Design Thinking and its Potential

Prof. Jurgen Faust, 2011

There hasn't been a design topic in the past decade as extensively discussed in the scientific and business world as design thinking has been. Although difficult to define, it is not only an important aspect of design, but it also has some impact for the current business world, given that management schools have started to include the concept of design thinking in their educational curricula. Who was the first to introducing this concept in the 20th century is quite difficult to say; however, according to The Sciences of the artificial, A thinking human being is an adaptive system; men's goal define the interface between their inner and outer environments, including in the latter their memory stores, to the extent that they are effectively adaptive, their behavior will reflect characteristics largely of the outer environment and will reveal only a few limiting properties of the inner environment - of the physiological machinery that enables a person to think" (Simon 1996, p. 53).
Moreover, "The intellectual activities that produce material artifacts are no different fundamentally from the one that prescribes remedies for a social welfare policy for a state. Design, so construed, is the core of all professional training; it is the principal mark that distinguishes the professions from the sciences" (ibid, p. 111).
Therefore, Simon can be seen as one of the initiators of design thinking. The main message he is trying to convey is that the human system is adaptive with a few limiting properties from the inner environment. On the other hand, designing is a general ability, useful in other disciplines, and is the core of all professional training.
In 1992, Buchanan referred to Dewey, stating, "We mistakenly identify technology with one particular type of product - hardware - that may result from experimental thinking, but overlook the art that lies behind and provides the basis for creating other types of products." (Buchanan 1992) From this perspective, it is easy to understand why design and design thinking continue to expand their meanings and connections in contemporary culture. "There is no area of contemporary life where design—the plan, project, or working hypothesis, which constitutes the 'intention' in intentional operations—is not a significant human activity, thus it plays an important role in shaping human experiences." (Buchanan 1992)
Buchanan further notes, "The challenge is to get a deeper understanding of design thinking so that more cooperation and mutual benefit is possible between those who apply design thinking to remarkable different problems and subjects matters."
Whether this challenge has already been met is a quite difficult question to answer; however, there has been extensive research on this topic in recent years. Moreover, there had been much hybridization and variations of the concept of design thinking since then. For instance, Faste introduced a concept what of he referred to as Ambidextrous Thinking:
"Combining 'Ambidextrous' with 'Thinking' creates at least two intended images. 'Ambidextrous' means the ability to use both hands, so the first image implies the use of the hands, and by extension, use of the whole body, in creative thinking." In this statement, Faste is referring to Piaget and the three stages of human development—a body-centered stage, a visual stage and a symbolic stage, beginning at age eleven or twelve. He further notes, "When problem solving becomes blocked at the symbolic level, humans must revert to the right brained abilities associated with these previous stages." Here, he makes reference to the visual level. For that reason he developed the course out of visual thinking. "Ambidextrous Thinking" was chosen as the name because it alludes to more than visual thinking, including solving problems using all of an individual's talents and resources. (Faste 1994)
In the past twenty years design thinking has grown in popularity, in particular amongst design consulting firms. IDEO's David Kelley was one of the leading public voices, who 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” (Tischler 2009).

The IDEO team was trying to popularize the concept of design thinking, as evident in this statement—“Edison’s approach was an early example of what is now called ‘design thinking’—a methodology that imbues the full spectrum of innovation activities with a human-centered design ethos. By this I mean that innovation is powered by a thorough understanding, through direct observation, of what people want and need in their lives and what they like or dislike about the way particular products are made, packaged, marketed, sold, and supported.”

“Put simply, it is 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.” Here, Brown does try to explain what design thinking is, but never gets close to a useful definition, connecting design thinking with the design process and three spaces involved—inspiration, ideation and implementation—as he describes the profile of a design thinker with the characteristics of empathy, integrative thinking, optimism, experimentalism and collaboration (Brown 2008).

Cross (2008), as one of the initial design theorists focusing on design thinking, is someone who sees some problems with the kind of loose definitions published on the issue. In his view, “However, ‘design thinking’ has now also become such a common-place concept that it is in danger of losing its meaning. The new consensus seems to be that design thinking encompasses many forms of thinking and intelligence” (Cross 2008).

Cross argues that the source for such a meaningless phrase potentially lies in the work generated by Simon, cited earlier. He notes, “What Simon tried to communicate …is largely a reflection of the complexity of the environment (or design situation) in which it finds itself, whilst the underlying cognitive processes that control the behavior may be relatively simple. So in this view, understanding designing is more about understanding design problems than about understanding design thinking.” (Ibid)

But Cross also sees problems in Schoen’s approach, arguing that,

“He (Schoen) was seeking a new ‘epistemology of practice’ that would help explain and account for how competent practitioners actually engage with their practice—a ‘kind of knowing’, he argued, which is different from the knowledge found in textbooks. In his analysis of the case studies that provided the foundations for his theory, he began with the assumption ‘that competent practitioners usually know more than they can say. They exhibit a kind of knowing-in-practice, most of which is tacit.’ He identified a cognitive process of reflection-in-action as the intelligence that guides ‘intuitive’ behavior in practical contexts of thinking-and-acting—something like ‘thinking on your feet’. At the heart of reflection-in-action is the ‘frame experiment’ in which the practitioner frames, or poses a way of seeing the problematic situation at hand.”

Reflecting on his own earlier writing and criticizing the way he framed design thinking in his earlier research, Cross further states, “I summarized design thinking as comprising abilities of resolving ill-defined problems, adopting solution-focused cognitive strategies, employing abductive or appositional thinking and using non-verbal modeling media. I identified these abilities as highly developed in skilled designers, but also suggested that they are possessed in some degree by everyone” (ibid).

Cross also sees design thinking as a form of intelligence, which helps to identify and clarify features of the nature of design thinking, and it offers a framework for understanding and developing design ability through design education. In his words, “Design ability is something that everyone has, to some extent, because it is embedded in our brains as a natural cognitive function. Like other forms of intelligence and ability it may be possessed, or may be

manifested in performance, at higher levels by some people than by others. And like other forms of intelligence and ability, design intelligence is not simply a given 'talent' or 'gift', but can be trained and developed" (ibid).
But there are other strategies to clarify what design thinking is:
In reference to creativity and design process, in extensive studies on human brain activity, researchers have identified specific areas of the right hemisphere of the brain as being active during design thinking.
"The two hemispheres of the brain, right and left, appear to have different cognitive specialisms. Neuroscience studies tend to confirm that the right hemisphere of the brain is more specialized in spatial and constructional tasks, in aesthetic perception and emotions. The left hemisphere is more specialized in language abilities and verbal reasoning. Damage to the left hemisphere often results in the loss of some speech functions, whereas damage to the right hemisphere, as we have seen, can result, amongst other things, in the loss of design ability." Nigel Cross summarizes several studies. (ibid)
More recently, in 2008, Terrey researched what non-designers characterizes who accomplish design tasks, identifying several key attributes required for design success:
1: Strong Visualization skills
2: Ability to work with complexity
3: Ability to think strategically from a user perspective to change
4: Ability to engage and drive collaborative dialogue
5: Ability to problem solve through inquiry
6: Ability to prototype changed experience
Comparing these attributes to those successful designers possess, she is not surprised to find differences in visualization potential of non-designers and designers. But she finds many similarities between designers and non-designers who successfully execute design work. For example, the ability to work with complex problems, prototyping, and collaboration are equally present in both groups. Therefore, the question is how have non-designers learned most of the skills design thinkers need to bring to the table to practice design thinking (Terrey 2008).
Earlier, in 2002, Stempfle and Schaub criticized existing design thinking explications with the following connotation, "Three important strains can easily be identified. We will label these strains the normative strain, the empirical strain and the design-as-an-art-strain."
"The normative strain is dominated by design methodologists. …This body of work derives from a rational analysis of design tasks and their requirements and thus has culminated in widely-known guiding principles for designers within standard educational textbooks."
"Research conducted in the empirical strain, however, has revealed that designers, in practice, rarely follow the methodology prescribed by normative theories. In fact, empirical studies raise the question of whether designers follow any methodology at all. Criticism against design methodology has emerged from empirical studies in design, depicting design methodology as a rigid prescription that does not work…
Moreover, the prescriptive accounts of design neglect many of the specific factors and constraints designers need to cope with in their daily work, such as economic constraints, time pressure and teamwork". (ibid)

Relief for the design practitioner came in the form of design-as-an-art theorists (Schön 7), who have turned trouble into a virtue by stating that the design process simply cannot be grasped by any methodology. Instead, they claim that the work of designers resembles that of an artist, who applies different kinds of methods in a flexible manner in a process of appreciation, action and re-appreciation, constantly reflecting on his own work (for a deeper analysis see e. g. Roozenburg & Dorst 8).

Based on this concept, Stempfle and Badtke-Schaub have conducted a study, subsequently proposing a Two-process-theory of thinking in design. It encompasses Process 1—characterized by an immediate evaluation of solution ideas, and Process 2—characterized by solution ideas being followed by analysis. Process 1 results in considerable savings in time and cognitive effort spent on a problem. On the other hand, with increasing complexity of the design problem it is likely to produce errors. Process 2, on the other hand, will yield qualitative solutions to complex problems, albeit after investing more time and greater effort. It has thus been argued that design teams will naturally tend to employ Process 1. However, given certain conditions, a transition to Process 2 is possible (Stempfle and Schaub 2002).

In contrast to many others, Love (2009) primarily focuses on the limitations of human functioning, and thus the limitations of designers working on complex systems design. Therefore, he also claims that design professionals in Art and Design fields are not aware of such biologically-imposed limitations of human thinking, intuition and feeling in design education, design practice, generating design solutions, design methods and design theory-making (Love 2009).
He argues, "In contrast, the field of complex systems design (particularly sub-field that focuses on complex socio-technical systems design) has committed extensive effort into understanding the design implications of these human limitations and developing specific design methods to address them. Awareness over time of the high level of failures of complex systems design failures has led the complex systems design fields to identify, and develop design methods to address, the limitations of human cognitive and emotional functioning in designing in the realm of complex situations" (ibid).
Thus, as a solution to shortcomings in design education, Love posits that changes are needed, towards more sophisticated understanding of complex systems design and prediction of the behaviors of design outcomes in complex design solution spaces. That will also include multiple feedback loops through the use of mathematically-based complex systems tools to address counter-intuitive behaviors relating to usability, emotions, user participation, interactions with other design objects, platform designs, design strategy, and design thinking (Love 2009).
In a recent collection of essays, edited by Lockwood, several authors including himself wrote on design thinking, from design thinking methods to value creation, through service design and customer experiences, offering many examples and industrial applications that design thinking is able to promote and generate.
In his introduction, Lockwood states that design thinking is essentially a human-centered innovation process that emphasizes observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping, and concurrent business analysis, which ultimately influences innovation and business strategy (Lockwood 2010). He argues that many aspects of design thinking can easily be classified as design management. He states, "Many people use the two terms interchangeable or, as Bruce Nussbaum is fond of saying, 'just call it a banana'" (Lockwood 2010).
"Design thinking could earn its rightful place alongside the design process, if we manage to connect the two in a meaningful way "(Lockwood 2010, p. 63). "The difference could be seen that business schools have tapped into the process of thinking through design, which allows them to quickly visualize problems and concepts, the development of people-based scenarios, and the design of business strategies based on design research methods." (Ibid)
Despite the fact that the interest in this subject has been steadily growing (Lindberg 2010, Jones 2010, Brereton 2010, Popovic 2010, Melles 2010), the confusion surrounding the definition of design thinking still remains. The complexity of a general definition shows as

well that design thinking is still an emerging arena, not framing it as a discipline, tool or technology.

Summary

In my view, of the inability to produce a general definition of 'design thinking' process stems from the term 'thinking', since it is equally difficult to comprehend and define. Miriam Webster defines it as the action of using one's mind to produce thoughts (Miriam Webster 2011). But what is a human thought? Entire interdisciplinary studies, such as cognitive science, are trying to answer this question, drawing from philosophy, psychology linguistics and neuroscience.

Moreover, the complexity multiplies when the term is associated with 'designing', since design is still in early stages of development. Nonetheless, there are several models developed to help understand the concept design through building a model. Krippendorff did so in his ' trajectory of artificiality' , but being just one example. Here, the tendency towards discourse and thinking in design is obvious, which means in order to design beyond objects, interfaces, design thinking is the human ability of using one's mind to produce thoughts that have the ability to change the existing situation into a preferred one. (Krippendorff 2006)

This doesn't stop at the border of the design discipline, since producing thoughts is an inherent human ability. Therefore, thinking, design thinking in particular, can be seen as the core of all professional development processes. Moreover, some argue that design thinking is an inevitable part of any designing It is a part of the human system, which is adaptive with a few limiting properties and it belongs to the general human ability. Hence, it is useful in many disciplines and should be the core of every aspect of professional training. Design thinking can be seen as a technology and there is no area of contemporary life where design (technology)—the plan, project, or working hypothesis which constitutes the 'intention' in intentional operations—is not significant in human operations, or is not a significant factor in shaping human experiences. Design thinking comes to its fore in problem solving challenges, since it primarily operates on a visual level, and might offer solutions in cases where the symbolic level is no longer useful. We can call that the right brain abilities. Or we might see that strength of design thinking to resolve ill-defined problems, adopt solution-focused cognitive strategies, or when it is needed to employ abductive or appositional thinking and using non-verbal modeling media.

Design thinking is a form of intelligence, as it is embedded in our brain's natural cognitive function and is not simply a given 'talent' or a 'gift'; therefore, it can be trained and developed. Given its importance, it is essential to re-emphasize the abilities a design thinker should have: 1: Strong Visualization skills, 2: Ability to work with complexity, 3: Ability to think strategically from a user perspective to change, 4: Ability to engage and drive collaborative dialogue 5: Ability to problem solve through inquiry, 6: Ability to prototype changed experience.

From my perspective, a design thinker must be able to engage in, and produce, discourse, design discourse, he must be able to co-design in teams, maintain dialogues with objects and through objects, in order to overcome limitations of imagination, prototypes and forms (Faust 2009).

In addition to strong visualization skills, which are usually a designer's key strength, designers need to move towards a more sophisticated understanding of complex systems design and prediction of the behaviors of design outcomes in complex design solution spaces. Finally, the discourse on design thinking needs to be sustained and extended, since there will never be a consensus on what it is. Still, it is worth noting that design thinking is the underlying ability of producing design thoughts, and since design depends on the designer's

ability to design, new aspects and elements are likely to emerge whenever design itself is redefined.

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Designbusiness or Designing Business (models)?

Asking the question of how to approach designing business, we could easily get into larger issues, including what is a business and how is a business structured, since we need to know what we are designing and where the problems might be.

However, questioning a definition of business brings up another problem—that of a model—since an answer, or at least some answers, immediately includes the question of a metaphor and a model. The answer is inextricably linked to an underlying model, as it is a language statement we would be constructing when attempting to give any answer.
Therefore we can't answer the question of 'what is a business', without answering the question of modeling and addressing the issue of a definition of a metaphor.
Still, we can legitimately, without having concerns to be inadequate, expand the question of a business to that of 'what is a business model', since we are modeling business when we are asking: what is a business?

Some answers towards modeling can be found in the work by Stachowiak, who speaks about the *characteristics of a model:*

a. *representation: a model is always an image of something*
b. *simplification: a model reduces the number of parts to the original by only capturing relevant parts*
c. *pragmatism: any model is created for a special purpose, and this purpose is specified for certain users within a certain period of time.*

(Stachowiak 1973, p. 131, translated by the author)

Therefore, in speaking about a business, or a business model, we are implicitly discussing an image of a business, which is a simplification of the real business, with a limited number of parts. It is a pragmatic approach, as we want to use it for a certain purpose (use of the model) and we might need to change the model as the purpose changes. "Therefore a metaphor or model is paradoxical. We can create insights, but it is in the same time a distortion, as the way of seeing created through metaphor and models, becomes a way of not seeing" (Morgan 2006, p. 5).

Another perspective can clarify the 'not seeing' aspect further. For instance, "a business (the author: model) can also be seen as a complex system, therefore some system thinking and theory will help us here. For instance a system has three common characteristics:

Complexity often (not always) implies the following attributes: (1) a complex phenomenon consists of many parts (or items, or units, or individuals); (2) there are many relationships/interactions among the parts; and (3) the parts produce combined effects (synergies) that are not easily predicted and may often ne novel, unexpected, even surprising" (Corning 1998, p. 200).

Every company, as a system, acts within a larger system, whereby the market and a business model always ignore some parts of the larger system, or ignores other systems, which participate within the market system. It may also ignore the interdependence of different systems (competitors for instance), or the position of the specific business within the business environment.

In reflection of these issues, Morgan takes the idea of Ludwig Bertalanffy, an expert in the theoretical biology, who had developed an open system idea. In other words, he sees businesses as organisms, in that they are open to their environment and need to achieve an appropriate relation with their environment in order to survive. (Morgan 2006, p. 38)
Therefore business model designing is system designing; however, it must be open system designing, in order to match our ideas of design business (models).
Moreover, given that open systems are complex, the designer needs to think in different categories and approach the designing process within different frameworks.
When designing a business, the framework becomes the business system, where the focus is on the changes within the existing business system towards the desired goal. The business model by itself, even as an open system, could still be designed by an individual; still, within an existing business, there other actors and stakeholders involved, who are likely to have other interests and speak other languages, and these other actors need to be seriously considered.
To frame business systems, many authors provided their views, some of which are given below.
According to Drucker, the answer is in good business model:
"Who is the customer? And what does the customer value? It also answers the fundamental story every manager must ask: How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?" (Magretta 2010, p. 3).
Another approach is to define the various elements:
"A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams" (Osterwalder 2005).
Johnson has the same approach: *"A business model consists of four interlocking elements (customer value, proposition, profit formula, key processes) that taken together create and deliver value"* (Johnson 2010).
Hence, when designing, we must accept that the business model is a conceptual tool, an image that gives insight, but also provides 'not seeing', and answers the question about the customer, stakeholders, and the value creation for the various stakeholders. It also addressed the issues of the architecture of the firm and its network of partners for creating and delivering this value. It depends on how the profit is created, with a sustainable revenue stream and on knowing that we are not alone, we are dependent on stakeholders, business employees, customer etc. Finally, design can also be seen as a system.

“[...] design is nothing more than another name for system just in the sense systems theory teaches: a self-processing, self-distinguishing and self-indicating, self-referential form, so that design indicates both the processes and its effect, just like systems does.”
Moreover, “Design points the system out to the system itself, for a moment it makes visible what is invisible in the system's observing process, but to do this it has to stop this process and to shift it into a switching situation” (Lehman 2005).
What does it mean for our business designing? Observer and observed in a business cannot be separated, and the result of observations will depend on the interaction of stakeholders (Marzoch 2011)
But the results of the interaction also depend on the interaction of people/stakeholders within the business. For instance, not everybody has the same ideas and understanding of the problems within a business. Therefore it will be difficult to design a business that would beet everybody’s requirements and compromises will always have to be made.
Therefore, business designers, as several authors are pointing out, need to execute design thinking and need to have a design attitude, which includes empathy, integrative thinking, optimism, experimentalism and collaboration (Brown 2008, Terrey 2008).
Designing business (models) within existing business is always a participatory act, …”where designers need to include stakeholder as designers in an ongoing discourse, collaborating with a broader community (the business). Moreover, they need to understand the problems and different perspectives of all community members in order to achieve the optimal design” (Krippendorff, 2006, p. 11). In the case presented here, the members of the business and the stakeholders are the primary focus of business design.

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