# DESIGN THINKING: ORGANIZATIONAL LEARNING IN VUCA ENVIRONMENTS

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## ABSTRACT

*Volatility, Uncertainty, Complexity and Ambiguity (VUCA) now defines the competitive environment of the digital economy in which organizations must adapt structures to match rapidly changing and more complex landscapes. Prior VUCA research identified frequent and rapid knowledge acquisition, pattern and trend recognition and cause and effect analysis as organizational learning imperatives which must be strategically considered. In response to increased disruption of VUCA environments, design thinking has gained popularity and widespread acceptance as a method to facilitate speed and frequency of organizational learning. This study approached design thinking from an absorptive capacity perspective to describe and document the perspectives of subject matter experts on how design thinking promotes organizational learning in VUCA environments. The present findings reveal design thinking learning structures increase the speed and efficiency of absorptive capacity and organizational learning. In return, this increased speed and efficiency results in faster decision making and innovation to pre-empt disruptive VUCA environments. As such, this study advocates for a re-conceptualization of design thinking from a problem solving and innovation construct into an organizational learning construct. This re-conceptualization will aide in removing vague definition and ambiguity from the concept while allowing for richer theory building and broader application of design thinking in a variety of contexts.*

**Keywords:** Disruption, Organizational Learning, Absorptive Capacity, Volatile, Uncertain, Complex, Ambiguous.

## INTRODUCTION

Volatility, uncertainty, complexity and ambiguity, the acronym VUCA, has come to define the digital economy as highly disruptive environment and potentially punitive to incrementally focused organizations. Learning is cumulative, incremental and as such, the efficiency of learning is highly dependent upon learning structures and the richness of existing knowledge. To further complicate this incremental paradigm, organizational learning relies on the accumulation of individual knowledge as well as communication structures to external and between internal environments of the organization. As a result of the incremental accumulative nature of learning and the difficulty in communicating knowledge, novelty in problem solving and innovation has become much more challenging in the new VUCA environment. Successful organizations operating in the VUCA environment are breaking this incremental paradigm to develop structures to intensify external knowledge absorption.

While quantitative, big data, analytics have come to define the digital VUCA environment, prevalent use of data mining methods rely on historical customer behavior and do not solely yield competitive advantage. In response to disruption, organizations are increasingly pioneering new models, frameworks, methods, structures and processes to engage with the

customer to sense and seize emerging patterns and future trends not easily defined from quantitative historical data. Design thinking has emerged as an absorptive capacity and integrative learning method to approach complex and often ambiguous problems from the perspective of the customer. Popularity surrounding design thinking in recent years has been largely due to its application within innovation which has resulted in anecdotal successes of design thinking practioners operating in highly disruptive VUCA environments. Therefore, it is incumbent upon researchers to further the study of design thinking and its usefulness in a variety of contexts and organizational settings to gain a deeper understanding of design thinking and its absorptive capacity capability to promote organizational learning.

This research study addresses how design thinking is used as an organizational learning process to pre-empt disruption of the VUCA environment. While absorptive capacity and organizational learning research is rich and extensive, providing a firm basis to explore design thinking, there exists a need for additional empirical research of design thinking in a variety of contexts including highly disruptive VUCA environments. Extending on previous research, the purpose of this empirical study is to describe and document the perspectives of subject matter experts on how design thinking is used to facilitate absorptive capacity and organizational learning in VUCA environments. As a result of data gathered and thematic investigation, this study confirms the ability of design thinking learning structures to facilitate absorptive capacity and promote organizational learning in a technology driven, highly disruptive, VUCA environments.

## LITERATURE REVIEW

### VUCA

Volatility, Uncertainty, Complexity and Ambiguity, the acronym VUCA, was first developed by the US war college to define conditions military leaders encounter on the battlefield. Recently, the concept has come to define the competitive environment of the digital economy (Bennett & Lemoine, 2014) in which organizations must adapt past structures to match environmental change (Heugens & Lander, 2009). Desai (2010) affirms the role of technology and digital disruption noting advances in interactive technologies as reason for the changes in the way stakeholders learn. In a VUCA world, organizations can no longer focus on internal learning and instead should focus on co-creative and collaborative learning (Desai, 2010; Baltaci & Balci, 2017) outside the boundaries of the organization. Bartscht (2014) proposes that organizations must continually explore the VUCA environment, gaining situational understanding to sense and seize on opportunities and threats.

Volatility refers to large scale, frequent change having no predictable pattern (Bennett & Lemoine, 2014). Felin & Powell (2016) note stringent demands are being placed on organizations operating in volatile markets which require structures to obtain and process reliable and current information. Traditionally, in stable environments, organizations relied on experience, routines, learning and scale but volatility evident in the new VUCA environment is driving organizations to engage with stakeholders across external boundaries, drawing them into the learning and innovation process (Felin & Powell, 2016). Change is likely in volatile environments; however, the timing and extent of change are unknown. Therefore, Bennett & Lemoine (2014) suggest organizations should structure toward organizational agility as a countermeasure to volatility to increase their ability to sense and seize on opportunities in the market place. The more frequently and continuously an organization engages in exploring the

VUCA environment, the more often the organization can update its situational understanding of the environment and thus minimize the effects of volatile change (Bartscht, 2015).

Uncertainty indicates lack of knowledge related to the frequency and significance of environmental change (Bennett & Lemoine, 2014). In uncertain environments, cause and effect are known however, timing and magnitude are unknown and may not occur at all. Uncertainty is solved by organizations investing in methods of collecting, interpreting and sharing of knowledge by devoting resources to boundary spanning activities. These boundary spanning activities are those actions which seek knowledge outside existing networks, data sources and analytic processes to gain knowledge from new partners providing new and richer understanding (Bennett & Lemoine, 2014). To understand an uncertain environment, organizations should proactively explore cause and effect factors impacting the uncertain environmental situation (Bartscht, 2015). Bennett & Lemoine (2014) note an uncertain situation is simply a lack of knowledge and therefore can be preempted by simply gathering more knowledge.

Drucker (2012) refers to the complex environment as a" threshold of chaos", characterized by technological disruption and globalization. Bennett & Lemoine (2014) define complexity as elaborate networks of interconnected parts being convoluted and multiform. Complexity is iterations of simple patterns (Bartscht, 2015) combined in a multitude of interconnections creating potential for information overload (Bennett & Lemoine, 2014). To simplify complex situations, organizations should structure themselves to the environment by adapting structures to align with and take advantage of complexity rather than struggle against it (Bennett & Lemoine, 2014). As such, organizations must adopt knowledge based strategies which facilitate immediate decision making (Drucker, 2012; Byrne & Callaghan, 2013; Adams & Stewart, 2015) by getting close to the environment and its stakeholders.

Ambiguity identifies a lack of knowledge of cause and effect where there is no precedent on which to base predictions (Bennett & Lemoine, 2014). Ambiguity typically involves new situations which are typically characterized by new strategies, products, markets or technological innovation. Newness is the challenge of ambiguous situations and therefore there is little quantitative and historical data on which to predict outcomes. Gathering information is vitally important in ambiguous situations but the challenge lies in knowing how to value the information collected as it is not apparent what information is useful (Bennett & Lemoine, 2014). Bartscht (2015) notes that organizations should shift paradigms from continual improvement and instead focus adaptability by being proactive in learning new knowledge to innovate and make better decisions.

## Organizational Learning, Absorptive Capacity and Design Thinking

Learning capabilities and problem solving capabilities do not differ in necessary preconditions and are the same in their modes of development (Bradshaw, Langley & Simon, 1983; Simon, 1985; Cohen & Levinthal, 1990). According to Cohen & Levinthal (1990), learning is cumulative and the efficiency of learning is dependent upon learning structures and the richness of what is already known. Due to this incremental nature of learning, novelty in either problem solving, innovation or general knowledge is difficult to achieve and require strengthening of absorptive capability structures and increasing knowledge diversity (Harlow, 1959). Similarly, organizational learning is an incremental accumulation of individual stakeholder absorptive capacities to learn, as well as the organizations direct communication structures to the external and internal environments of the organization. Sun & Anderson (2010) take an integrative systems thinking view to propose a theoretical framework to identify

interdependent nature between absorptive capacity capability and organizational learning processes to connect diverse knowledge across external organizational boundaries.

Absorptive capacity conceptualizes an organization's ability to utilize external knowledge through a sequential learning process that use existing internal organizational knowledge to recognize the value of external knowledge, assimilate this new knowledge through exploratory learning and apply this knowledge to create new knowledge and value (Lane, Koka & Pathak, 2006). Early research into absorptive capacity focused on learning and innovation with respect to the performance of the firm and the firm's ability to acquire, assimilate and apply external knowledge (Cohen & Levinthal, 1990). Todorova & Durisin (2007), drawing on learning theory, revised the absorptive capacity construct, introducing a reconceptualization which highlights social integration capabilities as a factor in organizational learning as the organization utilizes internally existing organizational knowledge to recognize the potential value of external knowledge.

Crossan et al. (1999) proposed a convergence to an organizational learning framework based on research streams of information processing by Huber, managerial cognition March & Olsen and innovation Nonaka & Takeuchi. From a dynamic capabilities perspective, this framework identified strategic renewal as a common theme on which to combine previous research stream and in doing so, identified the extreme dynamic nature of organizational learning and the associated impact to strategic renewal of the firm (Crossan et al., 1999). By highlighting the dynamic nature of organizational learning, Crossan et al. (1999) noted the importance of managerial capability to balance internal processes of the organization to promote organizational learning. Similar to Crossan et al., (1999); Sun & Anderson (2010) offered an integrated view of absorptive capacity and organizational learning from a system thinking perspective by proposing a framework noting absorptive capacity of a firm is contingent on its ability to learn through a combination of organizational learning processes (Kim et al., 2014).

While Cohen & Leviathan (1989) determined absorptive capacity is dependent on an organizations existing knowledge, Sun & Anderson (2010) re-conceptualized absorptive capacity as dynamic capabilities, taking an integrative system thinking view (Senge, 1990) of absorptive capacity and organizational learning as learning processes. Organizational learning theory can be traced back to Cangelosi & Dill and has been developed in a multitude of theoretical frameworks (Crossan, Lane & White, 1999). While there are many theoretical streams, Senge (1990) noted systems thinking as the most important factor impacting organizational learning (Kim et al., 2014). Senge (1990), proposed systems thinking as the key factor for understanding the interrelationship of parts impacting the whole as (Kofman & Senge, 1993) interconnected elements (Hosley, Lau, Levy & Tan, 1994) to be considered with respect to organizational objectives (Goh & Richardson, 1997). Senge (1990) identified systems thinking as a way to advance the objectives of the organization (Goh & Richardson, 1997) by analyzing the full problem space and its associated interconnected elements (Hosley, Lau, Levy & Tan, 1994) taking into account the interrelationship between parts (Kofman & Senge, 1993).Organizations are a collection of different parts coordinating systems and subsystems involved in the exchange of information both within and external to the organization (Kim et al., 2014).

Systems thinking deals with complexity (Murray, 1998; Kim & Senge, 1994) by overcoming learning barriers (Kim & Senge, 1994) allowing firms effective navigation of dynamic external environments (Senge & Carstedt, 2001). Kim et al. (2014) proposed that systems thinking is linked to absorptive capacity through exploratory, transformative and exploitative learning through the linkage of organizational learning processes (Fiol & Lyles,

1985) and organizational knowledge management activities (Vega-Jurado, Gutierrez-Garcia & Fernandez-de-Lucio, 2008). Sun & Anderson (2010) note that improvement of existing firm knowledge involves the acquisition and application of external knowledge. While absorptive capacity helps firms filter external knowledge (Lane & Lubatkin, 1998) system thinking is a capability and competence which allows organizations to effectively integrate complex knowledge throughout organizational systems and subsystems to be understood by the organization as a whole (Senge, Smith, Kruschwitz, Laur & Schley, 2008).

The knowledge-based view of absorptive capacity highlights the role absorptive capacity has in developing knowledge, promoting organizational learning, enhancing open innovation, managing alliances, creating strategic variety and impacting financial performance (Lichtenthaler, 2016). The knowledge-based view of the firm is an outgrowth of the resource-based view of the firm proposed by Barney. According to Barney firm resources are all capabilities, processes, attributes, assets, information and knowledge controlled by a firm, which can be strategically manipulated to gain competitive advantage. Grant (1996) confirms the importance of knowledge as the most strategically important resources of the firm and Kogut & Zander maintain that it is the main determinant of competitive advantage. Accordingly, the strategic importance of knowledge strongly reinforces the relevance of absorptive capacity as a key resource in developing and increasing a firm's knowledge. Building on Sun & Anderson (2010) and identifying gaps in literature, Kim et al. (2014) advanced systems thinking as positive influence on absorptive capacity and contributed to literature on the resource based view of the firm. In doing so, Kim et al. (2014) highlights organizational learning and absorptive capacity are impacted by management's role in understanding the interrelationship of systems and subsystems which enhance absorptive capacity and firm financial performance. Accordingly, Senge et al. (2015) proposed three core management capabilities of systems leaders; the ability to see the broader system in a complex environment, fostering reflection and shifting the culture from reactive to a proactive, co-creating, problem solving.

**Design Thinking**

Theoretical development of design thinking has been scholarly developed as the professional study of design management science (Johansson & Woodilla, 2010) with an academic foundation in excess of forty years (Johansson-Skoldberg et al., 2013). The younger management discourse of design thinking has gained significant popularity since approximately 2003 with management practitioners (Johansson-Skoldberg et al., 2013) and has been developed primarily in the business media and practitioner testimonial (Johansson & Woodilla, 2010).

The creation of artifacts theoretical framework of design thinking follows the rationalism epistemology and is based on the theoretical foundation of Herbert Simon's seminal work, The Sciences of the Artificial. Simon is widely considered a founding father of design management and recognized that, while other sciences dealt with existing information, design deals with the creation of new information (Johansson-Skoldberg et al., 2013). Building on Simon (1969); Hatchuel (2002) notes that scientific experimentation can be relied on to provide solutions which create new artifacts. Problems or problem spaces can be defined differently resulting in more than one representation of the same problem and generating multiple solutions in which the optimal solution may not be apparent or may not exist (Bousbaci, 2008). This abundance of solutions and lack of an optimal solution is the basis for the satisfying principle, which recognizes that when faced with certain, ill-conceived or vague problems, individuals generate

alternatives and in some instances do not pursue the optimal solution, but instead a satisficing solution (Hatchuel, 2002; Hatchuel & Weil, 2003; Bousbaci, 2008).

The reflexive practice theory in design thinking relies on the work of Schon which is based on the pragmatism theoretical frame and identifies the difference in technical knowledge and artistry (Visser, 2010). Schon's seminal work on reflection in action described the practice or methods, in which designers deal with ambiguous problem solving (Kimbell, 2009; Kimbell, 2011). As a pragmatic-based philosopher and educator, Schon was mainly concerned with the study of organizational knowledge acquisition (Visser, 2010; Johansson-Skolberg et al., 2013). Schon's hermeneutics view of the designer's method of problem solving relied on the ability of the designer to create a solution and then reflect upon that creation to allow for continual improvement and re-creation (Johansson-Skoldberg et al., 2013). The reflexive nature comes from the way the designer is constantly aware of their current understanding of the problem and is ready to revise that understanding (Galle, 2011). Problem identification, framing and reframing are an integral part of the process of challenging the original assumptions to continually incorporate learning to work toward a convergent acceptable outcome (Drews, 2009). A key component to reflective reframing is the ability of the designer to take a holistic view of the problem by assessing it from all sides in a 360-degree manner (Holloway, 2009). Many of the models view this holistic view as a systems way of thinking (Fraser, 2009) which visualizes the causal impact of change in one variable on other variables within system (Dunne & Martin, 2006).

Buchanan (1992) moved design from its cognitive roots toward a more intellectual approach generally applied to most anything (Kimbell, 2009). This widespread approach to the application of design made Buchanan's (1992) article on wicked problems the foundational work for not only the design discourse, but the entire study of design and design thinking in both the design science and management discourses (Johansson-Skoldberg et al., 2013). Wicked problems refers to problems which cannot be clearly defined, are ambiguous or complex in nature and are termed either ill-defined or "wicked problems" (Kimbell, 2009). These ill-defined problems are the basis of the study of design thinking related to the method or attitude, that designers approach problem solving (Boland & Collopy, 2004; Kimbell, 2009).The wicked problems approach was a concept borrowed from philosopher Karl Popper and applied to the field of design by (Bousbaci, 2008). While Rittel & Webber first applied the concept of wicked problems to design, Buchanan was the first to build upon this theoretical base (Johansson-Skoldberg et al., 2013). Scientists and business professionals approach problem solving linearly as two distinct phases, the problem definition and problem solution (Buchanan, 1992; Johansson-Skolberg et al., 2013). This linear approach to problem solving was in stark contrast to the analytic and synthetic practice designers employed. When approaching a problem from an analytical standpoint, designers assess all the elements of the problem and determine the requirements a solution must possess (Buchanan, 1992).

The design thinking theory making sense of things is based on research by Lawson, who explored the psychology of the creative design process and Cross (2001), who ethnologically researched the practice designers employ during design. Lawson & Cross approached design from a constructivist "epistemology of practice" defined by Schon as reflective practice (Feast & Melles, 2010). While Schon researched design from a philosophical point of view, Cross & Lawson design from a practical point of view (Johansson-Skoldberg et al., 2013). Cross (2001) proposed that the main contribution of design is design knowledge which is gained through the making and reflecting on artifacts. Design knowledge is the design behavior and theoretical

deliberation on how people learn, develops and teaches design ability to others. Divergent and convergent approaches as well as combinations of the two, is a practice of creating or visualizing, multiple possibilities (Drews, 2009) without assuming that these possibilities are the best (Boland & Collopy, 2004) but are instead paths toward a solution (Drews, 2009). Visualizing is a way to make sense of things (Rylander, 2009) in an intangible manner other than words or symbols (Brown, 2009) in order to communicate ideas to be discussed (Junginger, 2007) as the process moves toward convergence and mutual understanding (Ward, Runcie & Morris, 2009). Thinking by doing is an iterative practice which uses prototypes and reflection in action to stimulate thinking, learning and to explore multiple ideas (Boland & Collopy, 2004; Lockwood, 2009) by turning the visualized concepts into tangible representations to stimulate further reflection and exploration (Boland & Collopy, 2004).

Krippendorff (2006) proposed a semantic approach which was a turn away from technology-centered design and a move toward human-centered design (Galle, 2011). Krippendorff (2006) furthered Schon's focus on the designer by proposing stakeholders and the user as the focus of design concerned with innovation and things that do not exist. Krippendorff provides that design science break from traditional natural science methods based on historical patterns and instead seek to create new things. Hassi & Laakso (2011) identified the concepts of human-centered approach, visualizing, collaboration, thinking by doing and divergent and convergent work styles. The human-centered approach is highlighted in much of the literature on design thinking and usually involves empathy for the subjects (Brown, 2008; Clark & Smith, 2008; Dunne & Martin, 2006; Holloway, 2009; Junginger, 2007; Lockwood, 2009; Lockwood, 2010) through a putting people first approach (Brown, 2008; Porcini, 2009; Ward, Runcie & Morris, 2009; Porcini, 2009). In addition to a human-centered approach, collaboration across organizational functions and involving a wide range of stakeholders is also emphasized as an integral part of design thinking (Brown, 2008; Brown, 2009; Clark & Smith, 2008; Dunne & Martin, 2006; Holloway, 2009; Lockwood, 2010).Thinking styles referenced by Hassi & Laakso (2011) relates to cognitive styles, methods of thinking and processing information which includes elements of abductive reasoning, integrative thinking, reflective reframing and a holistic view. Abductive reasoning emanates from the design science theory of making sense of things which studies the cognitive way designers use abductive reasoning to gain understanding to generate ideas and possible solutions (Kolko, 2010). In addition to abductive thinking, another process inherent in the various models is integrative thinking which is the identification of the most important aspects of problems (Brown, 2008; Dunne & Martin, 2006) and creating a compromised solution from the competing possible solutions (Brown, 2008; Fraser, 2009).

Dunne & Martin (2006) proposed design thinking as a process and something that could be taught to everyone. From a management competency perspective, Martin revised his previous models and conceptualized design thinking as a cognitive process which uses both sides of the brain to analyze and solve problems (Johansson-Skoldberg et al., 2013). Dunne & Martin (2006) identified design thinking as a project mindset to approach wicked organizational problems using integrative thinking and abductive logic. Integrative thinking is the ability to determine the salient factors and important relationships within the entirety of a given situation and not just the individual parts or pieces (Senge, 1990). Abductive logic within the management discourse is similar to the designedly sub-discourse of making sense of things. Abduction, as applied to design, refers to a satisficing concept of providing the best case scenario by negotiating to the satisfaction of the designer, client and other stakeholders (Shearer, 2016) allowing for the creation of new knowledge and insights as other variables are introduced that are not part of the

original premise (Kolko, 2010). However, Martin (2006) goes a step further and proposes abduction as a skill needed by practicing managers to solve intermediate, organizational problems (Dunne & Martin, 2006; Johansson-Skoldberg et al., 2013) and as such, provided a theoretical grounding for the concept to be proposed in higher education as a method to deal with organizational problems in a wide array of disciplines (Johansson-Skoldberg et al., 2013).

Dunne & Martin (2006) is credited with taking the concept into higher education as a way to improve education of graduate-level, business-administration students by building the skills necessary for a deeper learning of the end user and end user experience (Dunne & Martin, 2006) by utilizing observation research techniques to uncover needs that are not easily articulated. Building on Argyris & Schon; Martin references the need for management education to develop skills of inquiry within MBA students. According to Dunne & Martin (2006), using appreciative thinking as an inquiry skill, management students trained in design thinking can gain a better understanding of what a person is thinking and arrive at an out of the box idea faster by removing their own bias. Likewise, according to Martin, if business schools can educate students on the importance of the usefulness of others, students will understand the value of curiosity and inquiry in problem solving (Dunne & Martin, 2006). Viewed as an equally important as the user-centered approach, interpersonal skills from collaboration with peers is key to developing a mutual understanding around a commonly agreed up set of facts. Collaboration in this context relies on team work and the idea of expanding perspectives by learning from non-homogeneous individuals.

Design thinking has increasingly been applied by organizations in a variety of industrial contexts (Wong, 2009) yet there is a relatively small amount of empirical research on design thinking in organizations from a performativity perspective (Carlgren, 2013) focused on the performance of the design-thinking methodology and accompanying tools (Seidel & Fixson, 2013; Carlgren, 2013). Much of this empirical research has been conducted in experimental settings involving students and thus the results have been mixed (Seidel & Fixson, 2013). This view gives the impression that the concept can be universally applied in any context by any firm, manager or an employee with the same results and associated value (Carlgren, 2013).While the rhetoric from proponents of design thinking calls for the application of design thinking across organizations in a variety of contexts, its application as an organizational learning process to promote absorptive capacity has yet to be determined. Furthermore, in light of the VUCA environment, the recent success of design thinking in organizational settings has been largely based on a practice view consisting of anecdotal descriptions in the businesses press (Brown, 2009; Johansson-Skolberg et al., 2013; Martin, 2009) and as a consequence, there exist very few empirical studies on design thinking (Carlgren, 2013; Johansson-Skolberg et al., 2013; Llamas, 2015) and its contribution to organizational learning.

## RESEARCH DESIGN & METHODOLOGY

The question this research study address is how design thinking is an organizational learning process to pre-empt disruption of the VUCA environment. Due to the contemporary aspects of design thinking, incremental theory building was necessary to address the inadequacy of existing research (Rowley, 2002) to understand the broad application of design thinking in various contexts across a range of settings (Bryman & Bell, 2011). This design of this study describes the insights of six subject matter experts in the field of design thinking. Participants were recognized as experts in the field of design thinking as consultants and practitioners, each demonstrating experience in a wide range of organizational contexts to provide a wide range of

perspectives. In the context of this research study, a case is defined (Yin, 2014) as a single organization, location, person or event (Bryman & Bell, 2011) and how SMEs describe the application of design thinking to promote absorptive capacity and organizational learning. The specification of unit of analysis provides internal validity as data is collected and analyzed providing insights regarding research questions. Information gathered for the study was accomplished via a purposeful sampling approach, based on criteria selected by this researcher, from a population containing the widest variety of perspectives possible complying with the purpose of this study (Higginbottom, 2004).A qualitative case study was used because it afforded flexibility to study design thinking and absorptive capacity in order to extend theoretical framework (Stake, 1995) and to illustrate causal relationships directly to gain understanding of theoretical constructs (Eisenhardt, 1989).

The design of this study adopted protocols of Yin (2014) whereby six SMEs from the field of design thinking were invited to participate. Screening of participants followed a two-way approach which integrated traits (age, gender and ethnicity) and capability (degree level and experience). The study consisted of four women and two men of mixed ethnicities and age groups. Four of the six participants had graduate level degrees and all respondents had a minimum of an undergraduate degree. All participants had suitable knowledge related to the application of design thinking into various organizational contexts with work experience ranging from nine to twenty-eight years of working with design thinking and innovation. All participants had experience working in design thinking organizations, consulting of various design thinking projects and various organizational learning settings including higher education. The present study used a purposive sampling model to ensure the sample size was adequate to accomplish saturation (Rowley, 2002) and participants were vetted based on credentials and background to determine experience and qualifications in the practical application of design thinking in organizational learning settings.

A purposed design using a semi-structured questionnaire was used, containing open-ended questions, to interview six SMEs in the field of design thinking to collect, compile and analyze their perspectives on the phenomenon of design thinking. The validity of this case study was achieved through the utilization of a variety of sources (Gibbert et al., 2008) and reliability was accomplished through the integrity of data collection methods and the use of data triangulation to support saturation (Tellis, 1997; Yin, 2014; Zainal, 2007).This case-study research is descriptive (Yin, 2014) and the goal of this study is not to provide generalization but to provide insights into how individual SMEs perceive the application of the concept and how it is being used in practice. Due to the lack of systematic research and anecdotal nature of previous studies, it is necessary to document and describe the perspectives of SMEs to understand how design thinking is applied in order to understand the impact to absorptive capacity and organizational learning (Edmondson & McManus, 2007). A multiple-case study is appropriate to understand a phenomenon in various contexts (Bryman & Bell, 2011) and the subsequent collection of these multiple data points is necessary to allow for corroboration and triangulation of data (Yin, 2014). Using the replication approach, this study selected six to 10 cases in which to understand the replication of the phenomenon of design thinking and how it is applied in the various contexts in order to understand similarities, differences and causal relationships in order to predict similar results based on a theory (Yin, 2014).

To develop a valid, testable and relevant theory, grounded in empirical reality, the study used an iterative process to develop inferences based on data collected from semi-structured interviews (Yin, 2014). Research was approached from a relativist point of view by using a

cross-case analysis to develop linear-analytic structures which focus on the issues and themes evident among the multiple cases represented in this research study (Yin, 2014). To aide in cross-case synthesis of emerging thematic patterns, information compiled and documented from participant research questionnaire's used a thematic investigatory strategy. On a case-by-cases basis, emerging themes, important words or working and implications collected from participant responses were identified and developed for evaluation and analysis (Tellis, 1997). Utilizing content itemization, theoretical propositions could be reached by itemizing subject matter patterning and grouping to organize and analyses (Zucker, 2009) the extent of emphasis or omission of a classification or disposition from the collection of information (Hatch, 2002). To determine correlation among and across the various participant responses assembled, questionnaire results were identified and emerging patterns were contrasted with alternative themes (Keengwe, 2007).Information and data collect from this qualitative multiple-case study was sufficient to identify commonalities, patterns and support the theoretical propositions. Responses to each open-ended research question, individual observation and analysis of participant responses and interpretations of information collected in the study were accumulated in a cumulative model in order to draw conclusions (Patton, 2002).

Replication of results was demonstrated by cross-case synthesis to indicate the extent to which replication logic was literal replication, whereby the outcome was predicted or a theoretical replication based on a prediction of contrasting data (Yin, 2014). Each of the six participants on which the cross-case analysis was performed was evaluated on a separate basis (Tellis, 1997), however, the information obtained from the research study was synthesized across all the six cases and the sequence of discovery was given specific attention in order to enhance the validity, reliability and the strength of this research (Yin, 2014). The research data collected was triangulated to provide cross-data validity checks of the data collected from the multiple cases to achieve more accurate and valid estimates of results (Stake, 1995). Triangulation to facilitate cross checking of data also assisted in determining consistency and variance between individual, in-depth interviews, maintenance of field notes and SME examination and reflection of data. Additionally, the use of multiple cases meets the criteria for construct validity.

## RESULTS AND DISCUSSION

The first theme identified in this study is organizational contingency, identified as the effectiveness of design thinking being contingent on organizational structure, people and culture. This concept of organizational contingency was evidenced by five of the six participants noting the internal structures to communicate knowledge, the talent level of people and the organizational culture described as design mind-set. Participant #3 states, "I think there's a chasm between how does one take the insights gathered from design thinking and communicate it across the chasm to people that have to develop the solution". Participant #6 stated, "I wouldn't talk about an organization acquiring knowledge, I would talk about the people in the organization acquiring knowledge. Knowledge is produced by people and people are in a culture and a context within that culture so of course all those things come into play". Participate #1 elaborates by saying, "it's not just acquisition of knowledge but how it transfers in the organization, now that's a competitive advantage, cause a lot of people stop at acquisition to the team that's doing the work". This supports organizational learning literature by further highlighting the need for management to develop a system thinking dynamic capability to promote absorptive capacity (Senge, 1990) (Kim, Akbar, Tzokas & Al-Dajani, 2014) to explore, transform and exploit external knowledge for organizational value creation (Sun & Anderson,

2010). When referring to the talent of the people in the organization, participant #1 stated, "the company's advantage is the talent pool that's applying it". Organizations are a collection of different parts coordinating systems and subsystems involved in the exchange of information both within and external to the organization (Kim et al., 2014). Participant #5 said, "if executed appropriately for the culture of the organization and applied quickly enough…you got to do it quickly, you got to figure out how to take the information and flow it across the development cycle…you got to have a way to communicate to all the stakeholders because the whole is greater than the sum parts".

When discussing the organizational structure and cultural impact on engaging in external learning another participant #3 "I think there are few organizations that have it (design thinking) baked into how they work". Senge (1990) identified systems thinking as a way to advance the objectives of the organization (Goh & Richardson, 1997) by taking into account the interrelationship between parts (Kofman & Senge, 1993). Participant #6 supported this by stating, "It's harder to create conditions to have things happen and encourage that than it is to try and manage things…everything dealing with people and human-centered design and knowledge is knowledge and people and context and culture dependent." Kim et al. (2014) highlights organizational learning and absorptive capacity are impacted by management's role in understanding the interrelationship of systems and subsystems which enhance absorptive capacity and firm financial performance. This was indicated by participant #3, "I don't think there are many organizations that have built the mind-set of design thinking to look outside the boundaries, it depends on the organization…it's not what the information is or where it comes from, but what the organization is doing, what its resource, its structure is like and again where are the networks of communication. Who's talking to whom? Where are the silos? It depends on all those things……there were some things we were learning business unit by business unit with design thinking that were somewhat consistent with one another…we never fully tapped it, it would've taken a different structure". Participant #1 added to the concept of culture or mind-set, saying, "I don't think there are many organizations that have built the mind-set of design thinking to look outside the boundaries. I think there are few organizations that have it baked into how they work".

The knowledge-based view of absorptive capacity highlights the role absorptive capacity has in developing knowledge and promoting organizational learning of knowledge external to the organization (Lichtenthaler, 2016). The knowledge-based view of the firm is an outgrowth of the resource-based view of the firm proposed by Barney (1986). According to Barney (1991) firm resources are all capabilities, processes, attributes, assets, information and knowledge controlled by a firm, which can be strategically manipulated to gain competitive advantage by sensing and seizing on opportunities. Participant #3 indicated this knowledge based view by stating, "in order for it to be systematically value creating, you need the ability to translate and make the connection between the acquired knowledge and how the acquired knowledge can apply to different functional areas that can use the knowledge…so the trick is, is that, that knowledge needs to be communicated to these different functional areas so that the value of the insights can be applied". According to Desai (2010); Baltaci & Balci (2017), in a VUCA world, organizations can no longer focus on internal learning and must focus outside the boundaries and as such, organizations must continually explore VUCA environments to gain situational understanding and to sense and seize opportunities and threats (Bartscht, 2015).

A second theme identified is design thinking as an action based learning that is explorative and experimental. Design thinking uses a wide range of stakeholders and other

environmental sources from which to gain knowledge, this was characterized by Participant #5 who stated, "Anything in the world…it's about the world around you". Participant #1, "we can look at analogous situations and learn from them and synthesize what is applicable, bio mimicry is a source of inspiration, looking at how nature solved the problem". While knowledge may be acquired from a variety of sources, design thinking learning is accomplished through reflection in action, exploring multiple ideas (Hassi & Laakso, 2011; Boland & Collopy, 2004; Lockwood, 2009) and turning visualized concepts into tangible representations to stimulate further learning through reflection and exploring (Boland & Collopy, 2004). This was articulated by participant #1 stating, "When you start prototyping and co-creating and testing and iterating, that's where application comes into play when you actually take action, based upon the insights and knowledge you have acquired. And I've seen real power in co-creation to really fundamentally shift a company's ability to take advantage of an insight…not shying away from the customer or consumer…but inviting them in to help you create".

Literature supports the iteration aspect by noting the design thinking mentality operates with the notion that mistakes are a natural part of the process of exploration and experimentation (Brown, 2008). Participant #1 stated, "I think part of design thinking, at least in my experience, is that you acquire knowledge and then you have to try it, you have to apply to assimilate…it's not a puzzle that has a simple formula to follow, it's something that differs every time you do it". This is supported by Simon (1996); Hatchuel (2002) which note experimentation provides solutions which create new knowledge. Kim et al. (2014) takes a systems thinking perspective of absorptive capacity to note critical organizational learning processes needed to identify overlaps and commonality in knowledge to be acquired by referencing existing knowledge in the organization. Furthermore, system thinking processes involve feedback loops (Senge, 1990) allowing knowledge to be iterated upon until a suitable outcome is achieved (Moon, Miller & Kim, 2013). Participant #5 takes this systems think view of feedback loops by stating, "you work with synthesizing it with the people on your project…creating a prototype of your project, being that an experience, a thing, a combination, a role-play, you test that out and then you iterate on it". Design thinking uses action based and reflexive design methods (Buchanan, 1992) in highly situational, VUCA environments, to evaluate not only problem but also the context in which the problem exists (Visser, 2010).

Key elements depict design thinking as explorative and experimental, tolerant of ambiguity, oriented toward the future and optimistic (Hassi & Laakso, 2011) involving a wide range of stakeholders as an integral part of design thinking (Brown, 2008; Brown, 2009; Dunne & Martin, 2006; Holloway, 2009; Lockwood, 2010). It is this, curiosity, the explorative and experimental nature of design thinking, the iterative nature, which makes design thinking particularly effective in dealing with the ambiguity of the VUCA environment. According to Bennett & Lemoine (2014) gathering information is vital in an ambiguous environment and organizations should focus on proactive learning and adaptability. Bartscht (2015) states uncertainty is a lack of information; therefore, organizations should proactively explore cause and effect relationships. Furthermore to address volatility, organizations should seek to frequently and continuously explore the VUCA environment to improve situational understanding (Bartscht, 2015). In support of design thinking ability to address the VUCA environment, participant #3 stated, "you learn stuff, you change stuff, you got to go back…you're constantly getting messaging from the market, it has to be dynamic".

The last theme confirmed by this empirical study is the immediacy of design thinking, defined as the speed and frequency of external knowledge absorption. The immediacy

assumption in absorptive capacity research assumes that knowledge acquired must be learned and applied immediately (Lichtenthaler, 2016). When discussing the speed of design thinking, participant #5 stated, "right away…every time you get something that is considered knowledge, every time it's been understood and it's become knowledge, you apply it right away". Participant #3 stated, "in order for value to be created, it has to be fast….so the speed at which you do it and have impact is critical if you're going to have design thinking be seen as a value added activity". This also confirms Kim et al. (2013) support of the immediacy concept and offer systems thinking as critical managerial competence necessary to understand organizational systems and subsystems as a coherent whole (Senge, 1990) in order to quickly and effectively analyze and integrate knowledge. When discussing how quickly organizations apply externally learned knowledge, participant #6 stated, "if they do human-centered design projects to get information and then they don't apply it, that's kind of a waste, so one would assume they apply fairly quickly". Leonard & Barton noted that effective use of knowledge is an important factor in value creation and is impacted by a lack of understanding of the sciences involved (Hoang & Rothaermel, 2010) as well as the misunderstanding by leadership of the capabilities of the firm to apply external knowledge (Zollo, 2009).

Design thinking is integrative and exhibits an interrelationship between acquisition, assimilation and application of external knowledge by integrating the user into the learning process to increase the speed and efficiency of learning. Participant #1 highlights immediacy through integration by saying, "that curiosity stance, that mindset is so powerful, that willingness to go and co-create and get feedback on your prototypes much earlier that most companies historically have done, is a powerful piece of design thinking". This co-creative idea of integration and immediacy is supported by Todorova & Durisin (2007) which draws on learning theory to propose the acquisition of knowledge by an organization utilizes internally existing organizational knowledge to recognize the potential value of external knowledge. Supporting design thinking capability, participant #1 adds, "Once you learn design thinking as a capability, I think you are frequently applying it but you're not necessarily doing the whole process".

The immediacy aspect of design thinking is a key advantage in responding quickly to the volatile, uncertain, complex and ambiguous learning environment of the digital economy. This is supported by Cohen & Levinthal (1990) seminal work that firms can benefit from investing in absorptive capacity to preempt changes in the environment by taking a knowledge based view of absorptive capacity to promote organizational learning, enhance open innovation, manage alliances, creating strategic variety (Lichtenthaler, 2016). In VUCA environments, more frequently an organization updates its situational understanding of the environment, the more it minimizes the effects of volatility (Bartscht, 2015) and preempts complexity by staying close to the external environment to gain speed in decision making (Drucker, 2012; Byrne & Callaghan, 2013; Adams & Stewart, 2015). Participant #2 supports design thinking's ability to quickly facilitate decisions by stating, "when there's a decision to be made, speed is high…..the companies that are the most competitive are the ones that can figure out the right problems to solve and then do that across the company".

## IMPLICATIONS AND RECOMMENDATIONS FOR PRACTICE

This study confirmed design thinking as a proven absorptive capacity process (Acklin, 2013; Llamas, 2015) to promote organizational learning in organizations operating in the highly disruptive VUCA environment thus pre-empting disruption. Design thinking successes have been primarily evidenced by anecdotal, practitioner based accounts (Carlgren, 2013) resulting in

a lack of clear understanding and academic foundation (Johansson-Skoldberg, Woodilla & Cetinkaya, 2013). Originally identified as a process for innovation, design thinking has since spread to other areas of organizations and in many instances; it defines the management methodology of the organization as a whole (Gardien & Gilsing, 2013). This study justifies wide spread adoption of the concept by finding design thinking as an absorptive capacity process to promote organizational learning in highly disruptive VUCA environments. As learning capabilities and problem solving capabilities do not differ and are developmentally the same (Bradshaw, Langley & Simon, 1983; Simon, 1985; Cohen & Levinthal, 1990), to justify and aide in wide spread adoption, this study advocates for future research to re-conceptualize design thinking from a problem solving construct into an organizational learning construct to remove vague definition and ambiguity from the concept. In doing so, this reconceptualization will aide widespread consideration in other areas, such as; strategy, organizational design, business model design, sales, marketing, engineering and user experience as well as a wide host of other contexts including of social innovation, sustainability, entrepreneurship and education .

This study has widespread practical implications and recommendations for management. Organizational learning literature highlights the needs for organizations to take a system thinking approach and for management to build structures to promote absorptive capacity to adapt to the increasingly complex nature of external knowledge (Murray, 1998; Senge & Carstedt, 2001; Bennett & Lemoine, 2014; Senge, Hamilton & Kania, 2015). This study confirmed design thinking as an organizational learning process which promotes exploratory, transformative and exploitative learning (Kim, Akbar, Tzokas & Al-Dajani, 2014; Fiol & Lyles, 1985), extending organizational learning theory, by supporting design thinking as a capability to overcome barriers to learning and effectively navigate dynamic complex external environments (Kim & Senge, 1994; Murray, 1998; Senge & Carstedt, 2001; Senge, Hamilton & Kania, 2015; Bartscht, 2015; Bennett & Lemoine, 2014). The collaborative and integrative nature of design thinking supports the acquisition and application of external knowledge (Sun & Anderson, 2010) allowing organizations to effectively integrate complex knowledge throughout the organization to be understood by the whole (Senge, Smith, Kruschwitz, Laur & Schley, 2008). Design thinking is impacted by management's role in understanding the interrelationship of systems (Kim, Akbar, Tzokas & Al-Dajani, 2014) and core management capabilities of complexity reduction, reflection and proactive co-creative problem solving. Therefore, this study recommends management operating in VUCA environments focus organizations on co creative and proactive learning by building design thinking structures to pre-empt the VUCA environment.

As this study calls for more management intervention to promote system wide design thinking structures to promote absorptive capacity and organizational learning, it is only appropriate to recommend widespread adoption of design thinking by higher education curriculums to address the new VUCA environment. Dunne & Martin (2006) first translated the concept of design thinking from practitioner into higher education as a way to improve the education of graduate-level business administration students. Dunne & Martin (2006) focused on the wicked problems aspect of design thinking to solve ambiguous problems by focusing on empathy, collaboration and integration. Boland & Collopy (2007) support design thinking as a critical skill for successful organizational leaders and the design attitude is an important cognitive mode for practicing managers which should be addressed by management education and practice. While Dunne & Martin (2006) provide some basis for extension of design thinking into strategy (Fraser, 2007) and organizational change and development Johansson-Skolberg et al. (2013); Boland & Collopy (2007) support design thinking as a critical for practicing

managers, this study provides empirical basis for further widespread adoption of the concept organization wide. According to Senge et al. (2015) systems leadership capabilities of proactive learning, reflection and ability to view the system as a whole are critical in complex environment. As such design thinking and its ability to promote absorptive capacity and organizational learning, should be a key component for higher education business management curriculums. While current trends are focused on quantitative analytics, this study has found that successful organizations operating in VUCA environments are those organizations relying on mixed methods approaches, using historical quantitative research data along with design thinking qualitative insights to sense and seize upon trends and patterns in the VUCA environment.

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