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Systems Thinking and Design Thinking: Complimentary Approaches?

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Abstract

Design Thinking(DT) and Systems Thinking (ST) came about through totally different and unrelated processes. The philosophies of both can be traced back hundreds of years but there has been a recent resurgence in their application. DT as popularized today has its initial roots in business, especially in product design where innovative products are designed to meet people's needs and thereby understand how to facilitate innovation. DT was extended and applied to management and soon it assumed the concepts of Systems Thinking, which, as will be shown later has been more established and developed over a longer period of time. Questions began to be asked as to how this new Design Thinking relates/ compares to ST. In some circles, it was welcome and seen to complement ST. If it is to be welcomed as an additional approach/ methodology to complement Systems Thinking in the search for ways to tackle the many wicked problems that are faced in modern day life; a further question is whether there are such problems that will be more amenable to this approach than the other existing system methodologies. In this vein, this paper is an extension of the previous paper;"How to Choose Systems Methods?" by Barry Clemson published in Systems Thinking World Journal: Reflection in Action (2013), and Nicolas Stampf's "How Not to choose Systems Methods" written in response to David Alman's (2012) STW discussion "How do I figure out which System thinking method or model is appropriate to the situation I'm trying to figure out how to deal with?"

Systems Thinking

Systems Thinking (ST) as traced from the work of Ludwig Von Bertalanffy (1968) and other various contributors, believes a system to be characterized by the interactions of its components and the non-linearity of those interactions (Jackson M.C, 2003 and Walonick D, 1993).

From this basic systemic stance, the systems perspective has developed and continues to develop and unfold to cover varied traditions and methods in the pursuit of how to tackle multifaceted / wicked problems (Rittel H and Webber M, 1973). As this systems perspective developed, it has become a vast and fragmented community because of the plurality and complexity of the problems to which it has been applied. This plurality influenced the understanding of ST. Fragmentation was inevitable and expected as the perspective evolved and new ideas were developed. There is now a plurality of systems methods/ methodologies / traditions that were derived from a conglomerate of concepts, models and tools that were developed by different thinkers who were associated with the General Systems Theory and other related bodies like Cybernetics, Operations Research, Chaos Theory, Complexity Theory, etc. Different disciplines developed their own interpretations of the same concepts and applications, resulting in several bodies of knowledge that share similar concepts but have not been integrated; neither do they form an internally consistent theory, rather they are fragmented. There are now, therefore, various traditions of ST. Whether Design Thinking is to emerge as another tradition of ST as it seeks to adopt a systemic stance is yet to be seen.

Design Thinking (DT)

Design Thinking has been largely attributed to David Kelly but there is no consensus on this as some argue that the concept of designing has been around since before the time Kelly and his associates formulated the IDEO Design Thinking frame work in the form it is now being applied at the IDEO design School and many other such design schools like the Rotman Design school (Miemisi 2010). He was however, the first to coin the term (Brown 2008).

Design Thinkers have described DT as a systematic approach to problem solving that starts from considering the customers and how to create a better picture for them (Liedtka and Ogilvie 2011). It has its roots in business, especially in product design where innovative products are designed to meet people's needs and thereby assist in understanding how to facilitate innovation. This has been described as an extension of earlier work by Christopher Alexander in the 1970's, (Alexander C, Ishikawa S, Silverstein M, Jacobson M, Fiksdahl-King I and Angel S , 1977) They described a good design as one that will be accepted, welcomed and embraced by the intended users and all people that will be affected by it and even just those who walk by. Alexander intended "pattern language" to be a method of describing good design practices within a field of expertise and was to be used by ordinary people to solve large complex design problems (Alexander C et al,1977)

The shift from industrial manufacturing to knowledge work and service delivery is further expanding the terrain of innovation. DT objectives are now being expanded beyond physical products to processes; services; IT powered interactions; entertainments and ways of communicating and collaborating which are all human centered activities in which it can make a decisive difference. Miemisi (2010) describes DT as a set of principles from mindset to process that can be used to solve a wide range of complex problems ranging from product development to organisational and societal problems as it is integrated with various tool-kits as appropriate. In this process, DT has been observed to adopt a systemic stance even though design thinkers do not necessarily use Systems Thinking language

In tracing the history of DT, Tim Brown (2008) explores how Thomas Edison (Israel, Paul, 2000) created an electric bulb that burned longer than previous versions. Edison's approach was intended not to validate preconceived hypotheses but to assist experimenters to learn something from the iterative process. Brown further views DT as a lineal descendant of that tradition; a discipline that uses the designer's sensibility and methods to match the people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity (Brown, 2008).

Herbert Simon(1969, 1981 and 1996) is largely accepted as one of the earlier contributors to highlight the notion of design as a way of thinking and a fundamental characteristic of

human problem solving and was considerably earlier than Brown and IDEO. Simon understood the relevance of design for human progress and advocated for it. His Sciences of the Artificial (1969, 1981, and 1996) was a fore runner of today's DT. (Boland, Collopy, Lyytinen and Yoo, 2008).

Boland and Collopy had a keen interest in design and its importance in management. They picked up from Simon's work and the lessons they learned from the designer Frank Gehry (Boland, Collopy et al; 2008) and convened a workshop on "Managing as Designing" in June 2002 (Boland, Collopy et al, 2008). They learned a number of lessons that they found to be relevant for management and organizational leaders from a further formal study of Gehry's design practice which is detailed in Managing as Designing: Lessons for Organisation Leaders from the Design Practice of Frank O Gehry written in 2004 and it positioned DT in Organisations, Management and Business(Boland, Collopy et al, 2008).

Simon(1996) identified three modes of problem solving (Analysis, Decision Making, and Design). Further to these, Roger Martin identified three modes of logic that are appropriate for Design Thinking (inductive, deductive and abductive reasoning Martin R,2009)

Inductive and deductive reasoning are the more widely used and dominant forms of formal logic.

Deductive Logic- is the logic of what must be; and it proceeds from the general to the specific **e.g**. If gold is yellow, then a blue rock is not gold

Inductive Logic- is the logic of what is operative and reasons from the specific to the general- **e.g** If a study proved that sales/sq metre are higher in small towns than in cities, then small towns are a more valuable market (Martin, 2009)

Deductive and inductive reasoning are useful in proving cases and the knowledge gained from using them is vital in informing decisions and proving whether a statement is true or false.

Philosophers such as John Dewy and William James found these two forms of logic to be not complete (Martin R, 2009). They put more emphasis on the process of how we know and understand rather than proving whether a statement is true or false. They understood the acquisition of knowledge to be an exercise and a process that involves interacting with and inquiring about the world rather than an abstract, purely conceptual exercise. This understanding can only be gained through experience.

Charles Pierce (as quoted by Martin R, 2009) argued that new ideas do not emerge from declarative logic (deductive and inductive logic) since a new idea cannot be proved using past data. New ideas cannot be, therefore, a product of these two forms of logic. There must be a third logical mode which he termed *abductive logic*. It is a product of logical leaps of the mind that arise when a thinker observes data that does not fit with existing model/s. The thinker then seeks to make sense of this observation by inferring to the best explanation (Martin, 2009). This was the true first step of reasoning which was in essence not observation but wondering. It is not aimed at proving whether something is true or false. Its goal, rather, is to posit what "could be". It is this logic that informs design

DT has been successfully applied by organisations such as Proctor and Gamble, among others, with impressive results until it became its "culture" (Rae, 2008).

Systems Thinking and Design Thinking

The concept of design has been used in ST prior to the advent of DT. Design in ST is however, different from design in DT. In ST, design is a creative act that attempts at estimating how alternative sets of behaviour would serve specified goals (Pourdehnad et al, 2011). This is preferred within ST as compared to "problem solving" or "planning"(Ackoff, 1981). Design in DT on the other hand, generally refers to applying a designer's

sensibility and methods to problem-solving no matter what the problem is(Pourdehnad et al, 2011). Tim Brown (2008) describes DT as a methodology for innovation and enablement which helps with the generation of innovative solutions

Discussion

DT and ST, rather than being mutually exclusive as suggested elsewhere(Collopy, 2009), complement one another and their integration is already being used by some organisations in their interventions. Early Designing processes have also been seen to stem from Checkland's (1993) Soft Systems Methodology (SSM) (en.wikipedia.org/wiki/design_Design thinking), which is a Systems Thinking Methodology.

Systems thinkers seek to formulate and thereafter attempt to dissolve or alleviate complex (wicked) problems from a systemic world view. Design thinkers seek to approach the problems from a variety of perspectives and purposefully design a conceptual model and find ways to move towards its attainment (Pourdehnad et al; 2011). DT was developed from a deductive logic base while ST grew from a scientific discipline where creative fields were not taken seriously nor emphasized (Jones and Bowes, 2012). In its development, ST therefore has placed a larger emphasis on deficit based approaches (Stampf, 2014). Russell Ackoff's idealised design (Ackoff, 1981) was probably the first Systems based method that employed the concept of design. Rather than dwelling on analysing mental modes by questioning assumptions that shape the way things are understood, Ackoff went straight to designing the idealised design which was the ideal scenario for the future that was wanted and thereafter seek ways to achieve it (Ackoff 1981, & also Flood 1999). This is a solution based approach,similar in a way, to the argument advocated for by the strength-based approaches that Stampf (2014) proposes as more effective in change initiatives as they avoid the problem analysis trap. Many Systems Thinkers start with formulating the problem but in both DT and the strength based approaches, more emphasis is put on the solution. In DT, more emphasis is put on purposefully designing a conceptual model and on finding ways to attain it while the strength based approach emphasizes helping people find experiences that work (or were successful) and building on that to move past the perceived problem.

As Design Thinking was extended to the field of management (Miemisi, 2010), it was then extended beyond design outcomes. Heather Fraser (2012) seeks to provide tools on how to tackle enterprise challenges and map out opportunities for growth. This is following the work she did with Roger Martin at Proctor and Gamble (P&G)after being appointed by Lafley (P&G CEO) who sought to raise the level of innovation and growth through design. This required pushing design beyond products and packaging into overall strategic development

Once DT entered the management domain, it was confronted by "wicked problems" (Rittel and Webber, 1973). Design Thinkers therefore realised the need for Design Thinking to become systemic as they realized its lack of the good theory and practices of systemic design(Jones and Bowes, 2012). Fabian Szulanski (2010) proposes the employment of a hybrid methodology that will capitalize on the strengths of the ST and Dt methodologies and he provides an illustration that sums up how the two contrast/ relate to each other (Szulanski, 2010, figure 3).

To date, the deliberate integration of Systems Thinking and Design Thinking is being developed and applied. It is nevertheless noted that DT has always had systemic characteristics and strands of ST have used some design concepts prior to DT (Ackoff, 1981)

- The Da Vinci Institute of Technology Management in Johannesburg uses a process that integrates ST and DT. Their approach is based on the premise that the adoption of a systemic/holistic understanding of social systems will be the key driver to re-

- design organizational systems so as to make them more resilient and more responsive to change.
- Dialogic Design International (http://dialogicdesignllc.com/) is a consulting firm whose approach facilitates processes for organisations to co-create strategies and innovation by working with participants in designing shared futures and taking action on Wicked problems.
- Pourdenad et al (2011) realizedthe complementarity of ST and DT and sought to connect the two and discussions on this are still ongoing.
- Systems Oriented Design (SOD)(Dubberly H, 2014) adopts and is developing a systemic perspective on Design Practice that has the mission of building designers' own interpretation of ST so as to enable ST to benefit from DT and Practice and also that DT and Practice benefit from ST. The need for this arose from the fact that the practice of design is forced into a process of the inevitable rapid change resulting from globalisation and the need for sustainability which increase the complexity of the design process. SOD seeks to address these problems by developing Systems Thinking in design practice with concepts that are developed for designers(Dubberly, H. 2014). The Systemic Design Research network was founded in 2011 with the aims of; i) advancing the practice of systemic design as an integrated discipline of systems thinking and Systems Oriented Design and; ii)advancing the knowledge and publications in Systems Oriented Design. The net work also convenes an annual international symposium on Relating Systems Thinking to Design (RSD) Systemic-Design.net/sdrn/ (accessed July, 2014)

The foregoing shows that there is room for DT to benefit from ST for a number of reasons. One is that ST has already developed a philosophy and tools that have been used and refined over a long period of time which will be of benefit to Design Thinking. This should be feasible as shown by the experiences of interventions that integrate the two. While ST was largely deficit based in that it sought to first understand the problem holistically, it is moving towards the adoption of strength based approacheswhich is closely related to Solution based approaches like DT.

ST and DT complement one another. ST aims at being holistic by following a method whereby the understanding of a system starts from the apparent issue and widens the system's boundary by expanding the circle to include thoseother factors that may not be so apparent but have an influence on, and are connected to it. This way, the "whole" system and the relationships are identified prior to modeling the system and finding ways of improving the system to and moving towards a more desired outcome. DT on the other hand, is more empathetic and human centered and requires the modeler to be inside the problem and design the solution after having walked in the shoes of the affected as opposed to being an expert who is invited to come in and help identify and improve on the problematic situation. This empathetic angle in DT will improve on the holism that ST emphasizes and seeks. It will give stakeholders a chance to walk in the shoes of others and increases their understanding of the problem and the potential to increase "innovativeness"/ innovation in the solutions arrived at. An increased understanding of the people in the system and the "whole" system itself is also to be gained.

Combining ST and DT has the potential of improving on the holistic understanding of the current system as stakeholders have the opportunity to view the system from different angles. This has the potential to generate more informed ideas to transform the system with a more holistic view. An approach that combines the two should therefore be more holistic, empathetic and innovative.

Author Biography

I was first introduced to Systems Thinking when I was studying for my masters degree at Hull University. I found Hull's management systems masters' program appealing to enhance my competence in my Organisation & Methods and OD work in the civil service of Zimbabwe. When I enrolled as a PhD student at Da Vinci Institute of Technology

Management, I was introduced to Design Thinking and its integration with Systems Thinking. I studied for my bachelor degree in Politics and Administration at the university of Zimbabwe. I have worked in various Human Resources fields in Zimbabwe and South Africa.

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