commitment to the truth	35	3	5	4.17	.747
Continually strived to see the whole	38	3	5	4.42	.722
Individuals learned	36	2	5	4.11	.785
People shared their own thinking to influence others	37	2	5	4.05	.815
The team or organization was designed	36	1	5	3.61	1.271
The team was not designed but took steps to correct	30	1	5	2.53	1.137
Built a shared vision of the future	37	1	5	3.95	.998
Created the results we truly desired	34	1	5	3.71	.970
Team or organizational learning transpired	37	1	5	4.11	1.100
Developed and unleashed collective aspiration	36	1	5	3.89	1.036

The operational practices highlighted in blue are those that had a mean score close to 4.5, indicating these characteristics were more often present in the respondents' design thinking initiatives: creative thinking, empathy, optimism, and continually striving to see the whole had the highest mean scores.

The attributes highlighted in red are those that had a mean score <4, indicating these operational principles were less frequently present in the design thinking initiatives. Of particular interest are the average scores for design thinking principles related to organization factors, specifically with team design, such as: the team or organization was designed to match the desired outcomes (3.61); and, the team was not designed to match the desired outcomes but took necessary steps to correct (2.53). These results represented the lowest mean scores, which may signal a lack of organizational design principles missing in design thinking initiatives, which is a salient factor considering that Design Thinking is a team effort.

Regarding the time allocated to develop and test the design thinking initiative, the results are shown in Table 4.

Table 4. Time to Develop a Design Thinking Initiative

How much time did you have for the Design Thinking initiative you described from the initial onset/kick-off to providing a final deliverable?	Frequency	%
Less than 3 days	8	20.0
Between 4 days and one week	1	2.5
More than one week less than two weeks	1	2.5
More than two weeks less than one month	4	10.0
More than one month less than three months	12	30.0
More than three months less than six months	5	12.5
More than six months less than one year	3	7.5
More than a year	6	15.0
Total	40	100.0

Base on this sample and on the data collection, the design thinking initiatives were expected to be concluded in a short span of time, some people mentioned that if you are going to fail, you must fail fast, so the majority of design thinking projects are conducted in timeframes of less than three months, with 20% of the initiatives lasting less than three days. A small percentage (15%) of the initiatives in this study were very long, covering a timeframe of more than a year.

Regarding the purpose and level of complexity of the design thinking initiatives, the frequencies are shown in Table 5.

Table5. Purpose and Level of Complexity of Design Thinking Initiatives

How would you describe the purpose of your Design thinking initiative?	Frequency	%
Product innovation	8	20.0
Service innovation	9	22.5
Strategy development/change	5	12.5
Organizational change/transformation	11	27.5
Other please specify	7	17.5
Total	40	100.0

How would you rate the level of complexity of the problem you were trying to solve with your Design Thinking initiative?	Frequency	%
Simple	1	2.5
A little complex	1	2.5
Moderately Complex	13	32.5
Complex	15	37.5
Extremely complex	10	25.0
Total	40	100.0

Innovation is a primary purpose of design thinking projects, with a 27.5% of projects focused on organizational change/transformation. This indicates the influence of design shifting and leveraging organizational issues, and being also to mention the product and service innovation.

Based on the data, most of the initiatives in this study were described as moderately complex (32.5), complex (37.5%), or extremely complex (25%). Few were considered simple or slightly complex (2.5%).

Regarding the level of expertise with Design Thinking and success rate, the majority of the respondents considered to have an above average (46.3), average (26.8%) or excellent (17.1%) level of expertise, connected with the success rate reported (see Table 6).

Table 6. Level of Expertise and Rate of Success with Design Thinking

Which of the following best describes your level of expertise with Design Thinking:	Frequency	%
Extremely Poor	1	2.4
Below Average	3	7.3
Average	11	26.8
Above Average	19	46.3
Excellent	7	17.1
Total	41	100.0

Successful	86%
Unsuccessful	14%

Regarding the relationship between the design thinkers and the innovations being delivered, Table 7 shows that:

- Organizational change/transformation was based on a team with design thinkers being strong at comprehensive solutioning, truth seeking, and optimistic collaboration.
- Product innovation was based on a team with design thinkers being strong at analytical prototyping, personal reflecting and comprehensive solutioning.
- Service innovation was based on a team with design thinkers being strong at personal reflecting, comprehensive solutions, optimistic collaborating, and analytical prototyping.
- Strategy development was based on a team with design thinkers being strong at aspirational visioning, personal reflecting, and truth seeking.

Table 7. Relationship between Design Thinkers and Innovations.

Purpose of initiative:	N	Cooperative Understanding	Aspirational Visioning	Truth Seeking	Comprehensive Solutioning	Optimistic Collaborating	Analytical Prototyping	Personal Reflecting
Product innovation	8	3.46	3.80	3.93	4.03	3.72	4.38	4.38
Service innovation	9	3.83	3.83	3.99	4.24	4.20	4.19	4.63
Strategy development	5	3.80	4.40	4.36	4.30	4.22	3.67	4.40
Organizational change/ Transformation	11	3.74	4.13	4.15	4.22	4.17	3.88	4.09
Other	7	4.07	4.27	4.34	3.94	4.12	3.38	3.83

FINDINGS AND CONCLUSIONS.

Based on the data analysis and the literature review the foundations of design thinking range from systems thinking and design science to philosophy and the arts to cover the required design thinkers' profile and team design and formation to deliver the desired outcomes or solutions. On the one hand, it is connected to mathematics, engineering, analytical thinking, cognitive problem solving, and left-brain thinking. On the other hand, design thinking encourages art, sketching, thinking with one's hands, and right-brain thinking.

The examination of operational practices of design thinking in this paper identified 32 operational practices of design thinking (Question 3 and 5). These operational practices were central measures of a survey that was created and implemented in the quantitative phase of the study.

The survey yielded 41 diverse design thinking initiatives to be examined. In order to provide explanatory and contextual data. The categories of design thinking in this study included cooperative understanding, aspirational visioning, truth seeking, comprehensive solutions, optimistic collaborating, analytical prototyping, and personal reflecting.

This study was exploratory, providing an initial empirical examination of theoretical operational practices of design thinking and design thinkers' profiles. Opportunity certainly exists to conduct a qualitative analysis based on case studies.

As a summary of results Figure 8 integrates the findings of the objectives and research questions regarding the who, how, and what of Design Thinking.

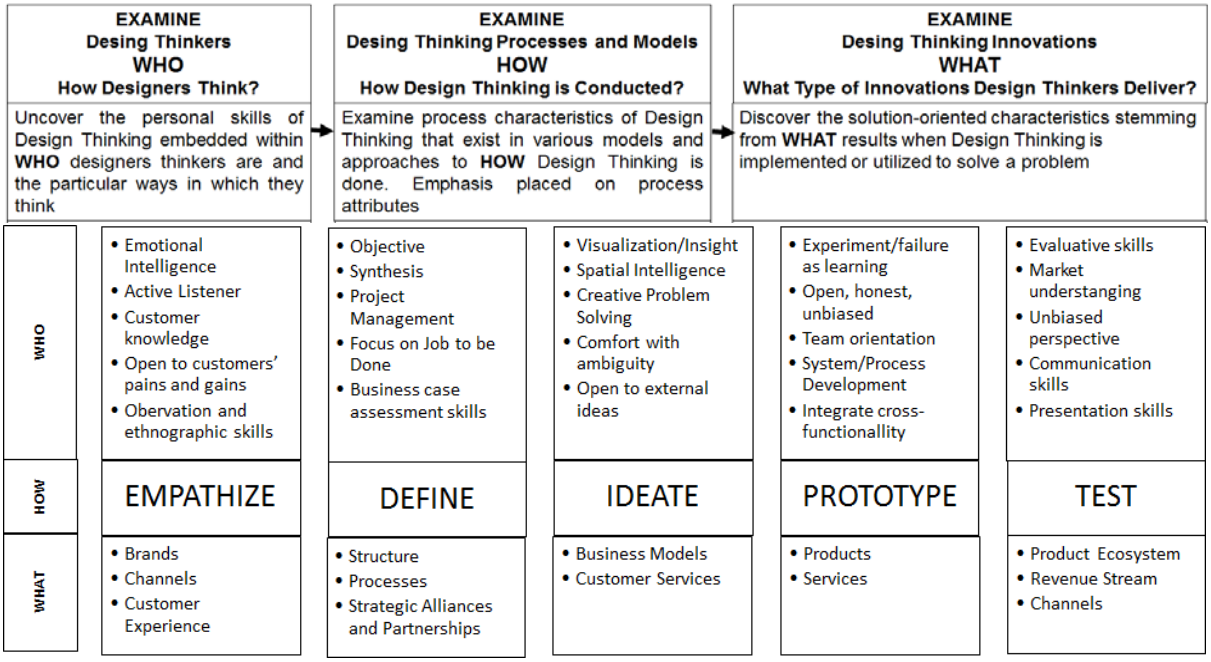

Figure 8. The Who, How and What of Design Thinking

The main findings are integrated in Figure 8, where innovation outcomes (what) required different profiles (who) in the different phases of Design Thinking (how). As an example, when innovating in the Customer Experience (what), and following the Design Thinking methodology (how), the Empathy Phase is central, and the skills required (who) are people able to observe, with emotional intelligence, active listeners, and open to identify customers' pains and gains.

Design Thinking based on the data analysis was fundamentally about the skills required for creative problem solving. This paper extended the two historical moments of Design Thinking to understand how the meaning of Design Thinking became a trend for academics and practitioners. Starting with a traditional perspective that considered Design Thinking as a cognitive style for professional designers solving ill-defined problems; followed by a general theory where Design Thinking and design were recommended for wicked problems solving; and extending to a recent perspective where Design Thinking is intended for organizational transformation and with business innovation as the goal of design.

All highly valuable to businesses in developing the capabilities they need to find a better balance between exploration and exploitation of resources and to create opportunities for innovation.

Based on the findings Design Thinking is no longer just about the right answer to a design problem; it is an iterative process with a more general potential to convert problems into opportunities. It is a human-centered activity, concerned with understanding and interpreting the perspectives of end-users and the problems they face in the reality of society. For this reason, it is important that designers should work with empathy, feeling their new solution before attempting to implement it. In essence, the findings suggested that any successful design product results from the intersection of three factors: the needs and perspectives of users, technical possibility, and commercial feasibility for the organization.

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