BRIDGING REPRESENTATIONAL GAPS IN FUNCTIONALLY DIVERSE TEAMS: THE ROLES OF INFORMATION ELABORATION AND PERSPECTIVE TAKING ON TEAM CREATIVITY

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DEDICATION

For Grace.

You are never too old to learn…

Proverbs 13: 12 Hope deferred maketh the heart sick: but when the desire cometh, it is a

tree of life.

ABSTRACT

As a result of differences in knowledge, conflicting interpretations of new knowledge, and incompatible views among team members, problem-solving in organizations may be difficult, and be further impeded by the lack of or limited sharing of knowledge. It is vital for team members to leverage the differentiated knowledge in order to make the different perspectives more compatible and complementary to achieving team goals. With limited research on the often underestimated interaction processes between team members during problem solving exercises, this study examined information elaboration and perspective taking as interaction processes that team members engaged in during a problem-solving exercise. Data collected from an organizational behavior simulation conducted using the Lego® Serious Play™ was used to examine the interaction processes, and their effect on team creativity.

Keywords: information elaboration, Lego® Serious Play™, organizational behavior simulation, perspective taking, representational gaps, team creativity, team diversity, team interaction

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CHAPTER 1: INTRODUCTION

It is vital for organizations to be able to adapt to the ever-rapidly changing business environment of today, where creativity and innovation are crucial to the very life of an organization (George, 2007; Zhou & Shalley, 2010). Organizations are now increasingly using diverse teams to carry out work in complex and specialized roles (Hoever, van Knippenberg, van Ginkel, & Barkema, 2012) in order to achieve creativity that may lead to the development of solutions that are both novel and useful (Hoever, *et al*., 2012; Levi, 2014). Teams are groups of people in work settings who perform required coordinated interactions in order to accomplish certain tasks and achieve defined common goals (Parks & Sanna, 1999; Forsyth, 1999; Levi, 2014). Past research on teams in organizational settings has found that while members of a team are more positively inclined toward the team, and are more similar than dissimilar (van Knippenberg, De Dreu, & Homan, 2004), in instances where team members have different perspectives, the same information may be processed as different knowledge (Cronin, Bezrukova, Weingart, & Tinsley, 2011). An a priori assumption is that team members may inevitably differ on a number of aspects[1], and yet these differences may still be considered as somewhat correlated[2] (Homan, van Knippenberg, Van Kleef, & De Dreu, 2007).

While some research (van Knippenberg, *et al*., 2004) has suggested that the use of cross-functional teams in organizations increases the introduction of diversity into work-groups, other studies (Milliken & Martins, 1996; Williams & O'Reilly, 1998) have produced mixed results in instances where work-group diversity may have positive and negative effects on performance.

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[1] For example demographically, psychologically, organizationally (McGrath, Berdahl, & Arrow, 1995)

[2] For example age differences in a team may be independent of gender differences, but age and gender may also covary (Homan, *et al*., 2007)

When functionally diverse teams do not share, or where they limit the sharing and access of knowledge among team members, the likelihood of the presence of differences between individual team members' problem definitions (representations) is high (Cronin & Weingart, 2005). These differences in the team members' problem definitions are referred to as representational gaps. A representational gap "reflects differences between team members' problem definitions that will ultimately affect group problem solving" (Cronin & Weingart, 2007, pg. 762). The inconsistencies that arise between these problem representations depend on how the presented problem has been conceptualized by different individual team members (Firth, Hollenbeck, Miles, Ilgen, & Barnes, 2015). Cronin & Weingart (2007) hold that some representational gaps may be very large when the difference relates to the overall categorization of the problem[3] or the representational gap may be smaller in instances where the different perceptions are about a specific issue[4].

While some previous research has focused on main outcomes such as conflict management, creativity, or performance in diverse teams (van Knippenberg, *et al.*, 2004; Cronin & Weingart, 2007; Weingart, Todorova, & Cronin, 2008; Firth *et al.*, 2015; Wang, Mannix, & Cronin, 2016), my thesis is particularly concerned with assessing the interaction processes between team members that may be used to bridge the representational gaps that arise when individual team members' problem definitions differ, and the ultimate effect of these processes on team creativity (Harvey, 2013). For the purposes of this study, the interaction processes here are related to interaction among team members. In general terms, team interaction involves more

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[3] An example of a larger representational gap (overall categorization of problem) is a cost reduction problem versus a sales problem (Cronin & Weingart, 2007)

[4] An example of a smaller representational gap (different perceptions of a specific issue) is the meaning of data to different actors (Cronin & Weingart, 2007)

behaviors (e.g. communication, learning, conflict, trust, friction) among team members than just interpersonal interaction, in order to achieve common goals (Wang, 2018). Effective team interaction is thought to improve team efficiency, while reducing the negative effects of competition and conflict on team effectiveness (Wang, 2018).

This study extends current literature by considering the effects of interaction processes involved in the bridging of representational gaps during a problem solving exercise, and in particular, the role of information elaboration and perspective taking interaction processes on team creativity. Information elaboration is the exchange, discussion, and integration of task-relevant information and perspectives between team members (van Knippenberg, *et al*., 2004), and perspective taking, which is comprised of interactions between team members, is fundamental to communication where diverse knowledge should be made available for team members to incorporate into decision-making and problem solving (Boland& Tenkasi, 1995). Past research on information elaboration and perspective taking (Boland & Tenkasi, 1995; Parker & Axtell, 2001; van Knippenberg, *et al*., 2004; Homan, *et al*., 2007; van Ginkel & van Knippenberg, 2008; Hoever, *et al*., 2012; etc.) have tended to review these constructs in the context of the main effects of diversity on team (group) performance and other outcomes such as creativity, innovation, decision quality, etc., but not as interaction processes that team members would engage in problem solving, and the possible effect of these processes on team creativity. By narrowing down to assess the two interaction processes that team members may engage in to overcome possible barriers (representational gap) to problem solving, this study will extend investigations on the effects of team functioning to problem solving. As the focus of the study is on interaction processes, the demographic aspects such as age, gender, race, or nationality of the diverse teams will not play a contributing role in the analysis, and the teams will be reviewed

from an informational/ functional diversity angle rather than the social category diversity angle that would be dependent on the impact of demographic data.

This study will first discuss types of team diversity and the impact of diverse teams on performance in a bid to highlight the influence of a lack of shared knowledge in functionally diverse teams. Next, the study explores barriers to problem solving, in particular, representational gaps. Following, by inferring that information elaboration and perspective taking as interaction processes help in the bridging of representational gaps, this study will assess these processes, and derive their effects on team creativity. This study is organized as follows: Chapter 2 provides an overview of literature on diverse teams, representational gaps, information elaboration, perspective taking, and team creativity, and it also develops the hypotheses. Chapter 3 addresses the research method, including the use of Lego® Serious Play™ for an organizational behavior simulation. Chapter 4 will provide results, discussion, limitations and conclusion of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 OVERVIEW

In a study conducted by Guillaume, Dawson, Otaya-Ebede, Woods, & West (2017), it was asserted that there is a plethora of research on the conditions under which diversity leads to negative or positive outcomes (Tsui, Egan, & O'Reilly, 1992; Cox, 1993; Chatman, Polzer, Barsade, & Neale, 1998; Jehn, Northcraft, & Neale, 1999). The contingency factors that govern these outcomes are not always clear, and it is argued that many of the predicted moderators are not backed by empirical support (Avery & McKay, 2010), or are of limited use because of study characteristics or differing study designs (Peterson & Brown, 2005). Guillaume, *et al.*, (2017) echo the contention of van Knippenberg, *et al.*, (2004) that workplace diversity is positively related to performance when the task has strong information and decision-making components, and when moderating variables can be associated with eliminating group bias and facilitating information elaboration. However, there is limited research work that examines interaction processes within team members, and the effects of these interaction processes on team creativity in a workplace setting with high diversity. Based on this current knowledge, the focus of this thesis will be to empirically assess the interaction processes that may be used to bridge representational gaps.

Representational gaps may limit a team's ability to execute team goals and hinder the achievement of problem solutions. The need to be able to apply knowledge to a situation in order to achieve a desired objective may help categorize a problem, formulate problem representation, and ultimately create action that provides the desired result. However, this may be impeded by the inconsistencies that arise in individual team member definitions of problems. A study conducted by van Knippenberg, *et al.* (2004) proposed the categorization-elaboration model

(CEM) that suggests "each dimension of diversity may in principle elicit both information/ decision-making and social categorization processes", and that these processes interact (van Knippenberg, *et al*., 2004, pg. 1010). The authors posited that group diversity is positively related to information elaboration and perspective taking within a group through the use of information in group task performance. Building on one of van Knippenberg, *et al*., (2004) propositions suggested in their CEM model[5], my study will endeavour to assess the interaction effects of information elaboration and perspective taking processes in bridging representational gaps. It will argue that when team members actively engage in information elaboration and perspective taking processes, there will be a higher chance of bridging the representational gaps that present barriers to problem solving, and will likely have a positive effect on team creativity. Figure 1 depicts an overview of the model for this study.
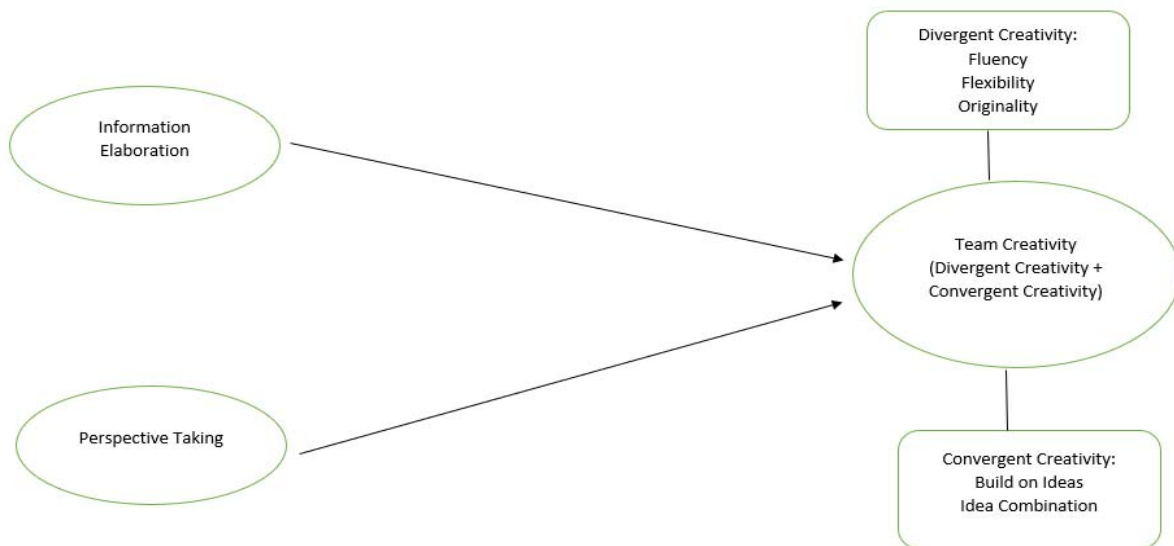
Figure 1: Overview model of interaction processes and team creativity

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[5] *Proposition 1:* The primary process underlying the positive effects of diversity on group performance is elaboration of task-relevant information (van Knippenberg, *et al*., 2004, pg. 1012)

While a team may strive to execute its team goals, it may lack shared knowledge, or there may be a lack of shared understanding within team members in identifying and/ or defining problems. In an effort to assess the proposed interaction processes of information elaboration and perspective taking, this study will foster the idea that by engaging in these interaction processes, a clearer path becomes available for team members to engage with each other and bridge the representational gaps that may hinder the achievement of solutions to a presented problem, and thereby also positively affect team creativity. Within an environment that is more tolerant of divergent perspectives, this study prognosticates that team members may be willing to share their viewpoints in an effort to achieve goals and solve problems. To develop a framework that guides this research, it will be appropriate to provide an overview of diversity in teams, the associated performance outcomes, and the barriers to problem solving within which representational gaps occur.

2.2 DIVERSITY IN TEAMS

2.2.1 TYPES OF TEAM DIVERSITY

Diversity refers to differences between individuals that may lead to the perception that another person is different from oneself (Homan, *et al*., 2007), and it denotes that team characteristic where team members differ in regard to a given attribute (Hoever, *et al*., 2012). Past research (Jackson 1992; Tsui, *et al*., 1992; Cummings, Zhou & Oldham 1993; Maznevski 1994; Jackson, May, & Whitney, 1995) has suggested categorizing diversity between observable or readily detectable attributes[6], and underlying or less visible attributes[7] to distinguish among different types of diversity. These differences may stem from demographic, psychological, and

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[6] Observable or readily detectable attributes for example: age ethnicity, gender or race
[7] Underlying or less visible attribute for example: education, experience or tenure.

organizational characteristics that result in different types of diversity manifesting within a team (Levi, 2014).

Work-group diversity is a key aspect of organizational life (van Knippenberg, *et al*., 2004; Homan, *et al*., 2007), and individuals within diverse groups possess a broad range of distinct and nonredundant task-relevant knowledge, skills, and abilities, while also maintaining different opinions and perspectives on tasks (van Knippenberg, *et al*., 2004). Among the different dimensions of diversity that provide divergent perspectives within a work-group, several studies (Jackson, 1992; Tsui, *et al*., 1992; Milliken & Martin, 1996; Jehn, *et al*., 1999) have suggested that one of the more important differences lays between social category diversity and informational/ functional diversity. Social category diversity refers to detectable attributes such as gender, age, and ethnicity, and impacts relational aspects such as team climate and relational conflicts (van Knippenberg, *et al*., 2004; Homan, *et al*., 2007). Informational/ functional diversity relates to attributes that are more job relevant (such as knowledge, perspectives, ideas, and educational background). Such diversity is less visible than the social category, addresses the accessibility of information (van Knippenberg, *et al*., 2004; Homan, *et al*., 2007), and impacts task-related aspects such as information elaboration and the decision-making process (van Knippenberg, *et al*., 2004; Homan, *et al*., 2007). Some examples where informational/ functional diversity applies include when group members are spurred to elaborate on task-relevant information for input in the decision-making process (Homan, *et al*., 2007), when information is processed for error detection, when there is engagement in team problem solving, and in trying to attain team effectiveness (Davis, 1969; Phillips, Mannix, Neale, & Gruenfeld, 2004; Tjosvold & Poon, 1998; Gruenfeld, Mannix, Williams, & Neale, 1996). These

may lead to a positive effect of information diversity that enhances group functioning as team members capitalize on the team diversity dimensions.

The focus of this thesis is on informational/ functional diversity where functionally diverse teams often lack shared knowledge as a result of inconsistencies in individual cognitive representations[8] (Cronin & Weingart, 2007). Some studies (van Knippenberg, *et al*., 2004, Homan, *et al*., 2007) contend that the positive effect of informational/ functional diversity may emerge where the exchange of task-related information and perspectives within a team supports the performance of complex tasks that require creativity, collaborative decision-making, and information processing. The exchange of task related aspects of information and perspectives may facilitate mutual understanding and shared knowledge among team members and may therefore support conditions where team performance can be executed, and team goals achieved. For effective team functioning, the goal would be to reduce negative aspects (e.g. team conflicts, lower communication) of team diversity, while extending effort to promote the exchange of information and perspectives that would capture the crucial elements of, and integrate input from, team members' discussions and suggestions (van Knippenberg, *et al*., 2004; Cronin, *et al*., 2011; Hoever, *et al*., 2012).

2.1.2 TEAM CREATIVITY IN DIVERSE TEAMS

The hub of this study is on the interaction processes related to a diverse team's performance. However, a brief discussion of one of the desired performance outcome, team

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[8] For example, a designer and an engineer in a cross-functional product development team at an auto manufacturer may conceptualize the mandate to develop a "tough truck" differently resulting in inconsistencies between the individuals' team problem definitions, increase the likelihood of conflict between team members, and difficult to integrate one another's information (Cronin & Weingart, 2007)

creativity, helps provide the frame of reference from which this study will assess the interaction processes that diverse teams may engage in before the eventual outcome.

It is generally recognized that an ultimate definition of creativity is lacking (Amabile, 1983), but the objectively identifiable constructs associated with its definition include fluency, flexibility, novelty, synthesis, analysis, reorganization, complexity, uniqueness, etc. (Kurtzberg & Amabile, 2001). Cropley (2000: pg. 77) provides an overview of what is referred to as "Test defined elements of creativity" that covers the multifaceted ways in which creativity is defined (see Table 1 below).

Table 1

Test defined elements of creativity

Test defined elements of creativity			
PRODUCT	**PROCESS**	**MOTIVATION**	**PERSONALITY/ABILITIES**
• Originality • Relevance • Usefulness • Complexity • Understandability • Pleasingness • Elegance/Well-craftedness • Germinality	• "Uncensored" perception and encoding of information • Fluency of ideas (large number of ideas) • Problem recognition and construction • Unusual combinations of ideas (remote associates, category combination, boundary breaking) • Construction of broad categories (accommodating) • Recognizing solutions (category selection) • Transformation and restructuring of ideas • Seeing implications • Elaborating and expanding ideas • Self-directed evaluation of ideas	• Goal-directedness • Fascination for a task or area • Resistance to premature closure • Risk-taking • Preference for asymmetry • Preference for complexity • Willingness to ask many (unusual) questions • Willingness to display results • Willingness to consult other people (but not simply to carry out orders) • Desire to go beyond the conventional	• Active imagination • Flexibility • Curiosity • Independence • Acceptance of own differentness • Tolerance for ambiguity • Trust in own senses • Openness to sub-conscious material • Ability to work on several ideas simultaneously • Ability to restructure problems • Ability to abstract from the concrete

Source: Cropley (2000: pg. 77)

Although prior studies on creativity have provided insight on performance outcomes, these were primarily explored through the lens of individual creative accomplishments (Woodman, Sawyer, & Griffin, 1993; Amabile, 1996; Zhou & Oldman, 2001). More recent research provides the consideration that team creativity may be conceptualized as "the joint novelty and usefulness of a final idea developed by a group of people" (Luu, Rowley, Dinh, Qian, & Le, 2019, pg. 4). In a study conducted by Joo, Song, Lim, & Yoon (2012), team

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creativity was defined as "the members' view of the extent to which the team suggests new ideas or solutions to achieve goals, perform work tasks, improve performance and solve problems" (pg. 79). Team creativity has been considered as the consequence of interactions among individual, group, and organization members (Woodman, *et al.*, 1993; Taggar, 2002). There is a gap in research to pursue the role of interpersonal interactions within teams striving for team creativity, as relatively little attention has been paid to team-level creative synergy where creative ideas are generated at team level instead of being generated by one mind (Kurtzberg & Amabile, 2001).

Kurtzberg & Amabile (2001) suggest that team creativity research should explore the factors within a team that affect the generation and sharing of ideas. This may involve processes that are distinct from the process of individual creativity, and that provide a link between information acquisition behaviours and their effect on creativity (Rangarajan, 2008). It is with this in mind that this study will attempt to analyze the direct interaction processes of information elaboration and perspective taking as relevant variables for the team creative process.

As more complex and creative work is now often carried out in teams, the importance of team creativity in helping organizations adapt to changing environments has become more widely recognized (George, 2007; Hoever, *et al.*, 2012). As a performance outcome, creativity, which has joint traits of novelty and usefulness of ideas regarding products and processes, is considered vital for organizations (Zhou & Shalley, 2010). Although some theories (Jackson, 1992; West, 2002) have predicted higher creativity in the presence of diversity in teams, the notion of a consistent effect of diversity on team creativity is not supported by generalizable and reliable evidence (Hülsheger, Anderson, & Salgado, 2009; Jackson & Joshi, 2011). Additionally, the paucity of research on team creativity limits the extent to which questions on the novelty and

usefulness of ideas may be addressed (Paulus & Nijstad, 2004; Zhou & Shalley, 2010). Hargadon & Bechky (2006) assert that perspective taking, which helps with the integration of perspectives and ideas has been linked to team creativity, while Hoever, *et al*. (2012) argue that the cognitive process of perspective taking, which may facilitate information exchange and also engender a comprehensive evaluation and integration of different perspectives, would have the potential to increase creativity in diverse teams. However, some research suggests that creativity may be undermined through process losses in teams by way of representational gaps (Cronin & Weingart, 2007; Weingart, *et al*., 2008). These studies contend that the overall impact of representational gaps decreases team creativity when the combination of team members' inputs is hindered as different representations of the same problem lead to team conflict and poor coordination. My study does not extend to assess the impact of representational gaps on the team creativity outcome, but rather the focus is to assess specific interaction processes during problem solving, and the effect of these interaction processes on team creativity.

2.1.3 BARRIERS TO PROBLEM SOLVING IN DIVERSE TEAMS

The research work on knowledge boundaries is useful in setting the groundwork to understand the formation of representational gaps, and my effort to address the roles of information elaboration and perspective taking in the bridging of these gaps.

Working across boundaries is key to competitive advantage, and the potential to manage knowledge at a boundary would essentially take a combination of capacity and ability (Carlile, 2004). Common knowledge specifies the differences and dependencies of consequence at a boundary, and the challenge in cross-boundary is not only communication, but also in the need to resolve the impact of negative consequences (Carlile, 2002; 2004). Individuals have to be willing to alter their knowledge, and also be capable of influencing and transforming knowledge from

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other functions (Carlile, 2002). Differences limit the effectiveness of cross-functional communication, and communities need to develop local understanding as a consequence of differences in expertise and experience (Bechky, 2003; Cronin & Weingart, 2007).

Knowledge is constructed within a certain social context and is particular to a community because it emerges through situated activity (Bechky, 2003). It is invested in methods, in technologies, in the ways of doing things in any given practice (Carlile, 2002), and is a critical factor in creating competitive success over time (Kogut & Zander, 1992; Nonaka & Takeuchi, 1995). Although there are significant costs associated with giving up and acquiring different knowledge, the value of developed knowledge is demonstrated in those realized successes achieved in practice (Carlile, 2002; 2004). Knowledge in new product development is localized around particular problems, but it is not limited to one situation. Instead, it can be similar across practices when localized around similar problems, such that it is local in nature, and not global (Carlile, 2002). Creating a new product requires differences in levels of experience, terminologies, tools, and incentives, and thus, the need for differences in the amount and type of knowledge that would be unique to each domain (Carlile, 2004). There is an expectation for communities to have different domains of substantive knowledge (Bechky, 2003), however, differences in perspectives across these communities may result in trouble sharing knowledge, and the difficulty of sharing or transferring of knowledge becomes an onerous issue to manage (Carlile, 2002; Bechky, 2003).

When different interests arise, the need to develop common knowledge, a process of negotiating and defining common interests, becomes vital (Carlile, 2004). The amount of effort required to share, and access knowledge increases as differences in amount and the type of domain-specific knowledge accumulated increases (Carlile, 2004). Additionally, as resources and

tasks change, there is need to develop an adequate common knowledge that would help manage the dependencies and accompanying complexities associated with the amount of effort required to share and assess knowledge at a boundary (Carlile, 2004). As the current status becomes insufficient in addressing the differences present, transferring knowledge becomes more problematic, especially when novelty arises, and domain-specific and common knowledge need to be transformed to share and access knowledge at the boundary (Carlile, 2004).

Transforming knowledge refers to the "process of altering current knowledge, creating new knowledge, and validating it within each function and collectively across functions" (Carlile, 2002, pg. 445). Transformation occurs when one community understands how knowledge from another community fits within the context of its own work, while enriching and altering current knowledge (Bechky, 2003). Both domain-specific and common knowledge need to be recognized as key at the boundary to provide better understanding of the challenges faced across domains, particularly in instances where innovation is desired (Carlile, 2004).

The process of applying knowledge to a situation in order to achieve a desired objective is problem solving (Cronin & Weingart, 2005). Knowledge about what is desired can help categorize a problem and formulate problem representation (Cronin & Weingart, 2005). Problem solving involves processing information in order to create and select actions with the end situation looking more like the desired result (Cronin & Weingart, 2007), although some research (Carlile, 2002) has indicated that the characteristics of knowledge that drive innovative problem solving within a function may themselves hinder problem solving and knowledge creation across functions.

In the Carlile (2002; 2004) studies, certain approaches have been suggested to facilitate collaboration across knowledge boundaries that would assist with the conceptualization of

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knowledge in organizations, and promote mutual understanding among interacting communities. The syntactic approach proposes integration as key to information processing and transferring of knowledge across a boundary where relations between sender and receiver at a boundary are adequately defined (Carlile, 2004). When novelty makes differences, dependencies, and meanings unclear or ambiguous, a transition from syntactic to semantic boundary occurs (Carlile, 2004). Novelty arises from differences in differences in kinds of knowledge, and when it increases, the amount of effort required to share and assess knowledge increases (Carlile, 2002; 2004). With the semantic approach, integration here involves the processes or methods for translating and learning about differences and dependencies at a boundary (Carlile, 2002). Novelty here presents results in different interests that have to be resolved and prods the transition from semantic to pragmatic boundary (Carlile, 2004). The pragmatic approach highlights importance of understanding consequences that exist between differences and dependencies, and integration recognizes that knowledge has to be transformed to deal with negative consequences (Carlile, 2002). The conditions of differences, dependencies, and novelty are all present, and communities must be able to represent more novel forms of knowledge, learn about their consequence, and transform domain-specific knowledge accordingly (Carlile, 2002; 2004).

When members of communities interpret the same information differently, conflict over how to perform a task or solve a problem is likely to be experienced (Cronin & Weingart, 2007). Information integration may become difficult to achieve as differences and dependencies increase, and novelty does not necessarily distinguish that what is new is something unknown (Carlile, 2004; Cronin & Weingart, 2007). Alternative perspectives are common in a joint

representation[9] (Cronin & Weingart, 2007), and when there are multiple actors, internal consistency of the joint-representation would be difficult to obtain (Cronin & Weingart, 2007). Gaps in the joint-representation may occur as a result of coordination problems and conflict in the information processing (Cronin & Weingart, 2007).

Representations are constructed for specific problems and guide the interpretation and evaluation of information (Cronin & Weingart, 2007). Although representation directs problem solving, it is important to recognize that when functionally diverse communities do not share, or, limit the sharing and access to knowledge, the likelihood of joint-representations being different is high, and this creates representational gaps (Cronin & Weingart, 2005).

2.2 REPRESENTATIONAL GAPS

2.2.1 ADDRESSING REPRESENTATIONAL GAPS

For reference, Cronin & Weingart (2007) define the concept of representational gaps as "differences between team members' fundamental definition of a given problem or task" (pg. 762). Representational gaps occur when perspectives are inconsistent, or because of incompatible cognitive representations of a problem, and are likely to lead to task conflict[10] rather than the amelioration of the problem (Cronin & Weingart, 2005). Representational gaps may manifest as contradictions, omissions, or incompatibilities in joint-representation, with gaps based on different knowledge sets likely to surface in omissions, and gaps based on different value systems likely to surface as direct conflicts (Cronin & Weingart, 2005; 2007). Representation is used to interpret information, and the occurrence of gaps may lead to conflict

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[9] Joint representation is a group-level structure which is an aggregate of individual representations (Cronin & Weingart, 2007)

[10] Examples of task conflict: conflicts about distribution of resources, conflicts about procedures and policies, conflicts about judgments, conflicts about interpretation of data (De Dreu & Weingart, 2003)

over meaning of information and reflect differences in problem definitions that affect group

problem solving (Cronin & Weingart, 2007). They may affect information processing as a

consequence of misunderstanding or potential misuse of information, and can also make

coordination of information difficult by creating contradictions in problem solving solutions

(Cronin & Weingart, 2007). Weingart, *et al*. (2008) assert that representational gaps may result in

team processes that increase team creativity as team members engage in constructive conflict and

improved coordination that stimulates critical thinking and debate rather than

miscommunication. That study also contends that some degree of shared understanding can help

to bridge a representational gap and minimize the process loss phenomenon of representational

gaps that takes resources away from the creative development process. In a study conducted by

Cronin & Weingart (2005), it is suggested that cognitive integration[11] may help reduce conflict in

diverse teams by minimizing effects of diversity on representational gaps, and affective

integration[12] may help reduce conflict by moderating effects of representational gaps on conflict.

In a study on enhancing performance in multiteam systems, Firth, *et al*. (2015) argue that efforts

made to reduce representational gaps (in this case frame-of-reference training) may also help

reduce uncertainty regarding the meaning and importance of problems shared, as specific teams'

efforts oriented towards team goals can be unified toward a common goal due to better

understanding.

2.2.2 BRIDGING REPRESENTATIONAL GAPS

Ideal conditions such as shared knowledge and mutual understanding among team

members allows for a strong foundation for a team to be high performing. While it is important

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[11] Cognitive integration: degree to which people understand each other's perspectives
[12] Affective integration: degree of trust, respect, and liking of teammates

to a team to be able execute team goals, representational gaps can create process losses in diverse teams that undermine effectiveness and thus preclude problem solving, These gaps are a source of contradictions, incompatibilities, inconsistencies, and a lack of shared knowledge (Cronin & Weingart, 2005; 2007). A goal to create mutual understanding among team members by bridging these representational gaps provides an environment where thoughtful intention, compatibility across team individuals, and high function may be attained, and effectiveness and problem solving achieved. Some studies suggest that the use of interpersonal processes such as cognitive integration and affective integration are important means by which to manage representational gaps (Cronin & Weingart, 2005), while other studies have proposed that the use of tools such as boundary objects and methodologies (which would represent functional interests) are effective means of bridging representational gaps (Carlile, 2004). Cronin & Weingart (2007) have offered other suggestions such as encouraging adaptation and insight, increasing motivation to learn, enhancing functional knowledge for non-experts, reducing biases about team members, and encouraging understanding as means to reduce representational gaps. My study will strive to review, in part, cognitive integration, which is one of the dynamics of the Cronin & Weingart (2005) proposed model of cognitive and affective integration that may be used to manage representational gaps. Cognitive integration will be reviewed under the lens of perspective taking in my study[13].

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[13] Weingart, *et al.*, 2008 describe cognitive integration as existing when team members are able to understand, anticipate, and integrate one another's perspective. This is in line with the definition of perspective taking for this study

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2.3 INTERACTION PROCESSES

For the purpose of this study, the definition of interaction process is derived from McGrath's (1964) proposed concept that team interaction is a process of interacting between different personal traits, and includes communication and conflict. Research on team interaction on team performance has held that the effectiveness of team members' interaction is key to team performance (Wang, 2018). Team interaction process is not only about examining the team division of labour, but includes reviewing such concepts as team communication, friction, conflict, trust, or learning that may be present during the process (Wang, 2018). The interaction process does not focus only on the results of team performance, but also on how the team interaction produces these results. With this in mind, my study will review and measure information elaboration and perspective taking as interaction processes in a team environment, and the effect these processes would have on the team performance (team creativity).

2.3.1 INFORMATION ELABORATION

van Knippenberg, *et al.*, (2004) define information elaboration "as the exchange of information and perspectives, individual-level processing of the information and perspectives, feeding back of results of this individual-level processing into the group, and discussion and integration of their implications" (pg. 1011). Further, to the degree with which information is shared, processed, and integrated within a team, members should interact repeatedly in order to achieve group information elaboration (van Knippenberg, *et al.*, 2004). Thus the information elaboration process extends beyond information sharing (Hoever, *et al.*, 2012), and as it requires all team members to contribute and participate in the discussion and integration of information

(van Knippenberg, Kooij-de Bode, & van Ginkel, 2010), shared task representations[14] have been

found to be an important facilitator of the information elaboration process in diverse teams (van

Ginkel, Tindale, & van Knippenberg, 2009; van Ginkel & van Knippenberg, 2008, 2009, 2012).

While the presence of conflict may impede the shared understanding of tasks and use of

distributed information within teams (van Ginkel & van Knippenberg, 2008, 2009), the use of

information elaboration facilitates the exchange, discussion, and integration of distributed

knowledge (van Knippenberg, *et al*., 2004), and is critical to team performance, decision quality,

and creativity (Kearney & Gebert, 2009; van Ginkel & van Knippenberg, 2009; Hoever, *et al*.,

2012). Information elaboration enhances group functioning (Homan, *et al*., 2007), and a team's

motivation to spend time and effort processing information is crucial to innovation, decision-

making and creativity aspects (De Dreu, Nijstad, & van Knippenberg, 2008; Nijstad & De Dreu,

2012; van Knippenberg, *et al*., 2004). Prior research regarding information elaboration primarily

focused on its association with diversity and team performance. To address the inconsistency of

various findings on the relationship between team diversity and performance, van Knippenberg,

et al., (2004), proposed that team diversity is most likely to lead to elaboration of task-relevant

information and perspectives when the group task has strong information-processing and

decision-making components, is highly motivated to process task-relevant information, and the

team members are high in task ability. That study argued that informational diversity stimulates

team members to elaborate task-relevant information and use the information as input in the

decision-making process. In a study by Homan, *et al*., (2007), the authors suggested that the

effect of diversity beliefs in informationally diverse groups was mediated by group elaboration of

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[14] Shared task representations: "any concept, norm, perspective, or process concerning the team
task that is held in common by team members" (Tindale, Smith, Thomas, Filkins, & Shelly, 1996)

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task-relevant information. Other studies have proposed that for optimal use of informational resources, information elaboration is an essential aspect of task performance when groups have shared task representations with emphasis on information elaboration (van Ginkel & van Knippenberg, 2008). In their research on transformational leadership, Cai, Jai, & Li (2014) found that when leaders focused on the team rather than on a few team members, this may help to reduce team conflict and enhance team information elaboration. In a study conducted by Wang, *et al*., (2016), it was proposed that a consequence of representational gaps is that information elaboration is difficult at the team level, and as such representational gaps are negatively related to information elaboration. Past research indicates that information elaboration is crucial for team effectiveness (van Knippenberg, *et al*., 2004), and predicts such team variables as performance (Kearney, *et al*., 2009), decision quality (van Ginkel & van Knippenberg, 2009), and creativity (Hoever, *at al*., 2012). However, to the best of my knowledge, there does not appear to be available research that would provide insight on the effect of information elaboration as an interaction process on team creativity. My study specifically seeks to review information elaboration as used in helping to bridge a representational gap, and to therefore assess and measure its role as an interaction process within team members and its effect on team creativity. The first hypothesis thus theorizes the following:

Hypothesis 1: *Information elaboration is positively associated with team creativity*

2.3.2 PERSPECTIVE TAKING

Perspective taking has been described as "communication that strengthens the unique knowledge of a community…and communication that improves its ability to take knowledge of other communities into account" (Boland & Tenkasi, 1995, pg. 351) and therefore "being able to reflect upon and re-narrativize the familiar to open up new insights and understandings" (Boland

& Tenkasi, 1995, pg. 355). Having a strong perspective as well as the capacity to take another perspective into account may be how more knowledge is compounded, and how improved possibilities for product or process innovation are achieved (Boland & Tenkasi, 1995). Hoever, *et al*. (2012) contend that team properties such as perspective taking are crucial in helping a team to be effective and achieve such goals as creativity and innovation.

Perspective taking is that attempt to understand the thoughts, motives, and feelings of another person, and it helps with reducing or limiting barriers to knowledge sharing among team members (Boland & Tenkasi, 1995). The beginnings of the process of perspective taking are primarily from social behaviour, which is predicated upon assumptions that a person makes about the knowledge, beliefs, and motives of others (Boland & Tenkasi, 1995), and where distinctive individual knowledge is exchanged, evaluated, and integrated with that of others in the team (Shrivastava, 1983; Nonaka & Johansson, 1985). To achieve perspective taking, diverse knowledge should be presented in its full uniqueness (Boland & Tenkasi, 1995). The depiction and exchange of representations of these understandings to team members help to reduce or at least limit incidences of barriers to knowledge sharing among team members (Boland & Tenkasi, 1995). Perspective taking can facilitate social interaction as a cognitive process that is directed at an external target (Hoever, *et al*., 2012), and it involves trying to consider the viewpoints of others (Caruso, Epley & Bazerman, 2006; Parker, Atkins, & Axtell, 2008). It may also involve a variety of inferential and judgmental processes, with resulting explicit representations of knowledge and understanding that may be exchanged with others to facilitate the appreciation of diverse knowledge (Boland & Tenkasi, 1995; Parker, *et al*., 2008).

The multidisciplinary interest in perspective taking is reflected in the way it is conceptualized, although research regarding it has mostly been within disciplines other than

organizational behaviour (Parker & Axtell, 2001). With a focus on information technologies, and in particular electronic communication, Boland & Tenkasi (1995) observed that perspective taking may not only be applied to help with problem solving in science work, but may also be extended to financial, marketing, and other non-scientific fields. In an information processing theory study, Grant & Berry (2011) demonstrate that as an other-focused psychological process that is a key mechanism of prosocial motivation[15], perspective taking strengthens the relationship between intrinsic motivation[16] and creativity, while a study conducted by Parker & Axtell (2001) proposes that organizational factors can shape and change perspective taking by arguing that some individual and job-related factors may positively predict perspective taking. Hoever, *et al.*, (2012) present perspective taking as moderating the effect of diversity on creativity, suggesting that it has the potential to increase creativity in teams by way of comprehensive evaluation of ideas, combined with the integration of different perspectives. For my study, the focus on perspective taking will be restricted to assessing it as an interaction process during team member engagement of a problem solving exercise, and will therefore theorize the following:

Hypothesis 2: *Perspective taking is positively associated with team creativity*

2.4 OVERALL

Representational gaps result from the different knowledge and values present in diverse work-groups, where individuals create representations that model a team's task while representing the individual's unique problem solving approach (Cronin & Weingart, 2007). The representations, which are crucial in the problem-solving process, guide the interpretation and

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[15] Prosocial motivation: desire to benefit others

[16] Intrinsic motivation: desire to expend effort based on interest in and enjoyment of the work that is being performed without any external incentives that may be provided

evaluation of information. (Cronin & Weingart, 2007). Such representational gaps occur in instances where there are variations or inconsistencies among representations that cannot be integrated (Cronin & Weingart, 2007).

Information elaboration is critical for team outcomes such as performance (Kearney & Gerbert, 2009), decision quality (van Ginkel & van Knippenberg, 2009), and creativity (Hoever, *et al.*, 2012), and with team members repeatedly interacting with each other, they can elaborate on information (van Knippenberg, *et al.*, 2004). Perspective taking is significant, particularly in work environments with blurred knowledge boundaries (Parker & Axtell, 2001), and where there is need for team members to work collaboratively (Dean & Snell, 1991). Perspective taking may increase the possibility of viable problem solutions for a successful team performance (Boland & Tenkasi, 1995), and may alleviate knowledge barriers that may hinder cross-functional understanding (Hoever, *et al.*, 2012).

In order to bridge representational gaps, problem solve and ultimately achieve goals within teams, a team interaction process is important, and measuring this process may provide instructive information on the experience and lessons learned from the team interaction, and also provide clarification of the effectiveness of the team to problem solve and achieve team goals. My study reviewed and assessed information elaboration and perspective taking as interaction processes, and explored the effects of these processes on the team creativity outcome.

CHAPTER 3: RESEARCH METHOD

3.1 OVERVIEW

This study explored the effects of information elaboration and perspective taking as interaction processes on the team creativity outcome. To test the hypotheses for this research, data derived from information collected from an organizational behavior simulation was reviewed and empirically analyzed.

3.2 ORGANIZATIONAL BEHAVIOR (OB) SIMULATION

To provide insight into the interaction processes and team creativity, this study adapted existing data obtained from an organizational behavior (OB) simulation, and derived the main hypotheses for analysis. Behavior simulations are advantageous in research settings where the processes or outcomes of interest are inherently complex (Bryman, 1989), and may be a preferred choice where the intention is to incorporate the realism of the field with the possible control available from a laboratory experiment (Jenkins, 1986, pg. 174). Additionally, such simulations may help provide a way for team members to make team-based decisions relating to the application of the OB theory, or apply OB concepts in quasi-realistic situations (Markulis, Zuckerman, Horn, & Strang, 2014).

An organizational behavior simulation 'Supporting the Local Economy' (MacDonald & Dann, 2018) was adapted for the simulation. Pre-defined problem conditions were used to develop and simulate representational gaps in problem solving between teams. The simulation was conducted in workshops using the Lego® Serious Play™ (LSP) process, where, through the use of Lego® kits, teams were required to solve a pre-defined problem by building a model. Appendix A details the conditions presented for the simulation, and information collected from the simulation provided the data used for this study. For this study, it was deduced that the

representational gap was assumed bridged when each team completed the construction of a model using the LSP process[17] that represented the team's solution to the problem presented in the pre-defined condition assigned to the team while participating in the OB simulation.

3.2.1 LEGO® SERIOUS PLAY™ AS SIMULATION

This Lego® Serious Play™ (LSP) process "is an industry strength business solution designed to create conducive conditions for problem recognition, knowledge creation, and shared understanding" (Dann, 2018, pg. 121). It helps break down barriers to communication and cross-disciplinary collaboration (Jensen, Seager, & Cook-Davis, 2018), while enhancing participatory development communication (Hinthorne & Schneider, 2012). The LSP method is suited for problems that warrant examination from multiple perspectives (Jensen, *et al*., 2018). With the full participation from all team members in the use of the LSP toolkit as a means to express diverse understandings and ideas, the emergence of problem solutions may be facilitated (Schulz, Geithner, Woelfel, & Krzywinski, 2015). Its collaborative process enables communication between team members and allows for the development of shared meaning to occur (Hinthorne & Schneider, 2012) by increasing the building on and combining ideas (Johnson, 2010), and facilitating empathetic perspective taking and creative problem solving (Mabogunje, Hansen, Eris, & Leifer, 2008).

3.3 SAMPLE

A total of 93 individuals (50 female and 43 males) participated in the LSP exercise for this study, and received either partial course credit or monetary compensation (C$15.00). Of the

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[17] The LSP process was used to conduct the organizational behavior simulation. A built LSP model at the end of the simulation indicates that the presented problem was solved, and the simulated representational gap was bridged. The size of the representational gap, or the extent to which the representational gap is bridged, or the problem is solved, is beyond the scope of this study.

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93 participants, 42 were students, 43 were both students and employed, and 8 were employed but not students (Mean age = 24.46; SD = 6.43). The participants were randomly assigned to a 2-person to 6-person team[18], and each team was randomly assigned a pre-defined problem condition that involved a decision-making task. 10 workshops in total were used to host the simulation exercise, with each workshop having two participating teams for a total of twenty teams (Team mean age = 24.97; SD = 4.83). This study reviewed the teams under the informational/ functional diversity lens. On account of the random assignment of actual participants at commencement of the workshop to the teams, this study inferred that the characteristics of informational/ functional diversity attributes were present in each of the teams and the informational/ functional diversity of the teams was not measured. The demographic data that identified the social category diversity characteristics of team members was not applied as a basis of categorizing and distinguishing team members, and cannot be traced back to any particular team outcomes. These were however controlled for, as some of the variables (e.g. age, gender, team size) have been found to affect creativity (Taggar, 2002).

3.4 PROCEDURE

On arrival at the simulation event location, each participant was welcomed and assigned to a team by the workshop facilitators to ensure that individuals arriving with pre-existing social bonds (for example friends, share-rides, or couples) were separated so as to avoid or minimize as much as possible, the pre-existing relationships that may influence the conditions of the exercise. Tables were set up to accommodate each team, and before commencing the workshop exercise,

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[18] The team size was not deliberate but was a default to the function of attendees. The team size was capped at 6 persons per team, but in the course of the workshop, there were either no shows or the registration for participation was not filled and therefore the team size was based on actual participants present at the commencement of the workshop.

consent forms were distributed to and signed by all participants in order to facilitate the collection of audio and video recordings of the sessions. In interluding phases during the workshop, each individual completed different portions of a Participant Booklet. Survey questions from the booklet and the workshop session recordings were used for data in this study. The task for each team was to build a model with the Lego® kits provided that would represent the solution to the pre-defined problem (see Appendix A) assigned to the team.

3.5 MEASURES

To test the hypotheses, information elaboration, perspective taking, and team creativity constructs were measured.

3.5.1 INFORMATION ELABORATION

Information elaboration was inferred from questionnaire data that assessed self-reported elaboration, and the data was aggregated to team level. Measured by a questionnaire that was administered in the course of the LSP exercise, a four-item scale adopted from Kearney, Gerbert, & Voelpel, (2009) was used to assess information elaboration. Responses to the questions were made on a seven-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" (Cronbach's α value is 0.70). Appendix B contains the items used to assess information elaboration. An example of the items included: "Participants in this workshop carefully considered the unique information provided by each individual team member".

3.5.2 PERSPECTIVE TAKING

Perspective taking was self-reported by individual team members who provided this data by completing a questionnaire. As perspective taking is often not overtly displayed, or apparent to observers, individual team members were in the better position to self-report (Grant & Berry, 2011). Prior research has demonstrated the reliability and validity of self-reports of perspective

taking (Davis, Conklin, Smith, & Luce, 1996). A four-item scale adapted from Davis (1980, 1983) was used to assess perspective taking. This scale contains items which reflect the ability of a team member to adopt the perspective or point of view of the other team members (Davis, 1980), and all items were assessed using a seven-point Likert scale (Cronbach's α value is 0.85). Appendix C provides the scale items which include, for example: "I often looked at the challenges we faced in the workshop from the different viewpoints offered by other participants."

3.5.3 TEAM CREATIVITY

The solution to the pre-defined problem was represented by the completed model (built with the Lego® kits) of each team, and for this study, team creativity was the measured outcome. Congruent with the measure used in Harvey (2013), my study evaluated team creativity in terms of divergent and convergent creativity, by examining and coding the ideas generated and used to build the model output created by the teams in response to solving the defined problem. Different from Harvey (2013), categories were directly stated in the pre-defined conditions for the problems to be solved, and therefore did not have to be inferred.

Divergent creativity was measured by coding for fluency (total number of ideas generated), flexibility (total number of categories present in the ideas generated), and originality in idea generation (percentage of unique ideas i.e., ideas not generated by any other team in the study), which is consistent with previous research on creativity (Guilford, 1950; Diehl & Stroebe, 1991).

An idea was represented by what was identified as a "build unit" in the model created in the organizational behavior simulation exercise. A build unit was defined as a combination of Lego® pieces that the team members explicitly indicated represented something in the completed

model. The build units were coded by two independent coders who were blind to this research and hypotheses. This would help provide a high level of reliability beyond chance (Fleiss, 1981) in the coding process. The two independent coders engaged in thorough discussion to address any discrepancies that arose during the coding process, and resolved these to a consensual agreement on the identified build units. The build units were coded as part of a larger study, and this researcher was not involved in the design for the coding of the build units. The definition for a build unit was provided from the larger study, and the already coded build units were used as source data for this study, and represented the ideas generated by each team. Fluency (total number of ideas generated) was therefore represented by the total number of build units identified in each individual model built by each individual team (i.e. idea = build unit). Appendix D provides a sample of a completed team model with the identified build units which are separately numbered.

For flexibility, the categories identified were derived from the pre-defined conditions (Appendix A) in the organizational behavior simulation that were presented to the participants (i.e. the themes were drawn from pre-defined problem conditions that simulated a representational gap). These pre-defined conditions instructed the participants to complete the exercise by solving the presented problem within the confines of the pre-defined conditions. The categories were identified from the common concepts that were already included within the specific parameters of the pre-defined conditions (Appendix A) and were as follows: (i) flexible and highly adaptive (ii) structured and meticulously planned (iii) accessible and inclusive (iv) exclusive and 'right people'. The pre-defined conditions were part of a larger study and were not specific to this study. However, these provided an opportunity to view team creativity in different settings, as well as being a source of the categories that were used to code for flexibility

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in the study. The categories were stated directly in the pre-defined conditions from the larger study, and therefore were coded where the participants in the teams directly mentioned them or used synonyms to indicate that the categories were present in the generated ideas. The total number of ideas generated (fluency) were reviewed by the researcher to identify these categories and then coded accordingly for flexibility. For reliability, an independent coder who was condition and hypotheses blind also categorized a sample of 40 ideas, representing 51% of non-repeating ideas generated by the teams, into the different categories. With an average Cohen kappa value of 0.92 across the categories, this provided a high level of reliability (Fleiss, 1981). Some examples of these coded themes are provided in Table 2 below:

Table 2

Example of categories present in ideas generated

Idea Generated (Build Unit)	Category/ Theme	Key Statements from Teams
Skeletons	Flexible/ Adaptive	"they're all part of a team and revolving around this common goal…And that's where we're getting that kind of high flexibility and adaptiveness that's going on as well"
Gear	Structured	"And then we have a bit of gear at the side here to illustrate that we're going to be watching the time, making sure that things are coming together for everything. So it works with the structure theme"
Bridge	Accessible	"And then we have accessible, which we illustrated for like the bridge"
Giant rope	'Right People'	"…to show how you can just trying to get their influence and trying to get donors"

For originality, this was calculated as the percentage of unique ideas identified for each team relative to the total number of ideas generated by all teams. Unique ideas were identified by confirming that the idea (build unit) generated was not used or presented by any another team. For example, a team with a model output that has a "wheel on a chair" build unit to represent a

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wheelchair would represent a unique idea. Unique ideas were identified by the researcher and an independent coder.

Convergent creativity[19] was measured by the extent to which team members built on and combined ideas on the model output from the organizational behavior simulation exercise. Building on ideas was measured by the extent to which the teams detailed or elaborated their idea, which indicated that team members built on a focal idea. This was rated on a three-point scale, with 1 = no elaboration to 3 = highly elaborated (See Appendix E). For example, a team with a circular concept for its model output that included an explanation of the different ideas generated, and detailed the accompanying connection between ideas and categories, would receive the higher '3' score for the detailed explanation or elaboration. The researcher conducted the rating, and an independent rater also evaluated a sample of 18 ideas, representing 22% of non-repeating ideas. The average of the two raters' scores was used for analysis. To measure combining multiple ideas into a single idea (i.e. the model output), the average number of categories present in the model output was calculated.

3.5.4 CONTROL VARIABLES

Based on prior research associated with team processes and outcomes, several control variables have been identified for this study. Diversity is sometimes linked to team functioning because of (social) categorization processes (van Knippenberg & Schippers, 2007), and these categorization processes can decrease elaboration (Tajfel, 1982). Demographic averages and diversity can affect behaviors and performance (van Knippenberg, *et al*., 2004), therefore Blau's

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[19] Convergent creativity is a construct introduced by Harvey (2013), which describes a process in teams that involves both generating and elaborating new ideas i.e. team members build on and combine ideas

(1977) index was used to measure for gender diversity (0.498) which may reflect variety (Harrison & Klein, 2007). Typical assumptions that demographic composition have implications on team processes and outcomes (Tsui & Gutek, 1999) will provide the basis to have team average age, female percentage, and team size selected as covariates to rule out alternative explanations. Age was measured in five intervals (from 1: 20 years and below to 5: 51 years and above), and team size was measured by number of team members (number of persons in a team) which may be related to team cohesiveness and intrateam communication (Bantel & Jackson, 1989).

3.5.5 ANALYTICAL APPROACH

Owing to the labor-intensive and cost-prohibitive organizational behavior simulation procedure, the sample size in this study is relatively small, and this presented some limits to the statistical tests that were conducted. Nonparametric regression was particularly suitable for this study not only due to the small sample size, but also because the data contained scale, ordinal and nominal measurements (Gibbons, 1993), and nonparametric regression provides an appropriate method based on the nature of the data for this study. The analyses conducted and data results reviewed were through Spearman's nonparametric correlations and Kruskal-Wallis nonparametric tests using SPSS software, and Nonparametric Kernel regression using Stata 16.

CHAPTER 4: RESEARCH FINDINGS

4.1 RESULTS

For this study, information elaboration and perspective taking were examined as processes engaged in to bridge a representational gap. By addressing the following hypotheses, this thesis sought to examine the interaction processes of information elaboration and perspective taking among team members during a team problem-solving exercise, and the effect on team creativity:

Hypothesis 1: *Information elaboration is positively associated with team creativity*

Hypothesis 2: *Perspective taking is positively associated with team creativity*

To test the effect of information elaboration on team creativity, and perspective taking on team creativity, nonparametric tests were conducted. It should be noted that for transparency, the control variables were included during analyses (Becker, 2005), but the results were essentially the same, and therefore the analyses without the control variables will be reported.

The descriptive statistics are displayed in Table 3. Separate tests were conducted for fluency, flexibility, originality, divergent creativity, build on ideas, idea combination and convergent creativity as dependable variables, and information elaboration and perspective taking were the measured independent variables. Fluency, flexibility, and originality were analyzed as individual measures as well as the single combined measure of divergent creativity. Additionally, build on ideas and idea combination were analyzed as individual measures as well as the single combined measure of convergent creativity. The results generated were not statistically significant in the association between information elaboration and team creativity, and in the association between perspective taking and team creativity. Although not statistically significant, the results revealed that both information elaboration and perspective taking were

correlated to team creativity within the sample size for this study. The results indicated that information elaboration is positively related to fluency, flexibility, and originality, as well as when the three measures are combined into a single measure of divergent creativity. On the other hand, although information elaboration is positively related to convergent creativity ($P = 0.455$) as a combined measure of build on ideas and idea combination, it is positively related to build on ideas ($P = 0.491$) and negatively related to idea combination ($P = -0.146$). Further, the results indicated that perspective taking was negatively related to fluency and originality, while positively related to flexibility as well as divergent creativity as a single measure of the combined measures of fluency, flexibility and originality. Perspective taking was also positively related to the single measure of convergent creativity as well as the individual measures of the same.

The results for this study do not support either **H1** or **H2** hypotheses that information elaboration and perspective taking are positively associated with team creativity. However, the results suggest a correlation existing between information elaboration and team creativity, and perspective taking and team creativity, albeit not strong.

Table 3

Descriptive statistics and correlations for team creativity, information elaboration, perspective taking and control variables team size and team age mean

	M	SD	1	2	3	4	5	6	7	8	9	10	11
1 Fluency	9.450	2.481	1	-.082	0.252	0.856**	0.474*	-.537*	0.345	.334	-.015	.417	.199
2 Flexibility	1.945	1.432		1	.336	.445*	.119	.859**	.323	.103	.141	.125	-.135
3 Originality	0.004	0.004			1	.402	.350	.082	.369	.421	-.347	.385	-.179
4 Divergent creativity	3.801	0.921				1	.487*	-.037	.478*	.354	.059	.440	.109
5 Build on ideas	2.450	0.759					1	-.111	.972**	.491*	.016	.387	.091
6 Idea combination	0.231	0.181						1	.127	-.146	.133	-.096	-.213
7 Convergent creativity	1.340	0.380							1	.455*	.047	.364	.04
8 Information elaboration	5.820	0.494								1	.294	.461*	-.158
9 Perspective taking	5.769	0.324									1	.229	-.221
10 Team size	2.850	1.137										1	-.344
11 Team age mean	24.974	4.828											1

$N = 20$
* $P < 0.05$, ** $P < 0.01$
M = Mean
SD = Standard deviation

Below, Table 4 provides a synopsis of the R-squared (R^2) values. Although R^2 values below 50% is expected in this kind of study that attempts to predict human behavior (in this case, participants engaging in team activity), the R^2 values in this study were fairly low, with some indicating almost none variability, and the predictors did not provide statistically significant results.

Table 4

Nonparametric kernel regressions R-squared values for information elaboration and perspective taking with team creativity

	R^2	
	Information Elaboration	Perspective Taking
Fluency	0.1114	0.0002
Flexibility	0.2993	0.0554
Originality	0.1775	0.1207
Divergent Creativity	0.1251	0.0035
Build on Ideas	0.4702	0.1093
Idea Combination	0.2272	0.0178
Convergent Creativity	0.4649	0.1232

The Spearman's rank correlation was conducted to test the strength and direction of association between the ranked variables. The correlation results are summarized in Table 5 below:

Table 5

Spearman's correlation coefficient for information elaboration and perspective taking with team creativity

	Information Elaboration	
	Spearman's correlation coefficient	*P* value
Fluency	.386	.093
Flexibility	-.121	.612
Originality	.257	.273
Divergent Creativity	.273	.244
Build on Ideas	.197	.405
Idea Combination	-.265	.260
Convergent Creativity	.073	.760

	Perspective Taking	
	Spearman's correlation coefficient	*P* value
Fluency	-.129	.589
Flexibility	.177	.456
Originality	-.257	.273
Divergent Creativity	-.109	.647
Build on Ideas	-.208	.380
Idea Combination	.109	.646
Convergent Creativity	-.091	.703

From the sample for this study, the results indicate that information elaboration has a positive weak correlation with both divergent creativity and convergent creativity. However, there is a marginal significance, $P = 0.093$, that is observed between information elaboration and fluency (total number of ideas generated), that had the strongest correlation coefficient of information elaboration and the dependent variables for team creativity, and indicated a

positively related association. For perspective taking, the results indicate a relatively weak and negative monotonic correlation with both divergent creativity and convergent creativity.

The Kruskal-Wallis one-way ANOVA was used to determine if there were statistically significant differences between teams with low information elaboration and teams with high information elaboration on team creativity, and also between teams with low perspective taking and teams with high perspective taking on team creativity. The overall tests do not show significant differences across the samples, and the distributions of divergent creativity and convergent creativity is the same across the categories of information elaboration and perspective taking. The Kruskal-Wallis H test showed that there was no statistically significant difference in divergent creativity between teams with low information elaboration and teams with high information elaboration, $\chi^2 (2) = 1.417$, $P = 0.234$, with mean rank divergent creativity measure of 8.36 for teams with low information elaboration, and 11.65 for teams with high information elaboration. Likewise, there was no statistically significant difference in convergent creativity between teams with low information elaboration and teams with high information elaboration, $\chi^2 (2) = 0.101$, $P = 0.751$, with mean rank convergent creativity measure of 9.93 for teams with low information elaboration, and 10.81 for teams with high information elaboration. Similarly, the results for the Kruskal-Wallis H test did not indicate statistically significant difference between teams with low perspective taking and teams with high perspective taking on either divergent creativity or convergent creativity (see Table 6):

Table 6

Mean rank measures for teams with low perspective taking and teams with high perspective taking and team creativity

	$\chi^2(2)$	*P*	Mean Rank Perspective Taking	
			Low	High
Divergent Creativity Measure	0.227	0.634	10.96	9.64
Convergent Creativity Measure	0.157	0.692	10.88	9.79

The findings revealed that teams with low information elaboration were not significantly different in the total number of categories present in ideas generated (flexibility: $M = 2.14$, $SD = 1.46$) nor in percentage of unique ideas generated (originality: $M = .0023$, $SD = .0028$) than teams with high information elaboration ($M = 1.85$, $SD = .1.46$; $M = .0045$, $SD = .0042$). With total number of ideas generated (fluency), there is a marginally significant difference, $P = 0.092$, between teams with low information elaboration ($N_{low} = 7$, $M = 8.14$, $SD = 2.55$) and in teams with high information elaboration ($N_{high} = 13$, $M = 10.15$, $SD = 2.23$). Figure 2 illustrates this finding. With the three measures combined into the single divergent creativity measure, there is no statistical significance ($P = 0.234$) in the results between teams with low information elaboration ($M = 3.43$, $SD = .85$) and teams with high information elaboration ($M = 4.00$, $SD = .92$).
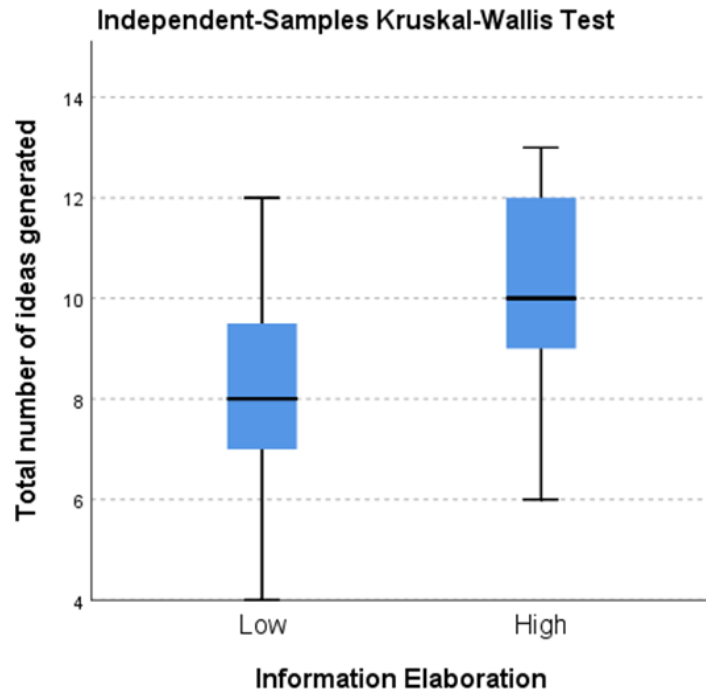
Figure 2: Kruskal-Wallis test for total number of ideas generated (fluency) for teams with low and high information elaboration

There was no statistically significant difference between teams with low perspective taking ($N = 13$) and teams with high perspective taking ($N = 7$) on team creativity (see Table 7 for M and SD scores). Interestingly, there were outliers present in the tests for divergent creativity and teams with low and high information elaboration, and divergent creativity and teams with low and high perspective taking. Analyses run excluding the outliers did not result in a change in significance.

Table 7

M and SD for teams with low perspective taking and teams with high perspective taking

	Perspective Taking			
	M		*SD*	
	Low	High	Low	High
Fluency	9.62	9.14	2.47	2.67
Flexibility	1.85	2.14	1.63	1.07
Originality	.0045	.0023	.0042	.0028
Divergent Creativity	3.82	3.76	.910	1.013
Build on Ideas	2.54	2.29	.776	.756
Idea Combination	.221	.249	.206	.137
Convergent Creativity	1.38	1.27	.386	.389

The analyses run to test the association between information elaboration and team creativity, and perspective taking and team creativity, did not provide a statistically significant indication of the relationship. However, a nonparametric kernel regression conducted indicated a significant relationship between information elaboration and originality ($P = 0.032$), with a 0.3% positive impact, and a marginally significant relationship between perspective taking and originality ($P = 0.088$), with a 0.4% negative impact of perspective taking on originality.

4.2 DISCUSSION

This study attempts to highlight the importance of information elaboration and perspective taking to overall team creativity by measuring the interaction roles they play in drawing on and integrating multiple perspectives in a team environment. To generate team creativity, team members need to engage in building on and combining one another's ideas (Harvey, 2013), which are both considered essential for creativity (Osborn, 1953; Hargadon & Sutton, 1997; Kohn, et al., 2011). However, contrary to the hypotheses predictions, the results in this study fail to find significant evidence of a role for either information elaboration or perspective taking in team creativity.

Process losses in teams created by representational gaps may undermine team creativity and team effectiveness (Cronin & Weingart, 2007), and this study attempted to review the roles of information elaboration and perspective taking processes that may help to close or bridge representational gaps, while preserving the functional team diversity and enabling the integration of perspectives. Using information elaboration and perspective taking, this research sought to understand how people alter their existing representations to accommodate new information (knowledge). While some research (van Knippenberg, *et al*., 2004) has proposed that information elaboration is a core process underlying the effects of diversity on group performance, other studies (Wang *et* al., 2013) have suggested that representational gaps may reduce or block information elaboration, which is considered a cornerstone of team functioning. Prior to team interaction, individual members of functionally diverse teams do not possess all relevant information and need to exchange and elaborate on information in order to understand the task at hand (Homan, *et al*., 2007). The notion of representational gaps may explain why some teams are unable to capitalize on the disparate knowledge of a diverse team (Cronin & Weingart, 2005). My study proffered that functionally diverse teams are dependent on information elaboration for team creativity, and that perspective taking (for example team members engaging in asking for clarification, or interviewing one another to understand goals, constraints or challenges) may improve teamwork, and thus help with team creativity. It is important to emphasize that from the findings, this study could not conclude much on the effect of information elaboration and perspective taking on team creativity.

4.3 LIMITATIONS

The study design did not have enough power to detect an effect based on the number of observations collected. Future research with a larger sample size may facilitate more observable

conclusions as increased numbers in sample size will boost the statistical power and effect size, and therefore help in analyzing these interaction processes and their effects on team functioning. The Harvey (2013) study had an almost similar overall number of participants as was used in this study. However, that study was comprised of equal sized teams (3-person team) across the board which resulted in a larger sample size to work with. In my study, the differing team sizes within the small sample size may have limited observable findings. Additionally, my research cannot speak to the effects of the differing team sizes on divergent creativity and convergent creativity. The teams in my study had varying numbers of participants per team, and the effects of different number of participants per team on fluency, flexibility, originality, as well as building on and combining of ideas cannot be assessed. A subsequent study of the hypotheses might be to use the same team size as was done by Harvey (2013). Another limitation of this study is that although creativity is generally viewed as occurring in behavioral episodes which unfold over time (Ford, 1996), the organizational behavior simulation that was conducted and from which data was used for this research, studied the team members' participation during a series of brief time intervals, conducted over approximately 60 to 90 minutes per workshop. It may be that, were the individuals to have an opportunity for freedom and growth over a longer period, this may provide a more optimal environment within which the teams could work and the effects of the interaction processes on team creativity intensify. An additional limitation is that as representations are personal and tied to individual identity, the simulated representational gap may not necessarily mirror disagreements across representational gaps that are likely to take on the interpersonal individuality that may occur organically. Finally, informational/ functional diversity of the teams was not measured, but inferred for the purposes of this study. This provided for the assumption that the less visible, but job relevant attributes needed to foster the

exchange and elaboration of information and thus problem solve (Homan, *et al*., 2007) were adequately represented in each team. A more comprehensive research design may provide the needed deliberate specifications for informational/ functional diverse teams rather than the assumed informational/ functional diversity of the team that was a default to the function of the actual attendees in this study. Also, where a researcher may wish to explore the impact of social diversity, participants could be made aware of this intent and outcome measures clearly linked to the demographic variables.

4.4 CONCLUSION

The purpose of this study was to measure the interaction processes of information elaboration and perspective taking which may facilitate high levels of interdependencies between team members. Information elaboration may be viewed as a cornerstone of effective team functioning (Wang, *et al*., 2016), and perspective taking may be considered a crucial mechanism to alleviate knowledge barriers that may hinder team functioning (Snell & Dean, 1992; Parker & Axtell, 2001; Hoever, *et al*., 2012). While my study sought to demonstrate information elaboration and perspective taking as relevant variables in the team creative process, the findings did not conclude the predictions of the hypotheses. Although the analysis from this study did not provide statistically significant results, there is evidence of an association between information elaboration and team creativity, between perspective taking and team creativity, as well as associations based on the possible differences in team composition (low or high) on team creativity.

This study provided the first opportunity to examine information elaboration and perspective taking processes in a team setting using an organizational behavior simulation that was facilitated by Lego® Serious Play™ (LSP). The simulation data collected presented an

avenue with which to examine these processes that may provide the means by which representational gaps can be bridged. In addition, the presence of correlations from the analysis provide an opportunity for interesting practical implications, particularly for enhancing LSP in teamwork settings. The team members' interaction with the LSP process demonstrated that teams can collectively perform to the extent of generating new and unique ideas, and building on and combining ideas to provide solutions. The LSP process may be used in work environments as a team building tool to encourage team members to take advantage of opportunities to share, ask questions for clarification, teach, and/ or learn from each other through interaction. Although it was not the main objective of this study, the use of the LSP process may provide the basis of future studies that may include examining how LSP may influence processes that enhance the ability for participants to collectively collaborate in a team to improve performance. Such a research agenda could use participants who are employed in specific, functionally diverse disciplines such that actual patterns of interaction that occur within teams in the practice field could be more closely observed and explored.

This study sought to examine the effect of interaction processes of information elaboration and perspective taking within team members to team creativity. Some of the data (e.g. categories) was dictated by the terms of the pre-defined conditions, and this study cannot speak to the effect of this, if any, on team creativity. Future research may consider data that would allow for coding of categories based on reviewing ideas and grouping them based on common themes rather than the use of categories that are directly stated. Additionally, although there was available audio and video data, it was not possible to code the data for divergent and convergent processes which may have provided insight into the teams' creative processes (Harvey, 2013). Future research may consider more comprehensive methods of configuring the

workshops in order to capture concise audio and video data that could be coded in order to

evaluate divergent and convergent processes, and how these would be reflected in the teams'

creative output (Harvey, 2013).

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APPENDIX A: PRE-DEFINED PROBLEM CONDITIONS FOR ORGANIZATIONAL BEHAVIOR SIMULATION

Doing Social Good

Problem: You have been given a team to work with, and must ensure that all members of the team understand the importance of facilitating a *flexible* and *highly adaptive* consultation event that will **gain community support** for a social campaign by being as *accessible and inclusive* as possible.

Context: You work for a non-governmental organization (NGO) in Lethbridge, Alberta called the Local Action Network (LAN). In a few weeks, LAN in collaboration with their local business partner, B-Good Corp., will be holding a consultation event to gather community feedback and support for a new social campaign that the two will launch together next year. **The last time LAN hosted a consultation event with a business partner it didn't go so well. The team responsible for running the event was too rigid and structured in their approach to consultation, and so some community members felt that they were excluded or unable to participate.** It is imperative that this time the consultation event goes well because the **success of their new social campaign**, and thus LAN's reputation, **relies on support from the local community**.

Task: Using the LEGO® Kits, build a model that you can use to explain to your team, how to execute a *flexible* and *highly adaptive* event that is also *accessible and inclusive*.

Doing Social Good

Problem: You have been given a team to work with, and must ensure that all members of the team understand the importance of facilitating a **structured and meticulously planned** consultation event that will **gain community support** for a social campaign by being as *accessible and inclusive* as possible.

Context: You work for a non-governmental organization (NGO) in Lethbridge, Alberta called the Local Action Network (LAN). In a few weeks, LAN in collaboration with their local business partner, B-Good Corp., will be holding a consultation event to gather community feedback and support for a new social campaign that the two will launch together next year. **The last time LAN hosted a consultation event with a business partner it didn't go so well. The team responsible for running the event was too flexible and accommodating in their approach to consultation, and so some community members felt that they were excluded or unable to participate**. It is imperative that this time the consultation event goes well because the **success of their new social campaign**, and thus LAN's reputation, **relies on support from the local community**.

Task: Using the LEGO® Kits, build a model that you can use to explain to your team, how to execute a structured and meticulously planned event that is also *accessible and inclusive.*

Doing Social Good

Problem: You have been given a team to work with, and must ensure that all members of the team understand the importance of facilitating a *flexible* and *highly adaptive* consultation event that will <u>gain community support</u> by reaching the *'right people'* amongst community influences and donors.

Context: You work for a <u>local business</u> in Lethbridge, Alberta called B-Good Corp. In a few weeks, B-Good Corp., in collaboration with their NGO partner, Local Action Network (LAN), will be holding a consultation event to gather community feedback and support for a new social campaign that the two will launch together next year. <u>The last time B-Good Corp. hosted a consultation event with an NGO partner it didn't go so well. The team responsible for running the event was too rigid and structured in their approach to consultation, and so important community members felt excluded or unable to participate.</u> It is imperative that this time the consultation event goes well because the <u>success of their new social campaign</u>, and thus B-Good Corp.'s reputation, <u>relies on support from key influencers and donors in the community.</u>

Task: Using the LEGO® Kits, build a model that you can use to explain to your team, how to execute a *flexible* and *highly adaptive* event that consults the *'right people.'*

Doing Social Good

Problem: You have been given a team to work with, and must ensure that all members of the team understand the importance of delivering a <u>structured and highly ordered</u> consultation event that will <u>gain community support</u> by reaching the *'right people'* amongst community influences and donors.

Context: You work for a <u>local business</u> in Lethbridge, Alberta called B-Good Corp. In a few weeks, B-Good Corp., in collaboration with their NGO partner, Local Action Network (LAN), will be holding a consultation event to gather community feedback and support for a new social campaign that the two will launch together next year. <u>The last time B-Good Corp. hosted a consultation event with an NGO partner it didn't go so well. The team responsible for running the event was too flexible and accommodating in their approach to consultation, and so important community members felt excluded or unable to participate.</u> It is imperative that this time the consultation event goes well because the <u>success of their new social campaign</u>, and thus B-Good Corp.'s reputation, <u>relies on support from key influencers and donors in the community.</u>

Task: Using the LEGO® Kits, build a model that you can use to explain to your team, how to execute a <u>structured and highly ordered</u> event that consults the *'right people.'*

Putting on the best event

Problem: You have been given a team to work with, and must ensure that all members of the team understand the importance of focusing on delivering a *structured and meticulously planned event*.

Context: You work for AggriGate, an agricultural tech start up firm. In a few weeks, AggriGate will be holding a major event to showcase the company's new product. The last product launch event didn't go so well because the previous team responsible for the launch was <u>too flexible in their approach, thus too accommodating of last minute requests, and too disorganized to manage the resulting unforeseen circumstances.</u> As a major product launch event, with key investors present, it is imperative that all team members agree to the best approach to ensure the *event* goes smoothly.

Task: Using the LEGO® Kits, build a model that you can use to <u>explain to your team</u> the importance of executing a *structured and meticulously planned event*.

Putting on the best event

Problem: You have been given a team to work with, and must ensure that all members of the team understand the importance of focusing on delivering a *flexible and highly adaptive event*.

Context: You work for AggriGate, an agricultural tech start up firm. In a few weeks, AggriGate will be holding a major event to showcase the company's new product. The last product launch event didn't go so well because the previous team responsible for the launch was <u>too structured in their approach, thus not accommodating of last minute requests, and too rigid to manage the resulting unforeseen circumstances.</u> As a major product launch event, with key investors present, it is imperative that all team members agree to the best approach to ensure the *event* goes smoothly.

Task: Using the LEGO® Kits, build a model that you can use to <u>explain to your team</u> the importance of executing a *flexible and highly adaptive event*.

APPENDIX B: FOUR-ITEM SCALE FOR INFORMATION ELABORATION

		Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
124.	Participants in this workshop complemented each other by openly sharing their knowledge.	1	2	3	4	5	6	7
125.	Participants in this workshop carefully considered all perspectives in an effort to generate optimal solutions.	1	2	3	4	5	6	7
126.	Participants in this workshop carefully considered the unique information provided by each individual team member.	1	2	3	4	5	6	7
127.	During this workshop, together participants generated ideas and solutions that were much better than those we would have developed as individuals.	1	2	3	4	5	6	7

APPENDIX C: FOUR-ITEM SCALE FOR PERSPECTIVE TAKING

		Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
120.	I tried to think about things from other participants' point of view.	1	2	3	4	5	6	7
121.	I often looked at the challenges we faced in the workshop from the different viewpoints offered by other participants.	1	2	3	4	5	6	7
122.	I felt I was good at putting myself in others' shoes.	1	2	3	4	5	6	7
123.	During the group discussions, I tried to take the perspectives of the other people in the workshop.	1	2	3	4	5	6	7

APPENDIX D: SAMPLE OF A COMPLETED MODEL WITH IDENTIFIED AND NUMBERED BUILD UNITS THAT REPRESENT NUMBER OF IDEAS GENERATED
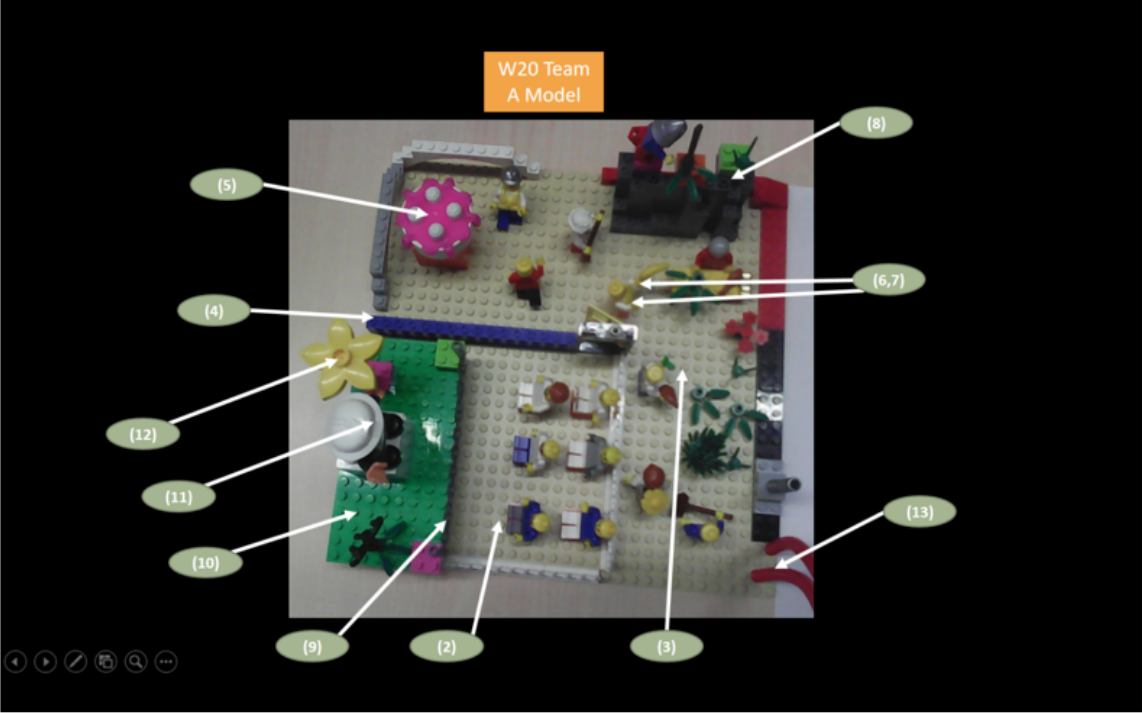
APPENDIX E: THREE-POINT SCALE TO MEASURE BUILDING ON IDEAS

Score	Description
1	A score of '1' was given when there was no/ minimal elaboration regarding the ideas (build units) generated and/ or categories (themes) in the ideas generated during the team explanation of the model
2	A score of '2' was given when there was general elaboration regarding the ideas (build units) generated and/ or categories (themes) in the ideas generated during the team explanation of the model
3	A score of '3' was given when there was high/ detailed elaboration regarding the ideas (build units) generated and/ or categories (themes) in the ideas generated during the team explanation of the model