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The Development of the Creative Synergy Scale

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THE DEVELOPMENT OF THE CREATIVE SYNERGY SCALE

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Abstract

This study developed a scale for teams to assess their behaviors related to creative synergy. Creative synergy is the interactions among team members where the collective creative results are greater than the sum of their individual efforts. When a team achieves creative synergy they have the potential to solve difficult problems with innovative solutions leading to positive impacts on our communities, societies, and even our world. This study looked at the internal-process variables of teams to determine what factors impact creative synergy. The research process involved two phases. In Phase 1, a survey was taken by 830 adults who were members of teams. The results were analyzed using exploratory and confirmatory factor analysis. A new scale was created that identified three factors teams need for creative synergy: team purpose, team dynamics, and team creative process. In Phase 2, the new scale was tested with three work teams to determine the perceived accuracy of the scale. The new Creative Synergy Scale will be a valuable tool for teams wanting to be more creative together. It will give them feedback on their level of team purpose, team dynamics, and team creative process. This dissertation is accompanied by two supplemental files: a video of the author's introduction (MP4) and a correlation table showing the original 75 items considered for the Creative Synergy Scale (PDF). This dissertation is available in open-access at OhioLink ETD Center, etd.ohiolink.edu and AURA: Antioch University Repository and Archive, http://aura.antioch.edu/

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List of Supplemental Files

All files are available as stand-alone supplemental files.

File Name	Type	File Size	Length
Climer2016_Dissertation_Intro	MP4	238 MB	2:20
Video providing an overview of the dissertation			
Climer2016_Correlation_Table	PDF	504 KB	
Correlation table showing the original 75 items considered for the Creative Synergy Scale			

Chapter I: Introduction

In our globalized, entangled, modern society, most significant projects, plans, and goals are often too large and complex for an individual to approach alone. Therefore, teams have become the quintessential unit of high performance (Katzenbach & Smith, 1999). Teams allow multiple perspectives, skills, and expertise to come together and meld brainpower to achieve more successful performance. Consequently, teams are a primary source of creativity and innovation in organizations (Kelley, 2001; Paulus & Nijstad, 2003; Sawyer, 2007; Tu, 2009).

There are many definitions for the word team, but Katzenbach and Smith (1999) present a rather aspirational one, "a team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable" (p. 45). Teams working at this level have the ability to produce highly creative results that can positively impact their organization, community, or even the world. Teams have an incredible ability to solve huge, complex problems, but only if team members can actually work well together. In the last 20 years, the research on creativity and teams has increased significantly, leading to a greater understanding of the nuances involved in creative teams. The research is unwavering that creative teams are not the "simple sum of individual creative skills" (Bissola & Imperatori, 2011, p. 77). Rather, teams have incredible creative potential *if* the group dynamics and team processes are high functioning (Bissola & Imperatori, 2011; Hülsheger, Anderson, & Salgado, 2009). The purpose of my dissertation is to conduct analysis of the most important components of successful teams leading to a scale for teams to use as a tool to assess their level of creative synergy.

Defining Creativity and Innovation

Researchers have explored the definition of creativity for decades (Amabile, 1996; Baregheh, Rowley, & Sambrook, 2009; Kampylis & Valtanen, 2010; Plucker, Beghetto, & Dow, 2004; Runco & Jaeger, 2012; Smith, 2005; Vissers & Dankbaar, 2002). Defining creativity has involved looking at the creative process, the creative product, the creative person, and the creative environment (sometimes referred to as "press" in order to maintain four "P" words) (Amabile, 1996; Kaufman, 2009; Rhodes, 1961). The issue is that creativity can be all of these.

To look closer at the definition of creativity Plucker and his colleagues (2004) examined 90 research studies about creativity between 1996 and 2002. Sixty-six percent of the articles lacked an explicit definition of creativity sometimes making it difficult to determine the researcher's theoretical stance. They surmised that many researchers may not have defined creativity because it is difficult to define or because they assumed the reader would know the definition. They explained that the lack of a clear definition of creativity perpetuates myths about creativity and can make it difficult to write curriculum, conduct research, and they proposed a new definition in an attempt to alleviate this conundrum. They attempted to incorporate the four Ps within the definition. "Creativity is the interaction among *aptitude, process, and environment* by which an individual or group produces a *perceptible product* that is both *novel and useful* defined with a social context" (Plucker et al., 2004, p. 90). More simply creativity can be defined as novelty that is useful. This research study uses the Plucker et al. (2004) definition. This definition, and others similar to it, are common within the research literature and represent a current consensus within the field of creativity research.

Creativity and innovation are often discussed together and therefore is it important to also define the word innovation. Similar to Plucker et al. (2004), Baregheh et al. (2009) analyzed 60

definitions of innovation found in the literature from 1934 to 2008. Definitions varied so extensively across industries they stated, “there is no clear and authoritative definition of innovation” (Baregheh et al., 2009, p. 1324). Through their analysis they developed a comprehensive definition they felt could span research, business, and other industries. Their definition of innovation is “the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace” (p. 1334). This is very similar to creativity, but with a focus on organizations instead of an individual or team and the added element of financial impact (i.e., marketplace). To simplify, innovation could be defined as creativity with economic gain (Green, 2013), which would explain why innovation seems to used more often in the business and engineering fields, whereas creativity is the term used more in the humanities, arts, and education.

Introduction to the Problem

Creativity is widely valued across industries as essential to continuous performance and growth (Anderson, Potočnik, & Zhou, 2014; Kelley, 2001). Creativity leads organizations to high levels of success and helps them solve complex problems. Teams are a valuable way to approach these complex problems because of the collective creativity that can emerge through the group creative process (Paulus & Nijstad, 2003). However, creativity in teams brings a number of challenges and questions. Because human behavior can be diverse and complex, without consideration and awareness it could inhibit creativity (Milliken, Bartel, & Kurtzberg, 2003; West, 1990).

This complexity is, in part, explained by the systems theory of creativity developed by Csikszentmihalyi (1996), one of the leading researchers on creativity. He states, “creativity does

not happen inside people's heads, but in the interaction between a person's thoughts and a sociocultural context. It is a systemic rather than an individual phenomenon" (p. 23). In the research that led to his book *Creativity*, Csikszentmihalyi studied nearly 100 highly creative individuals to learn more about the trends and commonalities of highly creative people. The research participants included winners of Nobel prizes and other top awards in their respective fields. They were people who had significantly impacted the arts, sciences, and humanities around the world. During the extensive interviews, many participants deflected their success to that of their team and their colleagues. They recounted the importance of others in their creative process. Later one of Csikszentmihalyi's former students published *Group Genius: The Creative Power of Collaboration* (Sawyer, 2007). Sawyer explores the power of creativity in teams and the factors that foster and diminish creativity in groups. When the variables that foster creativity exist in a team at just the right level, the team achieves creative synergy. Creative synergy is defined as the interactions among team members where the collective creative results are greater than the sum of their individual efforts. Through an extensive literature review I have concluded that three components are needed for creative synergy with a team: (a) team dynamics, (b) creative team process, and (c) team purpose. These three components are briefly explained below and are examined in more depth in Chapter II.

Creative Synergy

Three components of creative synergy are explained in this section.

Team dynamics. The research on creative teams can be divided into three categories of input, process, and output based on the model initially presented by Hackman (1987) (see Figure 1.1).

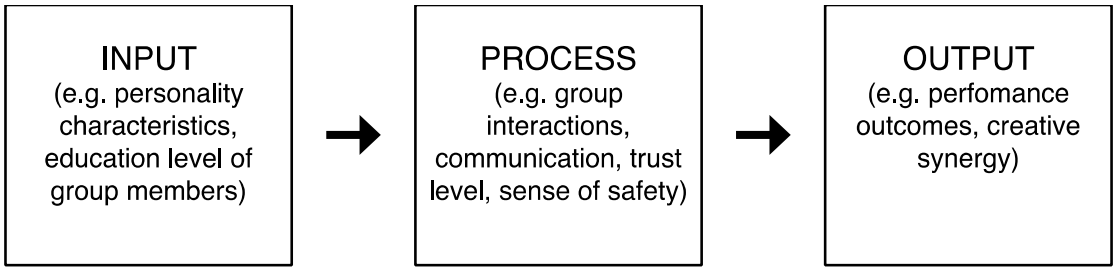


Figure 1.1. Input, process, and output categories. Adapted with permission from "The Design of Work Teams," by J. R. Hackman, 1987, *Handbook of Organizational Behavior*, p. 315.

Input variables are factors that are determined before a group gets together. This may include personality characteristics, past experience, and diversity of the team. Process variables, on the other hand, include variables that occur once the group begins interacting, such as communication, trust among the group, team climate, and sense of safety within the team (Hülsheger et al., 2009). A meta-analysis of numerous studies revealed that the process variables have the greatest effect on creativity, meaning the process in which teams engaged and their relationships with each other are more important than specific traits, skills, or backgrounds (the inputs) they bring to the group (Hülsheger et al., 2009; Taggar, 2002). For creativity, the most notable process categories were trust, conflict, collaboration, team climate, and shared sense of purpose. Overall, moderation was key. For instance, too much collaboration led to complacency, whereas too little meant team members were just working side-by-side engaged in "parallel play" (Badke-Schuab, Goldschmidt, & Meijer, 2010). Too much conflict and a decision would not be made or no idea would be acted upon. However, too little conflict led to groupthink, where a group strives for harmony over critical thinking (Chen, 2006; Kratzer, Leenders, & van Engelen, 2006; Farh, Lee, & Farh, 2010). Groupthink has been the blamed for many well-known disasters including the 1961 Bay of Pigs invasion, referred to as one of the "worst blunders ever committed by an American administration" (Whyte, 1998, p.199) and the space shuttle

Challenger explosion, one of the worst accidents in space travel history (Whyte, 1998). Lack of conflict is one of many reasons for groupthink.

In sum, these process variables can also be called team dynamics and are a significant factor to team creativity (Hirst, van Dick, & van Knippenberg, 2009; Hülsheger et al., 2009; Nemeth, Personnaz, Personnaz, & Goncolo, 2004; Taggar, 2002). If teams can improve their team dynamics they can become more creative and innovative together.

Team creative process. The second component of creative synergy is team creative process. There are numerous creative processes that have been developed over the years, but most follow some variation of problem-finding, problem-solving or solution-finding, and solution-implementation (Basadur, 1994; Basadur, Gelade, & Basadur, 2014; Lubart, 2001). Most creative processes are deliberate processes based on our natural problem solving tendencies and were designed by researching and understanding creative cognition (Ward, Smith, & Finke, 1999).

Even though creativity is a natural process, we may inadvertently deviate or not follow each stage when attempting to be creative. Understanding the process can help us realize where we get stuck, what is missing from our own creative experiences, and how to deliberatively be creative. The creativity research has advanced enough that we now realize there are several mental processes needed for creativity and most people prefer certain processes over others (Basadur et al., 2014; DeCusatis, 2008). In the last decade, two assessment tools have emerged to analyze individuals' preferences for each of the stages of the creative process. They are the FourSight Thinking Profile (Puccio, Miller, Thurber, & Schoen, 2014) and the Creative Problem Solving Profile (Basadur et al., 2014). They both help individuals and teams understand how the creative process might be used to expand their creativity.

These tools are valuable to help teams understand each member's preference and gain insight into the team's profile. Both a limitation and strength of FourSight and the Creative Problem Solving Profile (CSPS) is that they assess preference, not ability or behavior. Understanding preference may help explain our behaviors, but these scales do not specifically measure behaviors. They do provide an opportunity for participants to understand how they can develop other strengths or work with colleagues with complimentary preferences. A complement to these tools would be an assessment that measures team behaviors related to creative process. This will be one component of the scale I create through this study.

Team purpose. In addition to team dynamics and team creative process, team purpose is the third critical component for teams to achieve creative synergy. To anyone who has studied teams, this will not be a surprise. A clear sense of purpose has been shown to be critical to the success of any team, whether striving to be creative or not (e.g,. Katzenbach & Smith, 1999; Kouzes & Posner, 1995; Larson & LaFasto, 1989). Additionally, several researchers have found that team purpose is one of the most significant indicators of a team's creativity (Hülsheger et al., 2009; Pearce & Ensley, 2004; Pinto & Prescott, 1987; West, 2003). While a team may be assigned a specific purpose, team members work together to further develop and identify with that purpose, therefore it is a critical internal-process variable for a team's creative synergy.

Team dynamics, team creative process, and team purpose are all significant contributors to creative synergy. For teams striving to become more creative, an assessment tool measuring these components of creative synergy would be valuable for their success. When focusing on improvement, it can be helpful to have a baseline measure of the starting point and be able to assess the changes periodically over time. This study will develop a team scale to measure the

team's level of creative synergy. A team can periodically use the scale to assess their growth or change. The next section explains in more depth the research gaps related to creative synergy.

Problem Statement

Creativity is often assessed by judging outcomes and the final product (Kaufman, Plucker, & Baer, 2008). However, Brannick and Prince (1997) offer an alternative approach and point out, "team process measures may give us a truer picture of team functioning than do outcome measures. Unlike outcome measures, team process measures may shed light on problems encountered by the team and the means to fix them" (p. 10). In order for teams to become highly creative they need to have a strong understanding of where they are and where they need to go. There are two significant gaps in research that, if addressed, could help teams with this problem.

The first gap is in understanding what is needed for teams to achieve creative synergy. In the many workshops and presentations I have led on creativity, I have learned there is a lot of confusion about the topic of creativity; about what it means, what is required for it, and how to enhance it (Plucker et al., 2004; Sawyer, 2012). Additionally, the research on creativity in teams in the last few years has advanced significantly and we now know that more is not always better when it comes to trust, communication, and conflict, all important elements of team creativity. This study will begin to identify the optimal levels for each of those team dynamics and incorporate that into a useful scale for teams.

The second gap is in understanding the behaviors related to the creative process. Some studies suggest that we may have preferences for certain stages of the creative process (Basadur et al., 2014; Puccio et al., 2014). This means some people prefer problem-finding, others problem-solving, and still others solution implementation. This new scale will provide feedback on behaviors related to the creative process. Preferences are not the same as behaviors. For

instance, a team may have a member who has a strong preference in problem-finding, but because of the team dynamics or other reasons the team spends almost no time in this stage. This new scale will provide valuable feedback to the team and help them recognize areas of potential growth.

Purpose of Study

The purpose of the study was to design an instrument to assess a team's level of creative synergy. However, the scale will not focus on a team's output, but rather their process. In this case their process refers to their behaviors and observable interactions with each other, particularly their team dynamics, team purpose, and team creative process. Team process variables have a significant impact on a team's creative output (Hülsheger et al., 2009; Taggar, 2002). Creative output is notoriously difficult to judge (Kaufman et al., 2008) so measuring creative process can be a useful tool to predict output (Hülsheger et al., 2009). A team will be able to use the scale to assess their process at any point to determine which areas they are strongest in and which areas they need to improve in order to maximize their team's creative potential. The scale involves three components. The first will assess the team dynamics needed for creative success within a team: trust and participative safety, communication, and creative abrasion, which are similar to conflict and are further explained in Chapter II (Driver, 2001; Hirshberg, 1998; Hülsheger et al., 2009). The second will assess the team's sense of purpose. The third component will assess behaviors related to the four stages of the Creative Problem Solving process: clarify, ideate, develop, and implement.

Statement of Research Questions

This study addressed the following research questions:

1. What factors emerge from exploratory and confirmatory factor analysis with items designed to measure team-level behaviors related to creative synergy in teams?
2. What is the relationship between the ten proposed creative synergy concepts and the factors resulting from the factor analyses?
3. What correlations exist between the factors that emerge from the factor analyses?
4. Do team results of the scale align with the teams' perceptions of themselves?

Nature of Study

The study was conducted in two stages using a sequential, mixed methods design.

- Stage One: This stage involved designing and delivering the initial survey. The survey was sent to over 1500 potential participants with the hope of getting at least 300 participants to complete it, as needed for statistical analysis. After quantitative analysis the survey was edited and narrowed down into a scale, discarding items that are not needed.
- Stage Two: The new scale was delivered to three intact work teams. The full team results were compiled then presented to the team either in person or via a video call. Feedback was solicited from them about the accuracy of the results in order to test internal reliability. Essentially, do they believe the results were an accurate representation of their team?

Study participants were adult members of intact work teams. The survey was sent electronically requesting their voluntary participation. They were asked to forward the survey to others who may be eligible and willing to participate. Specific criteria for participation and more details about the methods are covered in Chapter III.

Significance of This Study

This study is important because the scale can be used to provide valuable feedback for teams striving to be more creative. This scale could provide concrete, actionable feedback to help teams understand how their behavior is supporting or impeding their attempts at creativity. A team's ability to learn together has a significant impact on their performance (Robinson & Rose, 2007) and their ability to innovate (Yoon, Song, Lim, & Joo, 2010). This scale will provide an opportunity for teams to learn together about their behaviors.

Because creativity is about forming something new, teams striving to be creative are, by nature, change agents. Change agents can also be referred to as leaders. As Sinclair (2007) states, "good leaders are those who reflect upon themselves as individuals, honestly and insightfully" (p. 128). Reflection is a significant part of learning (Dewey, 1938) and crucial for teams striving to learn together. Assessment tools, such as the one being developed in this study, provide an opportunity for teams to gather unique data about themselves, reflect on their behavior, and decide what they want to change. This assessment can also push teams "to understand themselves and their world at a qualitatively higher level of mental complexity" (Kegan & Lahey, 2009, p. 25).

My goal with this study was to design a scale that can be used by teams to self-assess their behaviors related to creative synergy. My premise is that the feedback and reflection resulting from a scale such as this one leads to a greater understanding of who we are (Luft, 1982). Understanding ourselves helps us develop our capacities and become stronger leaders and better change agents (Sinclair, 2007).

Researcher Background

My professional career has involved working with hundreds of teams in a variety of contexts. My work has ranged from outdoor education, college student affairs, and organization development with small businesses and large organizations. I currently own a consulting practice called Climer Consulting where I work with teams to help them become more creative and successful.

My experiences have impacted my understanding of teams. For example, I have seen individuals come together to form incredibly strong, resilient, and creative teams. I have also seen how individual team members can have either a positive or negative impact on the team's ability to be creative or effective in any way. I strongly believe in the value of creativity and collaboration, and in our human potential to be more creative. Over the years I have asked myself, "What makes some teams more creative than others? Why can some teams succeed with implementing new ideas, but others can only talk and complain or cannot even come up with the ideas in the first place? How does creativity training and professional development impact individuals and teams?" These questions led to more inquiry about creativity, which led to getting trained as a facilitator in the Creative Problem Solving process and becoming certified to deliver the FourSight Thinking Profile. In my consulting practice I use these tools to increase teams' effectiveness and develop a culture of creativity and collaboration within organizations. These experiences helped shape this body of work. This study will inform my own consulting practice and provide a useful tool for other consultants, trainers, and team leaders to lead their teams to higher levels of creativity and success.

Assumptions and Limitations

Several assumptions about the nature of creativity and teams were behind the theoretical basis for this study. First, humans have an innate ability to be creative (Guilford, 1950; Wheatley, 2001) and many of us are not tapping into that potential. A better understanding of creativity, the creative process, and our team dynamics can help teams become more innovative. The second assumption is that creativity is valuable and important. Third, collaboration in teams can help solve complex problems and many of today's problems are complex.

The scale was designed to be valid and reliable for intact adult teams in any sector who are striving to be creative together. Two criteria exist for application: the group must be a team striving to work together and they must want to be creative. The scale will not apply to other circumstances.

Creating the scale involved sending the survey to over 1,500 people requesting their participation. All participation was voluntary. Through a variety of approaches (described in Chapter III), efforts were made to solicit a diverse population of participants. The results will only be generalizable to a population similar to those who participated. If a certain population was not represented or represented in too small a number then the results will not be generalizable to that group, including race, gender, or professional sector. The other limitation is related to who volunteered or rather who did not volunteer to participate. The external validity of the results is limited based on the survey responses.

The scale development provides a useful tool for teams to better understand themselves. Yet, I view this study as a beginning. It is unclear what the impact of using the scale will be on teams. That is beyond the scope of this study, yet could be one of many valuable follow up studies.

Definitions of Key Terms

Clarify (part of CPS)—narrowing in on the specific goal, wish, or challenge that will be explored. This includes gathering data and determining the questions or challenge statement that will invite solutions.

Collaboration—"mutually beneficial relationship between two or more individuals, groups, or organizations who jointly design ways to work together to meet their related interests and who learn with and from each other, sharing responsibility, authority, and accountability for achieving results" (Schwarz, 2006).

Communication—"the act or process of using words, sounds, signs, or behaviors to express or exchange information or to express your ideas, thoughts, feelings, etc., to someone else" (Communication, 2015).

Creative abrasion—"Creative abrasion is a process in which potential solutions are created, explored, and modified through debate and discourse" (Hill, Brandeau, Truelove, & Lineback, 2014, p. 138). It is characterized by a moderate level of task conflict and low levels of relationship conflict. This is the ideal level of conflict in a creative team.

Creative Problem Solving (CPS)—"a comprehensive cognitive and affective system built on our natural creative processes that deliberately ignites creative thinking and, as a result, generates creative solutions and change" (Puccio, Mance, & Murdock, 2011). It was originally developed by Alex Osborn in the 1950s and has since been researched and further refined. There are currently two models of CPS used: The Learners Model and the Thinking Skills Model. This study uses the Learner's Model, which has four stages: clarify, ideate, develop, and implement (Miller, Vehar, Firestien,Thurber, & Nielsen, 2011).

Creative synergy—the interactions among team members where the collective creative results are greater than the sum of their individual efforts. In a team, creative synergy is achieved through positive team dynamics, team creative process, and team purpose. Creative synergy is typically achieved in high-performing teams.

Creativity—"Creativity is the interaction among *aptitude, process, and environment* by which an individual or group produces a *perceptible product* that is both *novel and useful* defined with a social context" [emphasis in original] (Plucker et al., 2004, p. 90).

Develop (part of CPS)—the process of selecting and further refining the few ideas that will lead to promising solutions.

Ideate (part of CPS)—the process of generating ideas to solve the challenge.

Implement (part of CPS)—Identifying resources needed, actions to be taken, and how to overcome hurdles related to implementing the best idea(s).

Innovation —"the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace" (Baregheh et al., 2009, p. 1334).

Internal-process variables—These are factors internal to a team that are absent until the team forms. They are developed throughout the team's tenure based on their interactions with each other.

Participative safety—"a single psychological construct in which the contingencies are such that involvement in decision-making is motivated and reinforced while occurring in an environment which is perceived as interpersonally non-threatening" (West, 1990, p. 311). In other words, team members feel emotionally safe to share their ideas, perceptions, and opinions.

*Relationship conflict —"*interpersonal incompatibilities among group members, which typically includes tension, animosity, and annoyance among members within a group" (Jehn, 1995, p. 258); also called affective conflict.

Task Conflict —"disagreements among group members about the content of the tasks being performed, including differences in viewpoints, ideas, and opinions" (Jehn, 1995, p. 258); also called cognitive conflict.

Team—"a small number of people working with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable" (Katzenbach & Smith, 1999, p. 45).

Team Creative Process— the team's use of the tools, techniques, and strategies of a creative process, whether that is specifically Creative Problem Solving or another similar process. This includes the use of divergent and convergent thinking, tapping into the creative preferences of team members, and motivation and autonomy to be creative.

*Team Dynamics—*the behavior and interactions within a team and the relationships between the team members. The three factors of team dynamics that are most significant to creative synergy in teams are: creative abrasion, participative safety and trust, and communication.

*Team Purpose—*the team's collective focus, their shared goals, and the team's commitment to reaching the goals.

Working Group—"a group for which there is no significant incremental performance need or opportunity that would require it to become a team. The members interact primarily to share information, best practices, or perspectives and to make decisions to help each individual perform within his or her area of responsibility. Beyond that, there is no realistic or truly desired

“small group” common purpose, incremental performance goals, or joint work-products that call for either a team approach or mutual accountability” (Katzenbach & Smith, 1999, p. 91).

Outline of Chapters

Chapter II explores the context for the study by examining relevant literatures and research. These include team development, creativity and creative process in teams, and similar scales assessing creativity and teams. The purpose of Chapter III is to provide an overview of the research methodologies and study design. Details of scale creation, participant selection, and data gathering will be shared. Chapter IV provides detailed analysis of the data and the results of each stage in the sequential study. Chapter V builds on Chapter IV by providing insights into future considerations, particularly for practitioners and implications for future research. This includes how teams could use the survey to gain more understanding of their own behavior and creative processes.

Chapter II: A Review of the Literature

Creativity is critical to the success of many businesses, non-profits, schools, and other organizations (Sawyer, 2012). Fortunately, humans have incredible potential for innovation (Florida, 2012). Teams can tap into this potential when they have a better sense of how their behaviors support or inhibit creativity and then adjust accordingly. This study proposes a new tool to assess a team's creative synergy providing them valuable data to enhance their performance. The purpose of this chapter is to outline the theoretical underpinnings of this research study. I will explain the creative process as a way to further explain creativity, explore why creative collaboration is important and how it can be enhanced, examine elements needed for creative synergy, and finally compare other similar creativity assessment tools for teams differentiating the proposed scale from what already exists.

The Creative Process

To further understand creativity, it is helpful to understand the creative process. Creativity models help us organize our thoughts and communication around creativity and better understand the related theories. Most creativity processes and theories are based on researching the natural processes of highly creative people and learning from their approach (Sawyer, 2012). What do they need to be creative? What steps do they take to solve a creative challenge? How do they come up with ideas? How do they determine which idea will work? Artists, scientists, inventors, writers, musicians, and actors have all been studied extensively (Bennis & Biederman, 1997; Csikszentmihalyi, 1996; Sawyer & DeZutter, 2009; Sutton & Hargadon, 1996). Over the years many researchers have made more deliberate those implicit steps creative people use. The value in understanding the creative process is that it helps us identify where we get stuck or which steps we skip and where we need to spend more time. Being more methodical in our

approach to creative challenges may seem unusual, but it is actually what many inventive, creative people do (Geschka, 1993; Gruber & Wallace, 1999; Sternberg, 2010). Creativity is not based on a blinding flash of insight, but on hard work (Gruber & Wallace, 1999; Sawyer, 2012).

Despite differences among creative process models, they all seem to have two things in common. First, they follow a general approach of problem-finding, problem-solving, and solution implementation (Basadur, 1994). Second, they each use divergent and convergent thinking (Basadur, 1994; Puccio, Firestien, Coyle, & Masucci, 2006). Divergent thinking involves generating as many ideas as possible (Puccio et al., 2011). Some ideas will work, some will not, but the purpose is to focus on quantity (Csikzsentmihalyi, 1999). Brainstorming is an example of a divergent thinking tool. Once many ideas and options are laid out there is a need to narrow down to focus on one or a few ideas. This process may involve evaluating or combining ideas and is called convergent thinking (Puccio et al., 2011).

Many of the seminal creativity models describing the creative process originated in the 1950s and 1960s and have been further developed, expanded, and researched since then (Sawyer, 2012). The models all have overlapping components and similarities. Some combine steps while others go in more depth breaking out each aspect. Among others, these have included TRIZ developed by Altshuller and colleagues (Barry, Dombs, & Slocom, n.d.; Mann, 2001), Synectics (Gordon, 1961), and Creative Problem Solving (Osborn, 1963). Yet, nearly 90 years ago Wallas (1926) proposed the first creativity process model that outlined four natural stages of creativity. The model has been modified over time and now includes a fifth stage and is simply referred to as the Stages of Creativity (Csikszentmihalyi, 1996). Below I will further explain these creativity models and also explain why Creative Problem Solving was the primary model used in this study.

Wallas and Csikszentmihalyi stages of creativity. The most commonly referenced creative process is a four-step process outlined by Wallas (1926). Csikszentmihalyi (1996) later added the fifth step. These are often referred to as simply the stages of creativity. They are as follows:

1. Preparation. This is the initial research and thinking that is needed to truly understand the problem or situation for which one is seeking a creative solution.
2. Incubation. After the initial research, data gathering, and thinking it is helpful to let the problem simmer in the back of one's brain. This allows the subconscious to create connections and to foster new ways of thinking about the problem.
3. Inspiration/Insight. This stage is sometimes referred to as the light bulb or the "ah-ha" moment. It is that moment when an idea pops into our head. This often happens when we are not doing anything related to solving the problem such as when showering, driving, or just waking up or falling asleep. When the brain is engaged in a routinized activity that does not take up much brain power we seem to be able to generate ideas, at least if we have completed steps one and two of the creative process.
4. Evaluation**.** For every idea that arises, it must be evaluated to determine if it is any good. Is it useful? Will it solve the proposed problem? Do we have the technology and resources to implement it? It is generally most helpful to do this after a number of ideas have been presented, rather than at the same time as generating ideas.
5. Elaboration**.** The final step to the creative process is actually implementing the idea. The action step is, for most people, the hardest part and usually takes the longest. During elaboration additional problems may arise requiring more creative solutions, challenges to completing the task may come up, and motivation may wane. "Genius

is 1% inspiration and 99% perspiration." This popular quote has been attributed to both Albert Einstein and Thomas Edison and many highly creative people have been known to say similar things, expressing the difficulties with the elaboration phase. Depending on the challenge, steps one through four could happen very quickly, even within seconds or minutes, although for many problems it takes months or years. While the steps are listed above in a neat chronological order the reality is often much messier. It may be necessary to move back and forth between steps repeating parts of the process before the final product is complete.

The benefit of this model is that it does separate out the Incubation stage highlighting the importance of stepping away from the problem and letting our mind mull over ideas subconsciously. This has been shown to be a crucial component to producing new ideas (Nickerson, 1999), although it is an area that needs more research. The weakness of this model is that it does not expand much in the Implementation stage. Also, the Insight stage might convey an oversimplification of developing ideas. Ideas do not always come in a flash of insight, but can slowly evolve over time (Sawyer, 2012).

TRIZ. TRIZ (Teoriya Resheniya Izobreatatelskikh Zadatch) is a Russian acronym for Theory of Inventive Problem Solving and was developed from 1946 to 1985 by Altshuller and his colleagues in the former U.S.S.R. (Barry et al., n.d.; Mann, 2001)

> TRIZ is an international science of creativity that relies on the study of the patterns of problems and solutions, not on the spontaneous and intuitive creativity of individuals or groups. More than three million patents have been analyzed to discover the patterns that predict breakthrough solutions to problems. (Barry et al., n.d., p. 1)

TRIZ is slightly different from the other creativity models because it emphasizes logic, data, and reasoning over intuition. The premise is that there is someone who has figured out a solution to a similar challenge, the solution is to find out what they did and apply it to your

context. Figure 2.1 shows the TRIZ model of taking the specific challenge, generalizing it to learn from others, and reapplying their approach to the original challenge. After analyzing over 20,000 inventions Altshuller concluded that all challenges are based on resolving contradictions (Mann, 2001). He narrowed his results to 39 common principles that are used to solve all challenges. These principles are referred to as thinking tools (Belski, 2009).

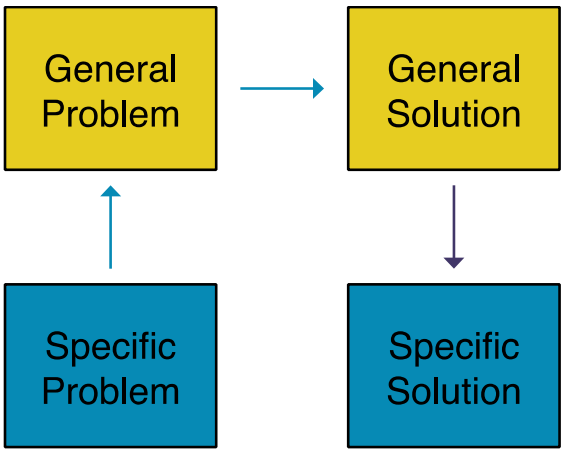


Figure 2.1. TRIZ model (Barry, Domb, & Slocum, n.d.). Reprinted with permission.

Due to its focus on functionality, TRIZ is probably most useful in engineering, science, and design domains. TRIZ is an incredibly robust process that has helped tackle significant problems in companies such as Michelin and Rolls-Royce (Birdi, Leach, & Magadley, 2012; Knott, 2001). It is probably not as useful in an artistic context such as when an artist is trying to solve a problem within their painting or figuring out the best way to visually communicate their ideas. Other creative models would be more useful in those cases. Perhaps the biggest limitation of TRIZ is that it takes considerable time and investment to fully learn to use the entire process and set of tools (Mann, 2001). It tends to be a more technical method. Fortunately, using smaller components or tools can still be helpful. For instance, Birdi et al. (2012) reports that when

engineers attended a one-day TRIZ training they demonstrated an improvement in creative problem solving skills, idea generation, motivation, and to some extent idea implementation. This was evident through self-reported impact surveys immediately after the training and up to 33 months later, along with patent-analysis, and examples of when TRIZ was used. One employee reported on a new patent designed after the TRIZ training that saved the company 193 million dollars. (This was later confirmed by a company contact.) While this was significant, participants who attended the training did not show an overall increase in idea implementation compared to those who did not attend. The researchers speculated this was because very little time was spent in the training on the implementation process. I suspect this is a common issue with creativity trainings.

Synectics. Based on research started in 1944, William J. J. Gordon and George M. Prince designed Synectics. It evolved "to uncover the psychological mechanisms basic to creative activity" (Gordon, 1961, p. 6). To determine the best way to develop creative ideas they tape-recorded meetings and analyzed results. Then, they tested these ideas by designing trainings to see how effective they were. American companies were the primary group studied and their process involved selecting personnel, training them in Synectics, and integrating them back into the client environment. Then they examined the impact the Synectics training had on increasing creativity on the problems trying to be solved.

Participating in the original Synectics training required being chosen from a highly stringent process (Gordon, 1961). Men (and it was all men most likely because that was the standard in the 1950s) participated in interviews that lasted up to 10 hours long and examined demeanor, personality, educational background, along with coordination, willingness to take initiative, emotional maturity, and metaphoric capacity. In additional to a typical interview,

candidates also were taken on a walk in the woods and to a cookout that involved a campfire. The candidate arrived when the campfire was being built and the group intentionally did not have enough kindling. They examined how the candidate responded—did they offer to help, observe what was needed to be done and go do it, or just sit and watch (Gordon, 1961). Certainly there was cultural bias in place here, but perhaps that was not a common awareness at the time.

If selected, participants then began an intensive training process to learn Synectics. The first stage involved a one-week training where the five to seven men lived together in a house. This period of communal living was an intentional way to help the men get to know each other and understand each other's strengths (Gordon, 1961). This was followed by 12 months of weekly training. This was definitely a comprehensive, or at least time consuming, creativity training program.

The main foundation for Synectics is in the power of metaphor (Gordon & Poze, 1971). There are numerous exercises and tools designed to help the creator make connections between seemingly unrelated items, often pulling inspiration from nature. For instance, perhaps the anteater or elephant was inspiration for the vacuum. Incubation is also strongly encouraged to allow the brain a break and for your mind to focus on other things that could perhaps lead to inspiration. Synectics has nine phases for putting the process into practice. They are:

1. Problem as Given
2. Making the Strange Familiar
3. Problem as Understood
4. Operational Mechanisms
5. The Familiar Made Strange

6. Psychological States
7. States Integrated with Problem
8. Viewpoint
9. Solution or Target Research (Gordon, 1961, pp. 156–158)

Gordon (1961) does state at the end of the book, “Some of the concepts described in this book may become obsolete. As I said in the first chapter, this book is a report of research in progress” (p. 158). Unfortunately, after 1961 Gordon did not publish much more about creativity research, presumably because he was too busy inventing. One of the weaknesses of Synectics is that there is little published on it, at least in an academic context (Nolan, 2003). This has made it difficult to access, research, and disseminate information about Synectics.

Another problem is that Gordon and Prince took a proprietary approach in how they shared and disseminated the information about Synectics (Nolan, 2003). They trademarked the term, gave their company the same name, and then struggled to ensure that everything produced under the term Synectics was presented to their standards. According to Nolan, they later realized that this was a mistake. In fact, they have been unsuccessful in keeping the trademark as the word is often used to refer to any general creativity and is the name of other companies, including a staffing firm who owns the website synectics.com (and appears to be unrelated to the original Synectics company).

Creative Problem Solving. While all these models are valuable, the Creative Problem Solving (CPS) model (Osborn, 1963) is significant. It is one of the most rese arched and has gone through several iterations in the last seven decades (Ma, 2006; Puccio et al., 2006; Scott, Leritz, & Mumford, 2004; Torrance, 1972). It is also one of the more general models applying to a wide range of creative situations. The purpose of CPS is to detail the process we naturally go

through when solving a creative challenge. The process was first identified by Alex Osborn in the 1950s. Osborn was part of B.B.D.O., one of the top marketing firms of the time (the "O" is for Osborn). Osborn was intrigued by creativity and in 1953 published *Applied Imagination* popularizing the CPS process. The following year Osborn paired up with Sid Parnes, a professor at Buffalo State College, to create a method for researching CPS and educating others about using CPS (Parnes & Noller, 1972). The process started with seven stages and has been refined over time. The current version has four stages (see Figure 2.2) (Miller et al., 2011; Puccio, 2002; Thurber & Nielsen, 2013). These stages are:

1. Clarify. Clarifying is about narrowing in on the specific goal, wish, or challenge that will be explored. This includes gathering data and determining the questions that will invite solutions.
2. Ideate. Generating ideas to solve the challenge.
3. Develop. Selecting and further refining the few ideas that may lead to promising solutions.
4. Implement. Identifying resources needed, actions to be taken, and how to overcome hurdles related to implementing the best idea(s).

Figure 2.2 The Creative Problem Solving model (Thurber & Nielsen, 2013). Reprinted with permission.

Unlike Synectics, one unique aspect of CPS is it is an open source process free for anyone to use, change, research, or teach. Each year the Creative Education Foundation hosts the Creative Problem Solving Institute (CPSI). This conference brings in 800–1000 people to learn and share about CPS. They offer facilitator training, but do not maintain the stringent controls on when/how the process is taught that some other organizations require with their product. Osborn and Parnes, the founders of CPS and CPSI, wanted the process and the associated tools to be used freely, to help increase creativity as much as possible.

Perhaps because of this openness, CPS has been the subject of numerous research studies. The first meta-analysis on creativity training examined the impact of creativity training on children by comparing 142 studies (Torrance, 1972). CPS was the most common method and had a 91% success rate (20 out of 22 studies showed positive impact). More recently, other meta-analyses found CPS to be effective with children, adults (Ma, 2006; Scott et al., 2004), and in business contexts (Puccio et al., 2006).

The CPS model is particularly valuable for teams because it allows for a thoughtful, intentional process leading to more creativity. One challenge teams have when they do not understand the creative process is that they can rush through or skip certain stages and then wonder why the project was not successful (Grivas & Puccio, 2012). CPS gives a useful structure along with tools and techniques to guide teams through the creative process.

The CPS model was used as the basis for the team creative process of the scale for three reasons:

1. It is well-researched and has shown to be successful in a range of contexts.
2. It is an open-source model and available for research.
3. It has been simplified over the years and is easy to understand, even for someone new to understanding creativity.

Influences on Creativity

In addition to understanding the definition of creativity and the creative process, it is important to note additional factors that influence creativity. A brief historical context will help explain the current thinking around creativity.

Nineteen fifty was a significant year in the history of creativity research. J.P. Guilford delivered an influential speech at the American Psychological Association (APA) annual meeting. As president of APA, Guilford urged psychologists to study creativity (Guilford, 1950). He focused his speech on the concept of creativity as a continuous trait we all possess. Guilford's focus led to traits-based studies for the next few decades (Kurtzberg & Amabile, 2001). Then, in the 1980s, another approach emerged that provided a deeper understanding of creativity (Sawyer, 2012). Amabile (1983) presented a sociocultural lens of creativity revealing that creative traits are not the most important aspects of creativity.

Amabile's seminal work described that even within the individual it is not just creative traits that lead to creativity. Amabile (1983, 1996, 2013) presented a model explaining three components individuals need in order to be creative: (a) motivation, (b) domain-relevant expertise, and (c) creative thinking skills (see Figure 2.3). In general, motivation from within leads to more creative ideas than extrinsic, reward-based motivation (Amabile, 1983; Bennis & Biederman, 1997; Kohn, 1999; Pink, 2009). Additionally, you need technical, procedural, and intellectual knowledge in the area you want to be creative in. For instance, to design a creative building you need some expertise in architecture. This does not preclude cross-fertilization between fields and in fact, creativity can be enhanced when you bring together people with different skills such as an architect, an engineer, and an artist (Amabile, 2013; Jehn, Northcraft, & Neale, 1999). The third factor needed for creativity is creative thinking skills. These can be developed and built over time (Baer & Kaufman, 2005; Clapham, 1997; Epstein, Schmidt, & Warfel, 2008; Glover, 1980; Mansfield, Busse, & Krepelka, 1978; Scott et al., 2004).

Figure 2.3. The Three Components of Creativity. Reprinted by permission of Harvard Business Review. Exhibit/image *The Three Components of Creativity.* From "How to Kill Creativity," by Amabile, issue September-October 1998. Copyright © 1998 by the Harvard Business School Publishing Corporation; all rights reserved.

Amabile's research shifted the field of creativity to consider other factors beyond just inherent traits or talents. Later, creativity researcher Csikszentmihalyi (1996) published influential research rejecting the idea that people are the sole influences on their own creativity and creative contributions. His systems model approach identified several factors at work. In 1999, Csikszentmihalyi stated,

> When I started studying creativity over 30 years ago, like most psychologists I was convinced that it consisted of a purely intrapsychic process. I assumed that one could understand creativity with reference to the thought process, emotions and motivations of individuals who produced novelty. But each year the task became more frustrating. (p. 313)

Csikszentmihalyi's research involved in-depth interviews of over 100 highly creative individuals to learn more about the trends and commonalities of creative people. The research participants included winners of Nobel prizes and other top awards in their respective fields. They were people who had significantly impacted the arts, sciences, and humanities around the

world. What Csikszentmihalyi revealed is that creativity is impacted not only by the individual, but also the domain and field one is operating within. The domain refers to “a set of symbolic rules and procedures” (Csikszentmihalyi, 1996, p. 27). Examples of domains are physics, mathematics and psychology, or even more narrowly positive psychology or cognitive psychology.

The field includes all the individuals who are operating within the domain, the gatekeepers of the domain. In psychology these include researchers, practitioners, academic journal editors, and government agencies funding and supporting psychology. They decide what should be researched, studied, and applied to the domain (Csikszentmihalyi, 1996).

The individual person is the third piece of the creative system. When they develop new ideas it is up to the field to determine if the new ideas will be incorporated into the domain. If the ideas are accepted, the next generation will see the ideas as part of the domain and build upon them (Csikszentmihalyi, 1996). If no one responded to Picasso’s artwork he would not have been viewed as creative because he would not have changed the domain of art.

These three components of creativity—the domain, the field, and the individual—are like a three-legged stool and are essential for new ideas to be implemented (Figure 2.4). Without one piece of the system the whole stool would collapse. This has important implications for managers and leaders of teams. If effort is made to help teams become more creative, it will be a waste of time if the organization is not open to new ideas and perspectives (Csikszentmihalyi, 1996).

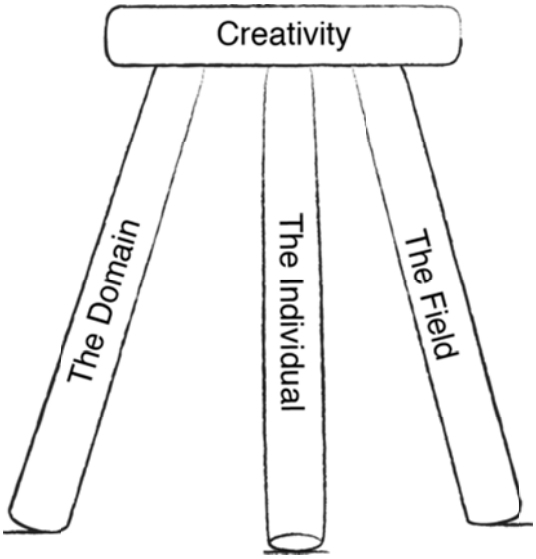


Figure 2.4. Components of creativity: The domain, the field, and the individual (derived from theories from Csikszentmihalyi, 1996).

This research by Csikszentmihalyi was incorporated into the domain of creativity research and significantly influenced the field. In the last two decades there has been an increase in the research related to creative teams, creative organizations, and the factors that influence creativity beyond the individual's experience, talents, or skills. In mainstream U.S. culture we have fostered an individualistic image of the brilliant hermit tinkering in his lab or the pensive artist quietly producing masterpieces (Bennis & Biederman, 1997). In reality this is rarely the case. In many cases a team is involved in the creative process. The lead person may be the one who gets credit, but often a team does the work. Neither Einstein nor Edison worked alone, but instead had teams helping them with all the variables and complexities of their research (Bennis & Biederman, 1997; Sawyer, 2007). Even those who do work alone are influenced heavily by their interactions with others (Csikszentmihalyi, 1996).

Teams

Around the same time as Amabile's and Csikszentmihalyi's work was published, the business world was shifting to a more team-based approach to work (Campion, Medsker, &

Higgs, 1993; Katzenbach & Smith, 1999). Teams play a significant role in organizational creativity (Paulus & Nijstad, 2003). Their ability for creative synergy leads to innovation and can positively impact desired results, whether financial, societal, educational, or otherwise. Before examining the many elements impacting team creativity, it is important to first understand teams in general. As mentioned in Chapter I, teams are defined as "a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable" (Katzenbach & Smith, 1999, p. 45). In essence, the main purpose of a team is to get something done—to do something, change something, or influence something. The success of a team is based on the results; therefore, they must always attend to those results (Larson & LaFasto, 1989; Lencioni, 2002). However, there are many factors that influence a team's success. First, let's examine the inner-workings of low-performing and high-performing teams.

Low-performing teams. A common misnomer with teams is that "team character or its typical dynamics are formulated by accumulating the individual traits and values of each team member" (Donnellon, 1996, p. 25). However, it is not that simple. Teams are impacted by numerous variables that interact and intersect in infinite ways.

Low-performing teams can be characterized by a number of issues. They may have low levels of trust with each other or avoid engaging in the necessary conflict around ideas or goals (Garmston & Wellman, 2009; Lencioni, 2002); they might not have shared goals that align them to a common purpose (Johnson & Johnson, 2009; Larson & LaFasto, 1989); or they may be rewarded individually and have little to no incentive to act as a real team (Kohn, 1999; Pink, 2009). Low-performing teams can also be called potential teams because they can move to a

higher level of performance if they are willing to do the work to get there (Katzenbach & Smith, 1999).

Sometimes, low-performing teams are not actually teams, but are working groups. A working group is defined as

> a group for which there is no significant incremental performance need or opportunity that would require it to become a team. The members interact primarily to share information, best practices, or perspectives and to make decisions to help each individual perform within his or her area of responsibility. Beyond that, there is no realistic or truly desired "small group" common purpose, incremental performance goals, or joint work-products that call for either a team approach or mutual accountability. (Katzenbach & Smith, 1999, p. 91)

Working groups are often mistakenly referred to as teams, yet because they are not striving for a common, shared goal, they do not need to act as a team. While they still need to interact with each other and support each other, the same type of accountability found in a team is not present. Differentiating between a working group and team helps clarify the group's purpose, which in turn will positively impact performance (Katzenbach & Smith, 1999).

High-performing teams. Katzenbach and Smith (1999) build on their definition of a team when describing a high-performing team and add "members who are also deeply committed to one another's personal growth and success" (p. 92). They push each other, support each other, and have engaging discussions that resolve real problems. They transcend expectations and outperform other similar teams (Katzenbach & Smith, 1999). High-performing teams are ones who are performing at their peak. Many teams never achieve this level of proficiency because becoming a high-performing team is not easy. It requires discipline, courage, and paying attention to the inner-workings of the group (Garmston & Wellman, 2009; Katzenbach & Smith, 1999). In essence, it is hard work, but the rewards can be tremendous in both personal satisfaction and performance output. High-performing teams are characterized by

clear alignment around a common purpose, comfort with disagreeing with each other for the purpose of achieving better results, trust among group members, and high levels of accountability to each other. All teams should strive to become high-performing because the team's goal is impacted by their performance (Garmston & Wellman, 2009; Johnson & Johnson, 2009; Katzenbach & Smith, 1999; Lencioni, 2002).

What Influences a Team's Success

There are hundreds of volumes written on what impacts a team's success ranging from comprehensive research books with multiple editions updated every few years (e.g., Johnson & Johnson, 2009) to short popular bookstore reads telling stories about fictional successful teams in order to teach readers the essential ingredients (e.g., Lencioni, 2002). Sorting through the massive amounts of information can be daunting. It would not be possible to cover all aspects of what is needed for a successful team in this one chapter. Instead, I will narrow the approach to look at the elements of high-performing creative teams.

Variables impacting team creativity. As teams have become more important in business, there has been a surge of research in the last 15 years focusing on creative collaboration. The results show that creativity can be collectively increased by working with others (Amabile, 1996, 1998; Csikszentmihalyi, 1996; Paulus & Nijstad, 2003; Sawyer, 2007) and "teamwork is a major source of innovation in organizations" (Paulus & Nijstad, 2003, p. 8). However, groups can also stymie creativity (Paulus & Nijstad, 2003; Wong, Tjosvold, & Liu, 2009). As shown above, not all groups are teams and just calling the group a team does not mean the results will be better. There are a number of variables that impact a team's level of creativity. The variables can be divided into four categories. Two intersecting pairs of variables form the four categories (see Figure 2.5). These two pairs of variables: input-process and internal-external can intersect to

create the four categories of variables impacting team creativity. These are further explained below.

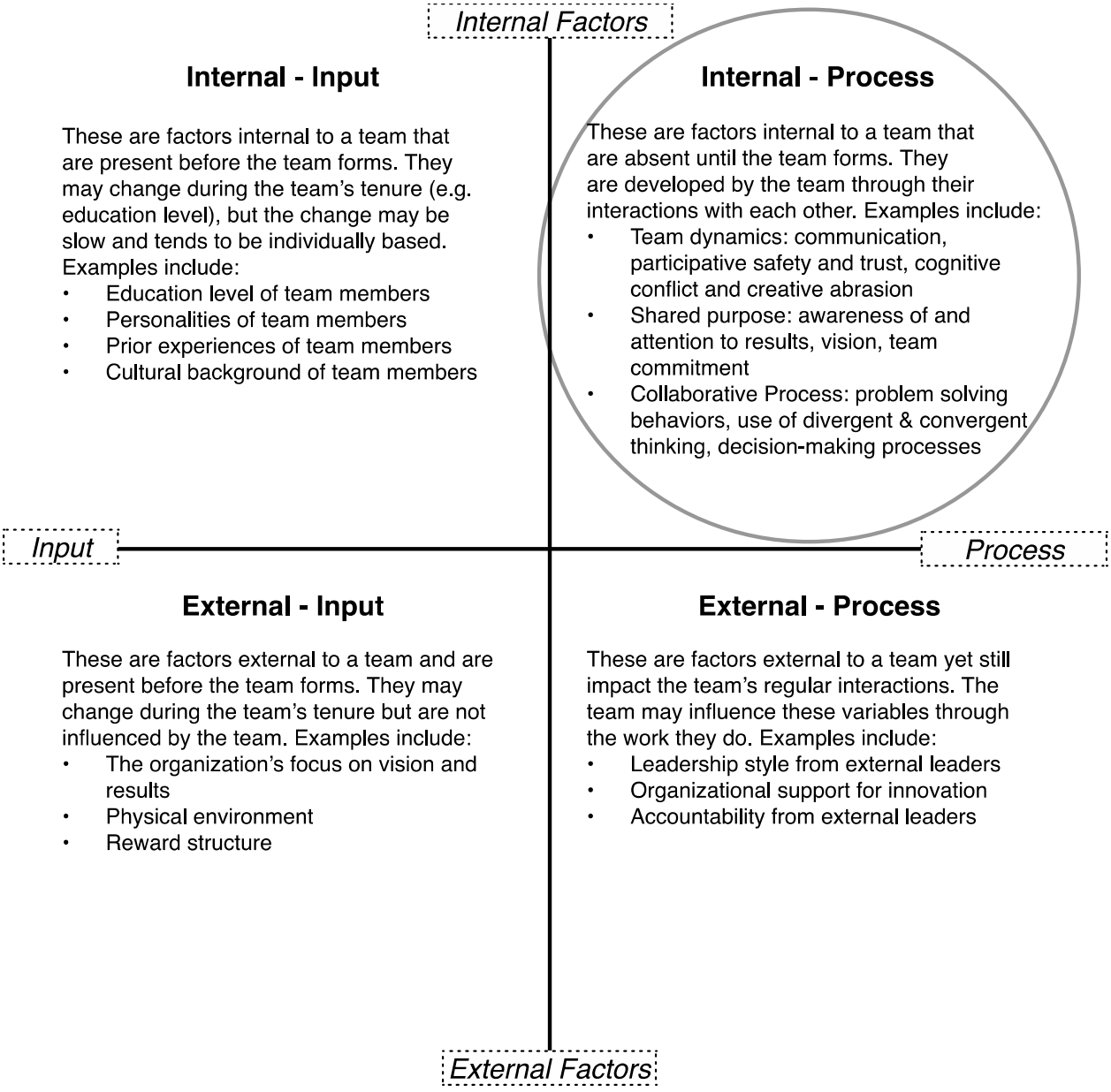


Figure 2.5. Variables impacting team creativity.

Internal and external variables of team creativity. The first pair of variables consists of internal and external variables. Teams are impacted by factors internal to or within the team

and factors external to the team. External factors are ones that leaders and others outside of the team can impact. People external to the team may include managers, customers, clients, and executives and their behaviors impact the team. These external variables include leadership, the organization's support for creativity, the organization's culture, and the physical environment. These external influences can be in place regardless or irrespective of the team. Team members do not create the external variables. The variables are separate from the team, yet still impact the team. Internal variables are factors created by the team members. These include the process the team uses to approach a creative problem, personalities of team members, and team dynamics. Internal factors are present because of the team members. They are variables the team members can influence and control within the team. For instance, a team member's personality is an internal factor because she is part of the team and within the team. Team members' trust in each other is an internal variable. However, the organization's culture, for example, will exist separate from the team. It will impact the team, but it is not part of the team, therefore it is an external variable.

Input and process variables of team creativity. In addition to the internal and external variables, another pair of variables can impact a team's creativity. These are input variables and process variables as mentioned in Chapter I (Hackman, 1987; Hülsheger et al., 2009). Input variables are aspects of the team that are determined before the team interacts with each other such as education level, individual personalities, or team size. Whereas, process variables are based on the team's interactions both within the team and interactions with others outside the team, such as with leaders and peers.

When these two sets of variables intersect they create four categories of variables: internal-process, external-process, internal-input, and external-input. The research will focus exclusively on the internal-process category as explained next.

Internal-process variables of team creativity. The internal-process variables could also be called team dynamics. They include levels of trust, communication, and conflict, for instance. In creative teams, the team dynamics have more impact on a team's creativity than input variables (Driver, 2001; Hülsheger et al., 2009). This is good news because input variables tend to be more static, whereas process variables can change. In some cases, individuals may be selected for a team because of an input variable such as personality or area of expertise, but many times teams are based on someone's role in an organization or asking people to volunteer. There may be little to no opportunity to select based on personality or input variables. If input variables are relatively fixed, yet process variables are more dynamic, then influencing process variables such as trust among team members or level of conflict within a team can help a team create together. The focus on this research will be on the internal-process variables, as circled in Figure 2.5 There are two reasons to focus on these variables. First, these are the variables that teams have the most control and influence over. A team may not be able to change their environment or their leader's style or abilities, but they can influence their own internal dynamics and use that to increase their creativity. Second, these variables are also the ones that can have the greatest impact on creativity (Hülsheger et al., 2009). If a team has the drive to be more creative, they can collectively decide to focus on the internal-process variables that can improve their creativity.

Creative synergy in teams. When working together, teams need to focus on a number of internal-process variables in order to achieve creative synergy. Creative synergy is defined as the

interactions among team members where the collective creative results are greater than the sum of their individual efforts. Within the internal-process variables, I propose there are three categories of variables most important for creative synergy. Based on the research literature these are team dynamics, team creative process, and team purpose.

Team dynamics is defined as the behavior and interactions within a team and the relationships between the team members. Team creative process is defined as the team's use of the tools, techniques, and strategies of a creative process, whether that is specifically CPS or another similar process. This includes the use of divergent and convergent thinking, tapping into the creative preferences of team members, and motivation and autonomy to be creative. Team purpose is defined the team's collective focus, their shared goals, and the team's commitment to reaching the goals. These definitions will be expanded upon in the following sections.

Through this research study, I designed an assessment tool to help teams determine their level of creative synergy, essentially how they rate on each of the internal-process variables needed for creativity, team creative process, and team purpose. In the following sections I will define and explain in more depth the value and importance of each of these categories to achieving creative synergy.

Team Purpose

The reason for a team's existence is to collectively work together towards a specific purpose. For a sports team that may be to win games, for a software design team that may be to design educational products to teach adults a new language, or for an advocacy team that may be to eliminate homelessness in their city. Purpose may also be referred to as vision, mission, legacy, dream, goal, performance results, or calling (Katzenbach & Smith, 1999; Kouzes & Posner, 1995). Kouzes and Posner (1995) define a vision as "an ideal and unique image of the future"

(p. 95). Teams perform best when they have a shared vision or purpose to work towards (Katzenbach & Smith, 1999; Larson & LaFasto, 1989). Regardless of the specific term used, when teams collectively align around their common purpose they are able to be more collaborative and creative (West, 2003). In 1989, a study of 418 project managers examined the critical factors of success over the life of a project (Pinto & Prescott, 1987). Only one of the ten factors they examined was critical for each stage in the project life cycle. That factor was project mission, also known as team purpose.

Pearce and Ensley (2004) examined shared vision in product and process innovation teams of an automotive plant. They found that when collectively created the shared vision increased innovation as surveyed by managers, team members, and customers. In turn, the innovation successes reinforced the vision. They proposed, “those teams with the clearest vision generate greater levels of innovation and this reinforces the vision” (Pearce & Ensley, 2004, p. 272).

In the same study, shared vision was also found to reinforce positive team dynamics, productive team behavior, and team potency (the shared belief that the team can be successful), thus creating additional self-reinforcing cycles. The impacts of team dynamics on innovation will be further explored in a future section of this chapter.

A meta-analysis of team-level predictors of innovation, found 11 studies researching vision on team innovation (Hülsheger et al., 2009). The results show that vision has a strong and positive relationship with innovation. Two components contribute to the collective vision of a team: shared goals and team commitment.

Shared goals. Creative teams have a unique challenge when it comes to shared goals. On one hand clear, shared goals unite a team, increase commitment, and make it easier to work

together (Amabile & Kramer, 2011; Johnson & Johnson, 2009; Katzenbach & Smith, 1999; Wong et al., 2009). On the other hand, if the goal is too specific or narrow it impedes creative thinking (Hill et al., 2014). Sawyer (2007) points out,

> the key to improvised innovation is managing a paradox: establishing a goal that provides a focus for the team—just enough of one so that team members can tell when they move closer to a solution—but one that's open-ended enough for problem-finding creativity to emerge. (p. 45)

Garmston and Wellman (2009) call it "defining the sandbox" (p. 59). They suggest that teams need to determine who the decision makers are and what role the team will play. Will they be solving the problem themselves or contributing ideas and advice for someone else to use? This designation makes the team more effective and able to focus on their task and not guess what their task is. To increase creativity there needs to be some freedom and autonomy for how the group approaches the challenge and actual solves it (Burpitt & Bigoness, 1997; Larson & LaFasto, 1989). In addition, lack of clear goals has been shown to be an inhibitor to progress and innovation for work teams while clarifying goals is a catalyst to innovation (Amabile & Kramer, 2011; Thamhain & Wilemon, 1987). In sum, clear, shared goals are important for innovation and therefore for creative synergy in teams.

Team commitment. The collective sense of purpose can unite a team and bring about great commitment. Team commitment can be defined as "the relative strength of an individual's identification with and involvement in a particular team" (Costa & Anderson, 2011, p. 127). There are three characteristics of team commitment: (a) strong belief and acceptance of the team's values and goals, (b) desire to work hard on behalf of the team, and (c) a strong desire to remain a team member (Bishop & Dow Scott, 2000). There are many stories of people sacrificing significantly in order to give to a team. For instance, in the book *Creativity, Inc.* co-founder of Pixar Animation Studios Ed Catmull talks about the tremendous commitment team

members exhibited in the creation of the movie *Toy Story 2* (Catmull & Wallace, 2014). At times they worked up to 100 hours/week and sacrificed emotional and physical health to help the team reach the vision of creating a cutting-edge, innovative film. While this level of commitment is extreme and unhealthy (and even Catmull spoke to the dangers of the intensity of the work), it nevertheless demonstrates the impact of the commitment. Team members had a clear sense of purpose, shared goals, and a strong commitment leading to high levels of innovation. *Toy Story 2* was heralded as "one of the only sequels to ever outshine the original" (Catmull & Wallace, 2014, p. 72) and would eventually top $500 million in the box office. Lee Unkrich who worked on the film said, "We had done the impossible. We had done the thing that everyone told us we couldn't do. And we had done it spectacularly well. It was the fuel that has continued to burn in all of us" (Catmull & Wallace, 2014, p. 74).

In a study of the effectiveness of 75 high-performing teams, Larson and LaFasto (1989) interviewed leaders and members of impressive management and project teams across a range of industries. One of the commonalities among successful teams was a unified commitment to the team. The commitment came in the form of team spirit, dedication and loyalty, excitement and enthusiasm, but most of all a strong identification with the team and a willingness to work hard to help the team succeed. They also pointed out the importance in balancing individuality and team commitment. Too much team commitment only leads to groupthink, whereas too little leads to analysis-paralysis as the team attempts to sort out the competing needs (Larson & LaFasto, 1989).

A critical component of commitment is motivation. The number one factor that motivates employees is not rewards, it is not recognition; it is progress towards their goal (Amabile & Kramer, 2011). It doesn't matter if they are striving for a huge creative breakthrough or to

produce typical high-quality work, either way it is the small incremental wins that keep them engaged and motivated (Amabile & Kramer, 2011).

Often lack of commitment to a team is not based on unwillingness or apathy towards the vision, but rather ambiguity (Lencioni, 2002). When team members are unclear about the shared purpose, goals, or specific tasks it is more difficult to be actively committed to the team (Larson & LaFasto, 1989). "Strong goal commitment is necessary to maintain group member persistence for implementation in the face of resistance among other organizational members" (West, 2003, p. 261). Team commitment is correlated with trust and cooperative behaviors (Costa & Anderson, 2011). These and other team dynamics will be examined next.

Team Dynamics

As mentioned earlier, team dynamics are the behaviors and interactions within a team and the relationships between the team members. Team dynamics have a significant impact on a team's creativity. Three specific factors have the greatest impact. These are: conflict levels or creative abrasion between team members, participative safety and trust within a team, and communication between team members. The results of the research on each of these variables have been somewhat inconclusive, but over time each study has provided slightly more clarity. This section will explain the research on these variables and how they impact a team's level of creative synergy.

Conflict and creative abrasion. Conflict may be the most studied internal-process variable in creative teams. In creative teams conflict is welcomed because disagreements can lead to deeper thinking around creative challenges (Amason, Thompson, Hochwarter, & Harrison, 1995; Garmston & Wellman, 2009). However, the type of conflict, how it is managed, and its frequency all impact creative output (De Dreu, 2006; Hülsheger et al., 2009; Jehn, 1995;

Xie, Wang, & Luan, 2014). There are two primary types of conflict of interest here: task conflict and relationship conflict. Task conflict, also called cognitive conflict or team polarity, is described as, “disagreements among group members about the content of the tasks being performed, including differences in viewpoints, ideas, and opinions” (Jehn, 1995, p. 258). Whereas, relationship conflict, also called affective conflict, is defined as “interpersonal incompatibilities among group members, which typically includes tension, animosity, and annoyance among members within a group” (Jehn, 1995, p. 258). In a meta-analysis examining factors that impact team creativity, the results on conflict were not statistically significant (Hülsheger et al., 2009). The trend was in the direction that relationship conflict decreased innovation and task conflict increased innovation, but the correlations were weak. These inconclusive results may be partly explained by the nuance of conflict revealed in a more recent study (Xie et al., 2014). The optimal level of task conflict for innovation seems to be based on an inverted U-curve (see Figure 2.6). Too little conflict leads to complacency and too much conflict prevents the team from resolving the issue. Too much conflict also leads to decreased information exchange, which is valuable for innovation and conflict resolution (De Dreu, 2006). A moderate amount of task conflict leads to higher levels of innovation. In addition, the level of task conflict and innovative output are mediated by collaborative problem solving (De Dreu, 2006). If a group is skillful in their ability to collaboratively solve problems, they are more able to engage in task conflict at a lower to moderate level leading to more innovative outcomes. However, a team that lacks problem solving skills may suffer from too much or too little task conflict leading to decreased innovation.

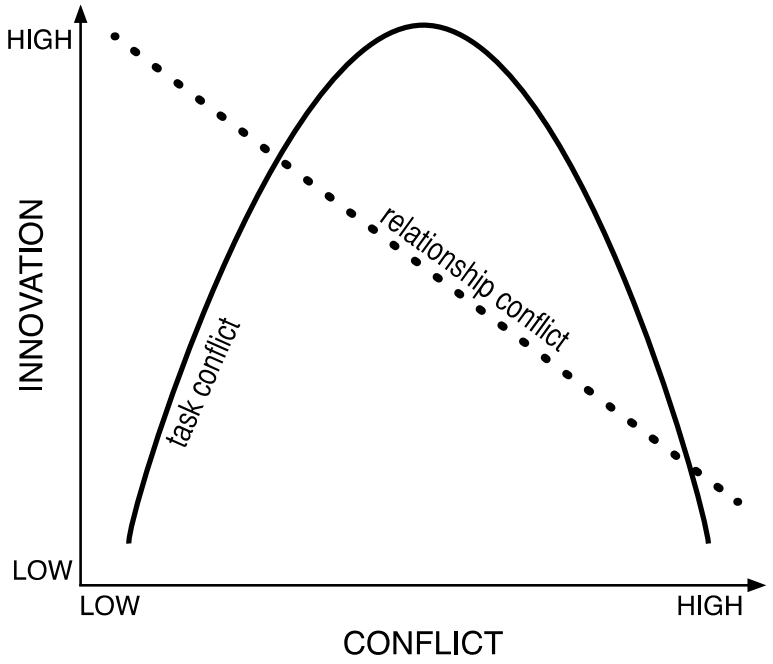


Figure 2.6. Optimal level of task and relationship conflict for innovation.

Jehn (1995) led a comprehensive study that also revealed the particular issues and problems with relationship conflict. Relationship conflict does not improve innovation, nor does it help any aspect of team performance. Surprisingly, it was not negatively correlated with team performance either, but it did lead to decreased "satisfaction, liking, and intent to stay" (Jehn, 1995, p. 270), which in turn results in decreased team commitment. Group norms of avoiding conflict led to decreased relationship conflict and therefore increased group satisfaction. The challenge for groups is to set norms that allow a moderate amount of task conflict, yet minimal amount of relationship conflict. This nuance can be challenging for a group without high levels of collaborative problem solving skills.

In addition to the type of conflict within teams, examining when the conflict happens is relevant. Three studies revealed that task conflict was more valuable in certain stages of the creative process than in other stages (Chen, 2006; Kratzer, Leenders, & van Engelen, 2006; Farh

et al., 2010). The studies examined team polarity (or task conflict) and the situational conditions of when it impacts creativity. The results indicate that a certain degree of team polarity is valuable during the initial conceptualization phases of the team creative process. However, too much conflict is detrimental. Later in the commercialization (implementation) phase conflict is more harmful. This makes sense considering that early in a project phase it is important to generate many different ideas and perspectives leading to task polarity. However, as the project is being implemented and nearing completion task polarity is less beneficial. In some ways, this is consistent with the research Jehn (1995) found on routinized and non-routinized tasks. Task conflict is valuable for non-routine tasks (such as creativity), but not routinized tasks (Jehn, 1995). In the implementation stage the focus is on getting things done and it is not necessary to always debate how to get things done. Sometimes it is just a matter of completing a simple task and engaging in conflict does not help make it more creative.

Another study took the issue of conflict a step further to figure out what response to task conflict leads to the most creative ideas (Badke-Schaub et al., 2010). The three behaviors with the most impact were competing, collaborating, and compromising. Competing is characterized by high assertiveness and low cooperativeness with a focus on one's own concerns above others. Collaborative behavior is highly assertive and highly cooperative with a focus on working "together with other people to find a solution that satisfies the needs of everyone concerned" (Badke-Schaub et al., 2010; p. 122). Compromising involves a medium level of assertiveness and cooperativeness. The solution tends to only partially satisfy each party. While the results of the study were somewhat mixed they found all three of these behaviors were needed in the creative process. They observed that "high rating groups produced more new ideas, associated more but also rejected more ideas" (Badke-Schaub et al., 2010, p. 130). These teams used more

competing and compromising behaviors, whereas the low rating teams tended to collaborate more, falling into groupthink to some degree.

In a later study, researchers examined how individual cognitive styles and different types of group conflict impacted group performance (M. J. Kim, Choi, & Park, 2012). They stated,

> for intuitive individuals, task conflict may serve as a cognitive group context that enhances creativity through stimulating divergent thinking, whereas relationship conflict may serve as an affective group context that distracts from their tasks and restricts the scope of attention. On the contrary, an opposite pattern of interaction may be found for systematic individuals. In a task conflict situation, systematic individuals are more distracted and taxed by increased cognitive load; however they are less susceptible to relationship conflict, being likely to downplay or ignore the conflict issues, and instead channel their efforts to pursue their task goals. (M. J. Kim et al., 2012, p. 1431)

In summary, conflict is complex, particularly in an organizational context (Hülsheger et al., 2009; Jehn, 1995). Creativity benefits from critical thinking and seeing the problem from a variety of perspectives (Bennis & Biederman, 1997). If a team can share a range of viewpoints, including minority dissent, it would reason they would be more creative (De Dreu, 2006).

Disagreeing about ideas pushes people to develop new ideas and improve the existing ones. However, conflict can also be challenging for some individuals because it often means differing on ideas, decisions, or perspectives, essentially things that matter (Patterson, Grenny, McMillan, & Switzler, 2002). Because emotions can run high, team members and leaders need to be aware of its potential negative effects. Understanding the optimal level of conflict is important for teams so they can best manage their level of task and relationship conflict, improve their collaborative problem solving skills, and increase their level of knowledge transfer therefore leading to higher levels of creativity. Moderate level of task conflict and low levels of relationship conflict is ideal for teams striving to be creative. This balance will be referred to as creative abrasion.

Creative abrasion was first coined by Jerry Hirshberg of Nissan Design International (1998) and has since been used by other researchers and writers to describe the ideal conflict in creative teams (Hill et al., 2014). The term conflict can solicit images of heated, passionate debates where the loudest voice wins, but this is not necessarily what researchers are referring to. Creative abrasion may conjure up images of a more positive, hopeful type of interaction, one that is crucial for a team's creative success; therefore, it will be used in this study.

> Creative abrasion is a process in which potential solutions are created, explored, and modified through debate and discourse. It can and often does involve heartfelt disagreement, but not always. Abrasion in essence means simply that ideas and options compete in order for the best idea to emerge. (Hill et al., 2014, p. 138)

Hirshberg (1998) developed the concept of creative abrasion when working with Nissan in the 1980s. He was hired to help "bring the intuition of Western designers into contact with the technological agility of Japan" (p.1). Throughout his time at Nissan he recognized the value of collaboration and conflict. He states, "creative collaboration between people can occur by an effort to retain conflicting cultural and disciplinary viewpoints in the mind *without discarding or allowing either to dominate*" (Hirshberg, 1998, p. 33). He eventually coins the word creative abrasion to describe the ability of teams to bring together conflicting views, friction, or polarities in a positive way to further enhance creative outcomes. He states,

> rather than trying to reduce the friction that naturally arises between people working together by diluting or compromising positions, *creative abrasion* calls for the development of leadership styles that focus on first identifying and then incorporating polarized viewpoints…. Recognizing, marking, and transforming pregnant moments of friction and collision into opportunities for breakthroughs are the work of *creative abrasion*. (Hirshberg, 1998, p. 33)

Participative safety and trust. Building on the conflict research, another dimension that impacts team creativity is participative safety and it moderates the relationship between team conflict and creativity (Fairchild & Hunter, 2013). Participative safety is defined as "a single

psychological construct in which the contingencies are such that involvement in decision-making is motivated and reinforced while occurring in an environment which is perceived as interpersonally non-threatening" (West, 1990, p. 311). In other words, team members feel emotionally safe to share their ideas, perceptions, and opinions. Fairchild and Hunter (2013) found that originality was high in groups with a high level of task conflict and a high level of participative safety. When groups had a high level of participative safety, but a low level of task conflict they were less creative, likely due to complacency, essentially they had no impetus to challenge the status quo.

Interestingly, when groups had a low level of task conflict and a low level of participative safety, they also rated very high on originality (Fairchild & Hunter, 2013). Upon further investigation, the researchers identified that these group members had a wide range of the personality trait "agreeableness." Having a low score on agreeableness is common among highly creative individuals, specifically scientists (Feist, 1998), yet also makes it more difficult to get along in a team particularly to help create an environment of participative safety or collaborative problem solving, both of which are beneficial for teams. It was suggested that groups with a range of variance in agreeableness would have at least one member who was highly creative and that would lead to more originality (Fairchild & Hunter, 2013). However, the low level of task conflict and low level of participative safety could make these groups seem more like nominal groups than true teams (Fairchild & Hunter, 2013).

Another study found that participative safety was the moderating factor between team size and innovation (Peltokorpi & Hasu, 2014). As team size increases so does innovation if there is a high level of participative safety. Additionally, participative safety was positively correlated with frequency of team meetings and task interdependence, "suggesting a positive

relation between supportive climate and social interactions in teams" (Peltokorpi & Hasu, 2014, p. 41).

One component of participative safety is the construct of trust within a team. A few researchers examined the impact of trust on a team's level of creativity. They found that "cognitive trust and collaborative culture are significant predictors of creativity, while affective trust is not significant" (Barczak, Lassk, & Mulki, 2010, p. 340). Cognitive trust refers to "one's willingness to rely on a team member's expertise and reliability" (Barczak et al., 2010, p. 334). Whereas, affective trust is "the confidence one places in a team member based on one's feelings of caring and concern illustrated by that co-worker" (Barczak et al., 2010, p. 334). When team members trust that their peers are reliable and competent they produce more creative results (Barczak et al., 2010). This fits with Amabile's (1996) model that expertise is needed for creativity.

Another study examined trust in the context of how happy teams were (Tsai, Chi, Grandey, & Fung, 2012). This was building on previous research that positive mood increases creativity in individuals (e.g., Isen, Daubman, & Nowicki, 1987). They were curious if this also applied for teams. Therefore, they looked at the intersections of positive and negative group affective tone (PGAT and NGAT), team trust, and creativity. Group affective tone is defined as "consistent or homogeneous affective reactions within a group" (George, 1990, p. 108). Examples of positive group affective tone include enthusiasm, activity, and excitement. On the other hand, negative group affective tone includes depressive and sluggish behavior (George, 1990). The results showed that creativity was highest in teams where PGAT was low and trust was high. Unexpectedly, "PGAT is positively related to team creativity when team trust is low" (Tsai et al., 2012, p. 651). This contradicts the research on individuals that when people feel

positive they are more creative (Amabile & Kramer, 2011; Csikszentmihalyi, 1990, 1996; Isen et al., 1987). The researchers argued this difference in teams could be that when team trust and PGAT are high groups can become caught in groupthink and maintaining the status quo. On the flip side, "low team trust helps enhance the multiple individual perspectives within teams and prevents the formation of group centrism" (Tsai et al., 2012, p. 651).

Amabile and Kramer (2011) were curious about the connection between positive emotion and creativity. They set out to examine how a team's inner work life impacts performance. Participants included 238 team members from 26 teams who were asked to keep a daily work journal. The result was nearly 12,000 journal entries that led to several unique insights about motivation, performance, and creativity in teams. One finding showed that positive mood increased the likelihood of having a creative idea by 50%. In addition, the positive mood impacted creative thinking the next day and sometimes even the day after.

In a study by Dougherty and Takacs (2004), innovative organizations were found to foster a sense of respect and people trusted each other to do their jobs. There was a willingness to join in, and a sense of fun and excitement about doing work. Joo, Song, Lim, and Yoon (2012) similarly talked about the importance of trust. In their study, team cohesion was positively correlated with creativity. Trust was one factor leading to team cohesion, therefore positively impacting creativity.

Trust can help a team engage in creative abrasion, which is essential for creativity. In sum, teams need a moderate to high level of participative safety and trust in order to be more creative together.

Communication. Like other variables that impact creativity, communication is best in moderation. One study examining the perceptions of communication and creativity found that

too centralized or too much communication within a team can decrease creative performance (Kratzer et al., 2004). This could be based on blocking or mutual influence that prevents creative ideas. The researcher made several suggestions for teams. They recommend holding as few meetings as possible during the process of the work and to not place all members of the team on the same floor avoiding highly frequent interactions. Their proposed ideal frequency is communicating one to three times a week. These techniques would limit interactions and help influence the team members from other external sources, increasing the potential for creative ideas (Hülsheger et al., 2009). This seems to be popular with innovative companies such as Apple and Basecamp (formerly 37 Signals, the creators of Ruby on Rails). These results were consistent with the Hülsheger et al. meta-analysis.

Hülsheger et al. (2009) found "if individuals maintain social relations with people outside their core work team, they are more likely to be exposed to new kinds of information and diverse viewpoints and thus generate fresh ideas" (p. 1139). Paying attention to communication with those external to the team is just as important as within the team.

Within a team, the type and quality of communication matters. Open communication between team members increases trust (Costa & Anderson, 2011), which was already shown to be valuable to creativity. Spontaneous, direct communication is also essential for creativity (Catmull & Wallace, 2014; Hoegl & Gemuenden, 2001). Communication that must always be directed through specific channels or can occur only in formal meetings inhibits the sharing of spontaneous ideas, asking quick questions, and fostering ideation. In sum, open communication and knowledge-sharing is valuable to team creativity, as well as external communication and interactions with non-team members.

Team Creative Process

The process a team uses to work through their tasks and come up with creative solutions makes a difference in their success (Katzenbach & Smith, 1999; Sawyer, 2012). Teams within highly creative organizations such as Pixar Animation Studios or the product design company IDEO use specific processes to develop new products (Hill et al., 2014; Sutton & Hargadon, 1996). Process provides structure and methodology to how a team approaches tasks.

There is a myth that creativity is best fostered in situations without rules where creators have complete freedom to do whatever they want. Reality has shown that is not quite the case. When some boundaries and parameters are placed on a task by use of a specific process or structure, the creative results can be more powerful (Medeiros, Partlow, & Mumford, 2014; Sawyer, 2012). Brainstorming is an example of a tool for divergent thinking that is more likely to spark creativity within a creative process when parameters are present (Isaksen & Gaulin, 2005).

Brainstorming as we commonly know it today was first introduced in 1948 in a little book called *Your Creative Power*. It was a surprising best seller. In the book author Alex Osborn (the same person mentioned earlier who developed Creative Problem Solving) suggested a process were the group storms up ideas without criticizing each other in an effort to enhance the creative juices. As the process of brainstorming gained popularity, numerous research studies have explored the effectiveness of brainstorming as a tool for generating creative ideas (Mullen, Johnson, & Salas, 1991; Rickards & Freedman, 1978; Sutton & Hargadon, 1996; Taylor, Berry, & Block, 1958). The results have shown that in many cases individuals generate more ideas alone than with a group (Jung, 2001), but some companies are having tremendous success with it (Sutton & Hargadon, 1996). IDEO has mastered brainstorming and used it to become one of the most prolific design firms in the U.S. (perhaps the world). However, their success is because they

use the tool with a strong technique and as part of a creative process. It is not that the tool itself is faulty, but rather the brainstorming technique may have been poor in those previous studies (Kurtzberg & Amabile, 2001). For instance, in one of the studies participants (undergraduate students) did not know each other (Taylor et al., 1958) and therefore they lacked past or future social relationships (Isaksen & Gaulin, 2005; Sutton & Hargadon, 1996). As seen earlier, developing a base level of trust within a team can increase the group's ability to be more creative (Barczak et al., 2010). Group process matters (Taggar, 2001) and if a group does not have time to get to know each other and learn each other's style that will impact their output. IDEO has used brainstorming to transform their culture to one that focuses on innovative design (Sutton & Hargadon, 1996). When summarizing brainstorming research, Rickards and Freedman (1978) state "we are extremely concerned with the gaps between the empirical findings of the experimental studies and the inferences that have been drawn from the studies" (p. 51). Later, Isaksen and Gaulin identified the same issue of making large leaps when reporting on brainstorming studies. They conducted a thorough experiment on nine variations of brainstorming. What they found was consistent with past studies debunking brainstorming, yet also with Osborn's original design. First, like previous researchers they found that nominal groups generated more ideas than self-facilitated brainstorming groups. However, Osborn (1948, 1963) talked at length about the role of a facilitator and their importance. When a facilitator was added to a brainstorm group, the number of unique ideas jumped by 700%, from 23 ideas to an average of 167. Like any tool, brainstorming is only as powerful as the technique used to implement it.

The way a group approaches a problem matters. Their methodology has an impact on their creativity (Sawyer, 2012). This includes the series of operations, actions, meeting norms,

tools and techniques, as well as the spirit of their approach and reflective practices (Garmston & Wellman, 2009; Isaksen, Dorval, & Treffinger, 2011). CPS is an example of a collaborative process. It can be a useful process for teams aiming to be more creative.

While it can be helpful to teams to know and use CPS, it is not critical to creative success. What is important is that teams intentionally move through a creative process allowing time for divergent and convergent thinking, problem-finding, solution-finding, and solution implementation (Basadur, 1994; Puccio et al., 2006), which naturally occurs in the CPS process.

Creative Synergy

If a team is trying to be creative their goal should be to meet each of the internal-process variables at just the right level. Achieving this "just right" mix will lead to higher levels of creativity than any individual could achieve alone or a team could achieve with a poor mix of team dynamics. This collective effort where the combined effect is greater than the sum of parts is creative synergy.

If teams want to achieve high levels of creativity they need to focus on team dynamics, team creative process, and team purpose. Balancing all three is needed for creative synergy. At first blush, creative synergy can seem like an elusive, extraordinary state that only special teams can achieve. But once broken down into its components it becomes accessible and achievable leading to higher levels of creativity (see Table 2.1).

A creative synergy scale that measures the internal creativity-related team variables would be a valuable tool to help teams reach that high level of creative synergy. Before further examining the proposed scale, an overview of similar scales is needed.

Table 2.1

Components of Creative Synergy in Teams

Team Purpose The team's collective focus, their shared goals, and the team's commitment to reaching the goals.	**Team Creative Process** The team's use of the tools, techniques, and strategies of a creative process (e.g., CPS).	**Team Dynamics** The behavior and interactions within a team and the relationships between the team members.
Shared Goals: The desired results that the entire team focuses on and commits to achieve. **Team Commitment:** "the relative strength of an individual's identification with and involvement in a particular team" (Costa & Anderson, 2011, p. 127).	**Clarify:** narrowing in on the specific goal, wish, or challenge that will be explored. This includes gathering data and determining the questions or challenge statement that will invite solutions. **Ideate:** Generating ideas to solve the challenge. **Develop:** Selecting and further refining the few ideas that will lead to promising solutions. **Implement:** Identifying resources needed, actions to be taken, and how to overcome hurdles related to implementing the best idea(s).	**Creative Abrasion:** interactions characterized by a moderate level of task conflict and low levels of relationship conflict. This is the ideal level of conflict in a creative team. **Participative Safety & Trust:** "a single psychological construct in which the contingencies are such that involvement in decision-making is motivated and reinforced while occurring in an environment which is perceived as interpersonally non-threatening" (West, 1990, p. 311). In other words, team members feel emotionally safe to share their ideas, perceptions, and opinions. **Communication:** "the act or process of using words, sounds, signs, or behaviors to express or exchange information or to express your ideas, thoughts, feelings, etc., to someone else" (Merriam-webster.com)

Assessments in Creativity and Team Dynamics

As explained above, there are numerous factors a team needs to manage in order to be creative together. It is helpful for a team to have a collective understanding of these factors as well as how well they are achieving each one. An assessment tool designed specifically for this purpose can help a team gauge the current state of their creative synergy. However, there are numerous other tools that assess various aspects of team creativity and team dynamics. In particular, FourSight (Puccio et al., 2012), the Campbell-Hallam Team Development Survey (Hallam & Campbell, 1997), the Team Climate Inventory (Anderson & West, 1996), and the Situational Outlook Questionnaire (Isaksen, Lauer, & Ekvall, 1999) will be examined. Each of these provides valuable input to a team, but in a different way than is proposed. Below is a description of each tool followed by an explanation of how the proposed creative synergy scale would differ.

FourSight Thinking Profile. In the last two decades Puccio and his colleagues developed an assessment tool called the FourSight Thinking Profile that analyses individuals' preference for each of the four stages of the Creative Problem Solving process (Puccio et al., 2014). There are several mental processes needed for creativity and not everyone uses all of them well. FourSight helps individuals and teams understand their own strengths and preferences in regards to CPS. This understanding can help expand their creativity by knowing the areas they lack or need to focus on more.

However, both a limitation and strength of FourSight is that it assesses *preference*, not ability or behaviors. Preference, in this case, means the type of mental activity someone is drawn to or naturally predisposed to (Puccio et al., 2014). Preference may help explain behaviors, but it does not specifically highlight behaviors. FourSight does provide an opportunity for participants

to understand how they can develop other strengths or work with colleagues with complementary preferences. The FourSight items primarily focus on what we like to do. Examples include statements such as

- I like to focus on creating a precisely stated problem. (Clarifier)
- I enjoy working on ill-defined, novel problems. (Ideator)
- I like to generate all the pluses and minuses of a potential solution. (Developer)
- I really enjoy implementing an idea. (Implementer) (Puccio, 2002)

FourSight was originally developed in 1994 as the Buffalo Creative Process Inventory. Since then, it has been modified and improved and the researchers are now on version 6.1, the eighth iteration of the scale (Puccio et al., 2014). It has shown to be reliable (Cronbach's Alpha between .78– .81 for each of the four subscales on version 6.0). Concurrent validity has been tested in two ways. First, by comparing to existing measures such as Myers-Briggs, Kirkton Adaption Innovation Inventory, and others and second, by examining reactions to the CPS training. The results show that FourSight has strong concurrent validity (Puccio et al., 2014).

FourSight is designed to measure individual and team preferences in the four stages of the Creative Problem Solving process. It is successful at this goal. However, FourSight does not assess *behaviors* related to the four stages. Teams may find it valuable to better understand how their behaviors are impacting their creative problem solving process. Even though someone has a preference for a certain stage, clarifying for instance, this does not mean the team collectively spends adequate time in that stage. Even with a Clarifier on the team, they may not take the time to clarify their problems before diving in and coming up with ideas.

A complement to the FourSight tool would be an assessment that measures team behaviors related to CPS. This will be one component of the scale I create through my dissertation.

Campbell-Hallam Team Development Survey. The purpose of the Team Development Survey (TDS) is to answer a team's question "how are we doing?" by measuring perceptions of team members and their observers (Hallam & Campbell, 1997). Teams can then use the information to celebrate strengths and improve deficiencies. The TDS has 19 subscales divided into four categories: resources, improvement, efficiency, and team success (Nelson, 2014). Each of the subscales has 3–6 items related to it. Each team member completes the 72-item scale (Hallam & Campbell, 1997). Observers may include team supervisors, customers, clients, or other colleagues who provide a 360-degree feedback to the team. This 360-degree feedback approach provides additional information and perspectives for teams, deepening the value of the tool. The 360-degree component provides teams with collective feedback to help them understand how others view their team performance. This is different from individual 360-degree feedback that may be found in other scales because the feedback is provided to the team as a whole, not the individual team members. This leads to a more objective measurement for the team creating a greater understanding of areas of strengths and areas to improve.

Once a team has completed the surveys they gather for a debriefing, preferably with a trained facilitator (Hallam & Campbell, 1997). The facilitator explains the results and potential implications for each of the 19 areas. Team members can see the low, high, and average scores for each scale. Seeing the range of scores is valuable, particularly if there is a wide discrepancy between members' ratings.

The subscales were developed from examining research on teams and based on well-developed psychological principles (Hallam & Campbell, 1997). The scale was initially developed conceptually and then refined through an iterative process of collecting data and modifying the scale. As of 1997, a national database of 1,881 people on 194 teams provides a norming sample. Team results are presented in comparison to an average team score.

The TDS is a valuable scale for a team interested in assessing their overall team performance and the resources available to them. However, it is not specifically designed to measure a team's creative synergy or help a team be more creative. Of the 19 subscales, one subscale asks four questions about innovation, offering a very high level assessment of the construct. The items are:

1. We are open to trying new and different approaches to our work.
2. Our team has a reputation for being innovative.
3. Our team members have many new and creative ideas.
4. We hesitate to try something new, even if the change would be a clear improvement. (reversed) (Campbell & Hallam, 1994)

The few items on innovation can give a general overview for a team, but do not provide much depth on this area. The TDS is valuable for a team seeking general feedback on variables that can enhance their overall performance. However, for a team specifically seeking to be more creative, the TDS does not focus on creativity-specific indicators.

Team Climate Inventory. The purpose of the Team Climate Inventory (TCI) is to measure team climate and process with respect to innovation (Anderson & West, 1996) and may be the closest to the proposed scale. There are four subscales: participative safety, support for innovation, vision, and task orientation. The scales derived from a four-factor theory based on

reviews of research on climate and innovation (Anderson & West, 1998). West first presented the four-factor theory in 1990.

The TCI has 38 items to be answered by all team members. There is also a shortened 14-item version available if the 38-items are too long for a team to complete (Kivimäki & Elovainio, 1999). Here are examples of the items:

- How clear are you about what your teams objective are? (Vision)
- We share information generally in the team rather than keeping it to ourselves (Participative Safety)
- This team is always moving toward the development of new answers (Support for Innovation)
- Do your team colleagues provide useful ideas and practical help to enable you to do the job to the best of your ability? (Task Orientation) (Anderson & West, 1998)

While there are certainly components of teamwork that are generic to all teamwork tasks (such as those measured in the Hallam-Campbell TDS), developing a measure that delineates a specific team task, such as innovation, can be valuable (Dickinson & McIntyre, 1997). The TCI does focus on several components important for team innovation, but has two significant gaps that will be addressed in the proposed tool.

The first gap with the TCI is that there are only four subscales. Three of these subscales focus on internal-process variables (vision, participative safety, and task orientation) while the fourth is an external-process variable (support for innovation). We have a much stronger understanding of innovation and creativity in teams since the theory's inception in 1990. There are additional constructs that can provide valuable measurement data for teams examining their

synergy for creativity (Hülsheger et al., 2009). These were mentioned earlier and include creative abrasion, team commitment, and communication.

The second gap is that each subscale is rated on the "more is better" concept. Research in the last 10–15 years has shown that for innovation high levels of all constructs is not necessarily ideal. As the research has become more nuanced, we now know that a moderate level of some constructs is better for innovation (Hülsheger et al., 2009).

Situational Outlook Questionnaire. The Situational Outlook Questionnaire (SOQ) is the English translation of the Creative Climate Questionnaire designed by Ekvall in 1993 in Sweden (Isaksen et al., 1999). The purpose of the SOQ is to "assess how much any particular context will support creativity and change" (Isaksen et al., 1999, p. 666). The SOQ consists of 53 questions on nine dimensions and includes three open-ended questions to provide an opportunity for more detail and depth (http://soqonline.net/). The nine dimensions the SOQ assesses are:

1. Challenge and Involvement—The degree to which people are involved in daily operations, long-term goals, and visions.
2. Freedom—The degree of independence shown by the people in the organization
3. Trust and Openness—The emotional safety in relationships
4. Idea-Time—The amount of time people can, and do, use for elaborating new ideas
5. Playfulness and Humor—The spontaneity and ease displayed within the workplace
6. Conflict—The presence of personal and emotional tensions (a negative dimension—in contrast to the debate dimension)
7. Idea-Support—The ways new ideas are treated
8. Debate—The occurrence of encounters and disagreement between viewpoints, ideas, experiences and knowledge.

9. Risk-Taking—The tolerance of uncertainty and ambiguity.

The SOQ offers normative benchmarks for innovative, average, and stagnant organizations providing meaningful and valuable data to teams wishing to become more innovative. The SOQ is appropriate for organizational level or team level assessment.

One unique aspect of the SOQ is the addition of open-ended questions to complement the typical quantitative questions. The researchers state, "verbatim comments from participants… could be used to either: elaborate, supplement, or clarify numerical results; or to identify and describe emergent constructs that were directly grounded in each specific context. In a sense, these questions allowed us to contextualize the quantitative results" (Isaksen & Ekvall, 2013).

The primary purpose of the SOQ is to assess the creative climate at the organizational level. However, it has also been applied to team contexts as well, although on a limited basis and primarily with high school students (Isaksen & Ekvall, 2013). The biggest gap in the SOQ is that it does not assess alignment to team purpose. This has been repeatedly shown to be a significant element of success for any team, whether their focus is creativity or just general high performance (e.g., Larson & LaFasto, 1989). In addition, the SOQ mixes variables related to internal-process with external variables. This can cause confusion for teams because they do not have influence over all aspects of these variables. The reason for this scale design is likely because the SOQ was originally designed to be a tool for organizational innovation, not individual teams.

Summary of assessments. Each of the four assessment tools described above give valuable feedback to teams based on what they were designed for (see Table 2.2). FourSight assesses individual and team preferences in the Creative Problem Solving process. The Team Development Survey answers the question of "how are we doing?" by providing internal and

360-degree feedback on resources, improvement, efficiency, and team success. The Team Climate Inventory provides teams with feedback on vision, participative safety, task orientation, and support for innovation. The Situational Outlook Questionnaire provides feedback on nine dimensions for creative organizations and compares the results with a database of other organizations. Each of these assessment tools have been tested and confirmed that they measure what they intend to measure.

Table 2.2

Pros and Cons of the Four Assessment Scales

Scale	Pros	Cons
FourSight Thinking Profile	Measures individual and team *preferences* for the four stages of the CPS process	Does not measure individual or team *behaviors* related to CPS
Team Development Survey	A general team development scale answering the questions "how are we doing?" Assesses resources, improvement, efficiency, and team success. Includes an option for 360 degree feedback for teams and team members.	Is not specifically designed for teams trying to be creative, therefore lacks creativity specific indicators. Does offer a 4-item scale on innovation, but it is general and at a high-level. The results are presented as "more is better", which is not always ideal for creative teams (e.g., communication and conflict need to be in moderation)
Team Climate Inventory	Assesses three internal-process variables: vision, participative safety, and task orientation. Available in a short and long version.	Outdated assessment that do not provide a complete picture of what teams need to innovate. Measures three internal variables and one external variable creating a confusing mix of results. Results are presented in a "more is better" format.
Situational Outlook Questionnaire	Includes nine dimensions that creative organizations are assessed on. Asks three open-ended questions providing an opportunity for qualitative feedback. Compares innovative, average, and stagnant team data.	Designed for use at the organizational level and includes a mix of external-internal variables. Does not assess team purpose, a critical aspect of team innovation or behaviors related to the stages of the creative problem solving process.

However, none of these tools provide a complete picture of a team's creative synergy including team dynamics, team creative process, and team purpose. The proposed Creative

Synergy Scale will provide teams valuable data about their internal-process variables including the most important team dynamics (trust, creative abrasion, and communication), their behaviors along the stages of the creative process, and team purpose. This data can be used by teams to help them determine the areas they need to improve and the areas they need to maintain in order to reach an ideal level of creative synergy.

Summary

For a team to achieve creative synergy and be able to produce high quality creative work it requires that team members attend to their own behaviors and the group process (Garmston & Wellman, 2009). A survey assessing a team's creative synergy is a useful feedback tool that will allow team members to understand their current behaviors and practices.

The purpose of this research study is to design a creative synergy scale for teams. There are several existing scales that provide feedback to teams regarding their interactions and factors that influence creativity. However, the proposed scale would provide more granular, in-depth feedback to teams on the most important internal-process variables that impact team creativity. It will not focus on external or organizational influences of creativity.

The scale will assess teams on three important components of team creativity. The first is on the specific aspects of team dynamics needed for creativity: creative abrasion, participative safety, and communication. The second is on the team's creative process to determine if they are indeed utilizing the stages and if not, what they skip. The third is their focus on a team purpose particularly team commitment and alignment to shared goals. The scale will allow teams to better understand their behaviors that are important for creativity. This understanding will help teams make the changes needed to build true creative synergy and enhance their creative output. The

specific details about research design and procedures including scale development, analysis, and participant selection will be discussed in Chapter III.

Helping teams to be more creative will allow them to solve more adaptive challenges (Heifetz, 1994), challenges requiring solutions that we cannot yet imagine. A team's ability to generate and implement creative solutions will have a positive impact on our communities, our societies, and even our world.

Chapter III: Methodology and Study Design

As the need for innovation continues to grow, the need for creative teams to solve complex problems increases as well. Teams experiencing creative synergy can produce something that could not be done by an individual alone (Kurtzberg & Amabile, 2001). They can solve real, complex, creative problems that have the potential to change organizations, communities, and beyond. As shown in Chapter II, the combination of a focus on team purpose, healthy team dynamics, and the ability to use team creative process helps a team achieve creative synergy. It is not easy though, as teams can be subject to political strife (Larson & LaFasto, 1989), low levels of trust (Tsai et al., 2012), the inability to have effective conflict (De Dreu, 2006), and lack of understanding of how creativity works (Sawyer, 2012).

It would be helpful for teams to be able to gauge how they are doing with respect to the components needed for creative synergy, essentially the interactions among team members where the collective creative results are greater than the sum of their individual efforts. Understanding their level of creative synergy provides valuable information to determine areas of competence and areas of improvement. Behavior feedback, such as through a behavioral assessment, can help expose blind spots and identify areas needing development (Campbell & Hallam, 1994; Puccio, 2002). Teams can then determine what they need in order to achieve higher levels of creative performance. The purpose of this study was to design a new scale for teams to give them valuable feedback on those critical components of creative synergy. This chapter explains the research procedures used in the study, including the scale development, data collection, data analysis, and scale testing with teams.

Research Questions

This study addressed the following research questions:

1. What factors emerge from exploratory and confirmatory factor analysis with items designed to measure team-level behaviors related to creative synergy in teams?
2. What is the relationship between the ten proposed creative synergy concepts and the factors resulting from the factor analyses?
3. What correlation exists between the factors that emerge from the factor analyses?
4. Do team results of the scale align with the teams' perceptions of themselves?

As suggested by Edmondson & McManus (2007), it is important to select research methodology to best answer the questions, rather than selecting the methods first then designing questions. I have taken the former approach and selected a mixed method research design to answer these questions (Schwandt, 2007). The research approach reflects a pragmatic research paradigm, which is typical of "what" research problems (Mackenzie & Knipe, 2006). Additionally, my desires to further understand the human experience related to creativity in teams was based on my interpretivist/constructivist paradigm (Mackenzie & Knipe, 2006). These philosophical frameworks guided the meaning and interpretation of my findings.

Research Design and Justification

The primary purpose of this study was to design a creative synergy scale for teams. The research design included a combination of quantitative and qualitative methods, with the quantitative focus being dominant (QUAN/qual). This combination allowed for both a wide sampling and an in-depth analysis (Creswell & Plano Clark, 2007). The sequential process included two phases. The initial focus, Phase 1, was quantitative and included collecting 1,226 responses to a survey and using factor analysis procedures to identify a creative synergy scale.

Following the quantitative data collection and analysis, Phase 2 used a qualitative design to test the scale with teams. During Phase 2, the scale that resulted from the Phase 1 factor analyses was administered to three teams. Individual and group feedback contributed to the scale's validity. The following sections outline the specific research procedures followed.

Phase 1: Scale Development

Scale development is a multi-step process. The steps used for Phase 1 of this study were developed based on the advice of scale development experts (Abell, Springer, & Kamata, 2009; DeVellis, 2003; Spector, 1992). The steps were as follows:

1. Determined theoretical basis and what was to be measured
2. Determined how the scale will be used
3. Developed items
4. Tested items
5. Administered survey
6. Evaluated the items

Step 1: Theoretical basis. Scale development must begin with designing a clear construct with a theoretical basis (Abell et al., 2009; DeVellis, 2003; Spector, 1992). Therefore, the process of developing this scale began with an extensive literature review in order to develop the scale's theoretical basis. Chapter II explained the three elements of creative synergy that emerged from the literature review: team purpose, team dynamics, and team creative process. The literature revealed that these three areas are critical for teams striving to achieve creative synergy.

Step 2: How the scale will be used. In addition to the theoretical focus, instrument design also requires thoughtful consideration of how the scale will be used. (Abell et al., 2009).

In this case, teams wishing to gain a greater understanding about their own behaviors and how well they work together to achieve creative synergy may use the scale. If a team were interested in assessing feedback on their level of creative synergy, then each team member would complete the scale. The results would be aggregated and the summated results available for review by the team. Because team members will be assessing their own team, items were based on observable team behaviors (Dickinson & McIntyre, 1997) and team member's personal experiences. The items were behaviorally oriented because the elements of creative synergy are behavioral in nature (Dickinson & McIntyre, 1997). Items asked respondents to rate their team based on what they have observed and experienced as a part of the team.

Step 3: Item pool development. After the literature review the next step was to develop an item-pool. Items were constructed by referencing the literature about what impacts creativity in teams. From that research ten theorized components emerged falling under three overarching categories: team purpose, team dynamics, and team creative process (see Table 2.1). The items were then constructed based on descriptions in the literature relating to each of the ten proposed components. The items were written in my own words and not taken directly from any other source. Following Clark and Watson's (1995) advice, items were constructed to broadly and comprehensively assess each variable. To assure full coverage of the ten concepts proposed for the model, some items were written knowing they were tangential to the topic. Factor analysis procedures showed which items were weak and unrelated and which were strong and highly correlated (Clark & Watson, 1995). For this same reason, some items might have seemed redundant to others, which was intentional (Abell et al., 2009). As Abell et al. (2009) state, "repetition of item content can have the effect of rotating a three-dimensional object to gain a view of it from all angles" (p. 43).

The initial item pool included 10 to 12 items for each of the ten theoretically proposed components. The item pool was then shared with 11 colleagues and they reviewed each item for clarity, wording, and appropriateness. The goal was for each item to be simple and easy to understand (Clark & Watson, 1995). Edits were conducted based on the feedback. Four items were eliminated, 32 revised, and several new items were created. At this stage, each of the ten components had between 10 and 14 items in the preliminary survey.

The edited group of 121 items was then presented to two content experts asking their feedback on the content validity of each item. Validity is an important aspect of any scale and particularly one such as this where the results could impact future decisions about team behavior and training (Abell et al., 2009; DeVellis, 2003; Spector, 1992). Validity is simply determining if the scale measures what it is supposed to measure (DeVellis, 2003; Spector, 1992). Content validity was determined for each item based on feedback from two content experts. Reviewers were asked to identify two aspects of each item: 1. if the item is clear and easy to understand and 2. if the item seems to measure what it is supposed to measure (e.g., team commitment, goal clarity, or level of trust with a team). Feedback from the reviewers led to additional edits of the items and the total was reduced to 75 items (see Appendix A).

Each item has six possible options for a response: 1 = *strongly disagree*, 2 = *disagree*, 3 = *somewhat disagree*, 4 = *somewhat agree*, 5 = *agree*, and 6 = *strongly agree*. Giving six options for response requires respondents to choose one side or the other (Clark & Watson, 1995). It also may be an optimal number for reliability in that too many options may actually reduce reliability, (Clark & Watson, 1995). If there are too many options respondents may not be able to delineate between the choices thereby creating randomness to the responses rendering

them less reliable. On the other hand, if there are too few items the responses may not be accurate enough (Clark & Watson, 1995).

Even though these items were being created for a scale, they were not a scale until their loading onto validated scales was established through factor analysis. In order to avoid confusion, during the development process the collection of items were referred to as concept-related survey questions. The survey contained four sections: (a) the introduction; (b) filter questions that identified potential respondents as being an adult member of intact work teams that they can name and reference; (c) the concept-related survey questions, including the 75 items intended to measure the three overarching creative synergy concepts with the proposed ten theoretical components; and (d) demographic questions.

Step 4: Item testing. Once the survey was developed and loaded into SurveyMonkey™, eight colleagues were asked to pilot the survey to assess its ease of use, format, and content. Their feedback was minimal and did not lead to significant edits. Since no significant changes were needed, their results were included in the final data set. If significant modifications had been needed the pilot responses would have not been included in the final data set.

Step 5: Survey administration. Following item development and testing, the survey was sent to participants. SurveyMonkey™, the online survey software, was used to collect participants' responses. Once finalized in surveymonkey.com, a unique link was sent via email and social media to over 1500 potential participants who were known to the researcher or who were in her professional circles. The selection process of participants is defined in a later section. The goal was to have at least 300 participants complete the survey. This sample size "should be sufficiently large to eliminate subject variance as a significant concern" (DeVellis, 2003, p. 88).

The sample size was above the minimum needed for conducting factor analysis (Clark & Watson, 1995; Kahn, 2006; Osborne, Costello, & Kellow, 2008).

Step 6: Evaluate the items. Evaluating and analyzing the results provided critical information about the items and how they fit into subscales leading to the Creative Synergy Scale. Once the data from the surveys was collected, descriptive statistics, bivariate correlations, and factor analysis was used to analyze the data using SPSS software. Exploratory and confirmatory factor analyses are data reduction processes that result in retaining only the items and subscales with high validity and reliability for measuring the creative synergy construct (J. Kim & Mueller, 1978) and to "verify that the items empirically form the intended subscales" (Spector, 1992, p. 53). Exploratory factor analysis, specifically Principal Component Analysis, was conducted to determine if the items theorized as potential subscales loaded onto separate components (Abell et al., 2009; Spector, 1992). There were 10 proposed subscales, but these are only theoretical based on the literature review. Exploratory factor analysis was used to check if the items did or did not indeed fall into 10 separate subscales.

Following exploratory factor analysis, confirmatory factor analysis was used to assess if the subscales work together as one full scale assessing creative synergy. Confirmatory factor analysis can uncover items not strongly correlated to the factor (subscale) and lead to elimination of those items for a more accurate scale (Abell et al., 2009).

Construct validity is an important aspect of the scale. Construct validity is defined as "a composite of characteristics that can only be meaningfully interpreted as an integrated whole" (Abell et al., 2009, p. 98). For this scale to have a high level of construct validity it means as a whole it measures creative synergy. With content validity the question is if each item is appropriate for the subscale, but with construct validity a more holistic view is taken to

determine if the subscales "behave" together as expected (DeVellis, 2003), in this case to measure a component of creative synergy. Construct validity was assessed with factor analysis.

Reliability. Reliability is a measure of how dependable a scale is (Abell et al., 2009). In other words, does the scale work the same every time it is used? Obviously this is important, otherwise it is not a useful tool for teams. There are different types of reliability and internal-consistency reliability is one type particularly relevant to the proposed scale.

Internal-consistency reliability is how well individual items on the scale consistently measure the construct (Spector, 1992). The goal was to find the items that best measure each construct and discard the rest. Correlation coefficients using coeffiecient alpha (Cronbach, 1951) was used. Items with higher coefficients remained part of the scale (Spector, 1992) and those with low coefficients were removed in order to increase the scale's reliability. Long assessments can be tiring to complete so the ideal assessment includes only the items needed (Abell et al., 2009). Therefore, each subscale was reduced to the minimal items needed while still maintaining robust statistical power.

Selection of participants in Phase 1. Research participants included individual adults who were members of intact work teams from a wide range of fields such as education, health care, technology, business, government, and non-profits. Participants needed to be adult members of teams who met both of the following criteria:

- The team had a small number of people (between 3–20).
- Team members work together to accomplish the team goals.

Participants were required to meet all of the above criteria to be eligible to participate in the study. Participants responded to the items based on a particular team in which they were a member. It was not necessary for other team members to participate because the purpose in

Phase 1 was to identify what factors emerged from factor analysis procedures and to identify factor reliability and validity. A convenience sample was used. The recruitment process aimed for a diverse pool including an equal number of men and women, range of races and ethnicities, as well as a sampling from many work sectors.

Participants were selected from my contacts and referrals from others. The recruitment process was voluntary and any adult meeting the criteria was welcome to participate. Participants were recruited from the following sources:

- The Climer Consulting email list of approximately 1300 people. This list was started in 2009 and includes participants who have attended workshops and seminars I have delivered or have opted-in from the climerconsulting.com or climercards.com websites. List members receive occasional newsletters from Climer Consulting with articles on topics such as leadership, team development, and creativity.
- My personal Facebook page reaching up to 660 people.
- @amyclimer Twitter feed reaching up to 141 followers.
- Sixteen LinkedIn groups I am a member of as well as over 710 LinkedIn followers.
- Listeners of The Deliberate Creative podcast, a weekly podcast I host about leading creativity in teams. Listens vary per episode and have been as high as 750 people.
- Over 450 personal contacts. This group will receive a personal email inviting them to participate.
- A new site, creativesynergyscale.com, was created to share information about the research results. This site has an email sign-up form for anyone interested in receiving updates about the research. A link to the survey was also available.

- All participants were encouraged to pass the survey on to others qualified for participation.

Appendix B includes sample emails, Twitter and Facebook posts.

Phase 2: Scale Testing

In the second phase of data collection three teams provided feedback about the revised scale and their perception of its accuracy. This provided a second level of construct validity. After the survey items were analyzed and developed into a scale, up to three intact work teams were selected to participate in Phase 2. These three teams had to meet the same minimum criteria used in Phase 1:

- The team had a small number of people (between 3–20).
- Team members worked together to accomplish the team goals.

A third criterion was added for Phase 2. Teams were limited to those striving to be creative. In addition to the criteria listed above, an effort was made to select teams from different vocational sectors such as business, non-profits, and education.

Teams were invited to participate based on my professional contacts. An email invitation was sent to the team leader explaining the research and asking about their interest and availability. If they were interested, I followed up with a phone call to ensure they were available during the timeframe needed and fully understood their role. Teams who agreed to participate were emailed a digital version of the scale along with an explanatory email. Each person on the team was invited to complete the scale. SurveyMonkey™ was used to host the survey and the front page of the survey included the informed consent form (see Appendix E). The team's results were aggregated and then presented in an in-person or online video conference with the team lasting between 60–90 minutes. This session had two purposes: (a) to allow the team to

understand the results of the Creative Synergy Scale and what it meant for their team, and (b) to provide feedback to me about the clarity, understanding, and validity of the items and the results. An outline of the one-hour session is available in Appendix C.

Feedback from the team sessions was captured via audio recording and later the feedback from team members was transcribed. The purpose of this phase was to determine if team members felt the scale was an accurate assessment of their creative synergy. A scale is only useful if a team believes in its value (Dickinson & McIntyre, 1997), therefore the face validity from the team was an important component of the tool's practicality. In addition to capturing verbal comments, at the beginning of the meeting each team member received a one-page paper feedback form inviting additional written feedback (see Appendix D). The form included three quantitative questions and four open-ended questions. The forms were collected at the end of the meeting.

The day after the meeting each team member also received an email with a link inviting optional additional feedback. This was provided in case they thought of something a day or two later and wanted to share additional ideas or feedback.

The feedback from the teams revealed if the team's perception of themselves aligned with the results from the scale. The results from the team meetings may inform future versions of the scale, but additional editing to the scale was beyond the scope of this research study.

Ethics

Throughout the research process, ethical standards were maintained in alignment with research on human subjects. Prior to any data collection, ethical approval for this study was sought from the Antioch University Institutional Review Board (see Appendix F). An informed consent form was part of the introductory section of the survey (see Appendix A) and the scale

(see Appendix E) and all participants needed to agree to participate in order to continue the survey. Participation in Phase 1 was anonymous and confidential. During Phase 2, participants' identities were known to me, but remained confidential. The survey did not ask about known sensitive topics, however the sharing of personal information or reflection on the team could have caused discomfort to a participant. All participation was voluntary and anyone participating in the study may have chosen to terminate their involvement at any time and for any reason.

Research Design Limitations

This research design has several limitations including: lack of access to the study and limited representation of participants. The first limitation was lack of access to the study. Even though Phase 1 of the study was open to anyone meeting the criteria, not everyone had access to the study. The populations were limited to only those with Internet access. Even those with Internet access may not have known about the study if they were outside my recruitment pool. This first limitation leads to the second limitation.

Phase 1 included 830 participants who completed the full survey. This was enough for adequate statistical analysis. Even though this was not a probability sample, it was ideal to have a diversity of participants including underrepresented groups. An attempt was made to engage a diverse pool in regards to race, ethnicity, gender, and professional sector. Caution must be taken when generalizing the results to a population that may not have been adequately represented. The scale will need further validation through confirmatory and discriminant analysis and validation with additional study groups. More details about the represented sectors are presented in Chapter IV.

Development of the scale must also consider how the scale will be used with teams. In this case, a facilitator or team leader could administer the scale then share results with the team

helping them to understand its implications and how the team can further develop their skills to become more creative together. The final product of this dissertation is a validated and reliable Creative Synergy Scale for intact adult teams striving to be more innovative.

The methods proposed for this research led to a tool for leaders, coaches, consultants, and team members to use to help teams gain a better understanding of the internal-process variables needed to be more creative and innovative. Designing a useful scale for practitioners and researchers was important to me and reflects my pragmatist approach (Mackenzie & Knipe, 2006).

Summary

The Creative Synergy Scale was developed through responses to a survey by over 800 adult team members. The final scale will help teams determine their level of creative synergy and provide feedback on areas of strengths and areas to be improved in relation to the internal-process variables of team purpose, team dynamics, and team creative process. Results from the statistical analysis and the final scale are shared in Chapter IV.

Chapter IV: Results

The Creative Synergy Scale was created to help teams understand their behaviors related to creative synergy. I define creative synergy as the interactions among team members where the collective creative results are greater than the sum of their individual efforts.

The purpose of the research study was to develop and test the Creative Synergy Scale and this chapter describes the results of the development process. The research involved two phases: Phase 1 was the actual scale development using exploratory and confirmatory factor analysis. In Phase 2, the new scale was tested with three intact work teams to assess its utility and ability to reflect a team's self-perception. This chapter describes detailed results from both phases of this scale development including details about the participants, the process of data cleaning, and the statistical process that was followed. The results are explained in context with the four research questions.

The research questions addressed in the study were the following:

1. What factors emerge from exploratory and confirmatory factor analysis with items designed to measure team-level behaviors related to creative synergy in teams?
2. What is the relationship between the ten proposed creative synergy concepts and the factors resulting from the factor analyses?
3. What correlation exists between the factors that emerge from the factor analyses?
4. Do team results of the scale align with the teams' perceptions of themselves?

Phase 1: Scale Development

Phase 1 was designed to address the first three research questions, which cluster around developing the scale. Participants in Phase 1 included 1,226 adults who responded to the survey hosted on SurveyMonkey™. The minimum number of responses needed was 300, yet the goal

was to reach between 600–1000 respondents. The survey was open for 11 days in December 2015. Of the 1,226 who responded, 830 completed the entire survey. This represents a 68% completion rate. The survey responses were then analyzed to create the Creative Synergy Scale.

Data cleaning. To begin data analysis, the data were downloaded from SurveyMonkey™ to SPSS. A total of 1,226 people responded to the survey. However, only 830 completed the entire survey (67.7%). Only those who completed the full survey were included in the analysis. Before conducting statistical analysis, all incomplete responses were removed. Table 4.1 shows how many people were removed at each question.

Table 4.1

Number of Partially Completed Surveys Deleted by Survey Question

Question	Item	Results	Participants Remaining
2	This survey is about how teams work together. Teams are small groups of people who work together and hold each other accountable to achieve a common goal. Examples of teams include, but are not limited to, project or planning teams, committees, volunteer teams, or sport/recreational teams. Thinking about your work and other interests, are you a member of a team with between 3-20 people?	27 skipped 25 answered "no" and ended the survey.	1175
4	Thinking about how the [Q3] team members *interact with each other*, how strongly do you disagree or agree with each of the following statements?	185 skipped	1043
5	Thinking about how the [Q3] team members *interact with each other*, how strongly do you disagree or agree with each of the following statements?	42 skipped	1001
6	Thinking about how the [Q3] team members *interact with each other*, how strongly do you disagree or agree with each of the following statements?	45 skipped	956
7	Thinking about the [Q3] *team*	32 skipped	924

	processes, how strongly do you disagree or agree with each of the following statements?		
8	Thinking about the [Q3] *team processes*, how strongly do you disagree or agree with each of the following statements?	25 skipped	899
9	Thinking about the [Q3] *team processes*, how strongly do you disagree or agree with each of the following statements?	30 skipped	869
10	Thinking about the [Q3] *team processes*, how strongly do you disagree or agree with each of the following statements?	16 skipped	853
11	Thinking about the [Q3] *team processes*, how strongly do you disagree or agree with each of the following statements?	15 skipped	838
12	Thinking about the [Q3] *team goals and purpose*, how strongly do you disagree or agree with each of the following statements.	6 skipped	832
13	Thinking about the [Q3] *team goals and purpose*, how strongly do you disagree or agree with each of the following statements.	2 skipped	830
		TOTAL PARTICIPANTS	**830**

Approximately 30% did not complete the survey. The dropout rate was expected for a few reasons. First, the parameters for initial participation were broad. The survey was open to all adults who clicked on the survey link. The potential respondent also had to be a member of a team. Further, the questions required being a member of a team long enough for the team to be sufficiently developed to answer questions about typical team behaviors. I considered requiring a minimum amount of time that a team had to be together in order to qualify for the survey, but the rate of team development can vary greatly between teams (Garmston & Wellman, 2009; Katzenbach & Smith, 1999; Tuckman & Jensen, 1977). Teams that are together for two weeks

can be more developed than a team that has been together for two years, depending on how frequently they meet and the type and quality of their interactions.

Second, the survey took about 10–15 minutes to complete and required reflection about team behaviors. For instance, for this item: "Our team cooperates to work through our differences" a participant would have to think about the differences the team has had and then think about whether or not team members cooperated to work through them. Another item stated, "Before selecting the best solution, our team considers several options." In order to respond, a participant would have to think about the times the team selected a solution to a problem and then think about if they considered several options first. This may have been easy for some participants, but more difficult for others. If it was too difficult then some people may have stopped the survey.

Third, some participants may have started answering with a particular team in mind, yet once they started answering the questions, they realized the questions did not apply to their team. One participant emailed me and wrote: "I started doing this for the team I began leading a few weeks ago as part of my new job and realized that answering questions at the level of detail you need was not yet possible. So, I stopped about 60% of the way through." While he did not say which specific items concerned him, some examples of items are: "Our team explores each challenge from several angles" or "We identify criteria to help us decide on the best ideas." If he was new to the team he may not have yet seen the team explore a new challenge or need to generate new ideas.

This survey was not aiming to reach a representative sample. The participants were identified through a snowball approach; it was distributed to as many people as possible through

social media, my contacts, and asking respondents to share with others. Of those that actually started answering the items, 79.5% completed the survey (n = 830/1043).

After removing the incomplete responses, further data cleaning was needed to prepare for analysis in SPSS. Measure types were properly categorized in SPSS, either nominal or scale. Then, the six inverse items were reverse coded so they could be analyzed in the same way as the rest of the items. Additionally, in the question "what industry does your team belong to?" the "other" responses were recoded to fit one of the listed choices, if possible.

Participant demographics. Of the 830 completed survey responses, 68.3% (n = 567) were from women, 246 identified as men, and 3 as other (agender, non-binary gender fluid, non-binary). Fourteen (14) respondents skipped this item. As expected, most respondents lived in the United States (92.9%), but 11 other countries were represented, including Canada (2%), Netherlands (0.4%), China (0.2%), Germany (0.2%), and one each in Australia, Mexico, New Zealand, Nigeria, Philippines, and Spain (see Table 4.2). Of those living in the United States, their race or ethnicity was predominantly white (81.8%) with 3.9% Hispanic, 3.1% Black or African American, 2.8% Asian/Pacific Islander, 1.7% Multiple ethnicity/other, and 0.2% American Indian or Alaskan Native. Most respondents were between 30-59 years old. See Table 4.2 for a complete breakdown of individual demographics.

Smaller teams were more common and most had 12 or fewer team members. Teams of 3–6 people had the highest representation with 39.5%. Followed by teams of 7–9 people with 24.9% and teams of 10–12 with 16.9%. Details are in Table 4.2. A wide range of industries were represented by respondents. The most prominent industries were education, both higher education and k–12, representing the highest percentage at 41%, non-profit organizations were

16%, and arts, entertainment, and recreation were 8%. Detailed demographics about the teams are displayed in Table 4.2.

Table 4.2

Demographics of Phase 1 Survey Respondents

Characteristic	No.	%
Gender		
Female	567	68.3
Male	246	29.6
Other	3	0.4
No response	14	1.7
Age		
18-29	111	13.4
30-44	303	36.5
45-59	321	38.7
60+	84	10.1
No response	11	1.3
Country Lived In		
United States	771	92.9
Canada	17	2.0
Brazil	3	0.4
Netherlands	3	0.4
China	2	0.2
Germany	2	0.2
Australia	1	0.1
Mexico	1	0.1
New Zealand	1	0.1
Nigeria	1	0.1
Philippines	1	0.1
Spain	1	0.1
No response	25	3.0
Race (for U.S. respondents only)		
White/Caucasian	679	81.8
Hispanic	32	3.9
Black or African American	26	3.1
Asian/Pacific Islander	23	2.8
Multiple ethnicity/other	14	1.7
American Indian or Alaskan Native	2	0.2
No response	54	6.5
Team Size		
3-6	328	39.5
7-9	207	24.9
10-12	140	16.9

13-16	76	9.2
17-20	72	8.7
No response	7	0.8
Team Industry		
Education (Higher Ed)	236	28.4
Non-Profit	136	16.4
Education (k-12)	106	12.8
Arts, Entertainment, & Recreation	69	8.3
Health Care	47	5.7
Government	38	4.6
Technology	36	4.3
Professional Services	34	4.1
Social Services	20	2.4
Manufacturing & Materials	18	2.2
Financial Services	15	1.8
Retail	7	0.8
Other (please specify)	51	6.1
No response	15	1.8

Note. n = 830

Research Question #1

After examining demographics, it was time to address the first research question. What factors emerge from exploratory and confirmatory factor analysis with items designed to measure team-level behaviors related to creative synergy in teams? The processes used to address this question and the results are described next.

Descriptive statistics and correlations. Descriptive statistics were run for each of the potential scale items. This included means, standard deviations, and measures of skewness and kurtosis (See Appendix G). Survey response options were: *1(strongly disagree), 2(disagree), 3(somewhat disagree), 4(somewhat agree), 5(agree),* and *6(strongly agree)*.

Bivariate correlations were calculated for each potential scale item with every other item. If any items did not correlate to at least one other item at =>.3, it was discarded. The items are all intended to address the same concept and if the bivariate correlation were < .3 it would mean that

the items share less than 9 percent (.3 x .3) of their variance. However, all items correlated to at least one other item at the => .3 level and most correlated to several others; thus, no items were removed at this stage and all were included in the exploratory factor analysis. (See the Supplemental File for the full correlation matrix.)

Exploratory factor analysis. Exploratory factor analysis, specifically, Principal Component Analysis (PCA) was used to determine the number of factors in the scale.

> The primary goal of EFA [exploratory factor analysis] is to identify latent factors that explain the covariation among a set of measured variables. Specifically, EFA explores how many factors exist among a set of variables and the degree to which the variables are related to the factors. (Kahn, 2006, p. 686)

Latent factors are not directly measurable (DeVellis, 2003; Kahn, 2006). Creative synergy is an example, as well as happiness, extroversion, and attitude.

Before running factor analysis, the KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity were run to determine if the sample size was adequate for factor analysis. As expected, the sample size was more than adequate, "marvelous" as described by George and Mallery (2011), with m = .985 and a significance level of .000. Larger samples "tend to minimize the probability of errors, maximize the accuracy of population estimates, and increase the generalizability of the results" (Osborne et al., 2008, p. 90). The same researchers also explain that there is not clear, empirical evidence for the ideal sample size when conducting an exploratory factor analysis. Some researchers argue for a ratio of responses to items (either 5:1 or 10:1) and others argue for a minimum sample size of 300 (Kahn, 2006; Osborne et al., 2008). Both these approaches have flaws and that discussion is beyond the scope of this study. Fortunately, this study had 830 completed responses for 75 items. This exceeds the minimum sample size regardless of which criteria is consulted.

PCA was the method used to extract the number of components, or factors, from the survey items (Osborne et al., 2008). PCA was used because "components are *defined by* how items are answered. Thus in PCA, the components are end products of the items and the actual scores obtained on items determine the nature of the components" (DeVellis, 2003, p. 128).

PCA was used with varimax rotation. Rotation is important "because the original factor structure is mathematically correct, but difficult to interpret" (George & Mallery, 2011). Rotation provides a more complete picture of the data. It would be similar to looking at a sculpture from multiple angles instead of only from the front. Varimax rotation was used and variables that loaded on multiple factors were deleted with each run. If an item loads on multiple factors that means it could measure more than one factor or latent variable (Kahn, 2006). PCA was run with a .4 cut-off (Kahn, 2006). I experimented with lower cut-offs (.2 and .3), but items loaded on too many factors. With a .4 cut-off the first run, or Round 1, resulted in eight components with an eigenvalue > 1.0. Components with eigenvalues <= 1.0 were not considered for the scale (George & Mallery, 2011; Osborne et al., 2008). Eighteen items loaded on multiple components and those were deleted. The second iteration, or Round 2, resulted in six components. Five items were deleted for loading on more than one component. In Round 3, six components were produced again, this time with only one item loading on more than one component. It was deleted for the fourth round. In Round 4, six components were produced with no items double loading. This was the final run. Table 4.3 shows the number of items removed in each round. Table 4.4 shows the item loadings for each of the six components.

Table 4.3

PCA With a .4 Cut-Off

	Components with Eigenvalue >1	Items removed due to loading on >1 component
Round 1	8	18
Round 2	6	5
Round 3	6	1
Round 4	6	0

Table 4.4

Factor Loadings Based on Principle Component Analysis

	Component					
Variable	Team Creative Process	Team Dynamics	Team Purpose	4	5	6
Q09_1_TP Our team narrows the issue or problem into a clearly stated challenge	.72					
Q10_6_TP Our team breaks down a new solution into action steps	.72					
Q08_3_TP Our team clearly defines each problem we are trying to solve	.69					
Q11_3_TP We identify criteria to help us decide on the best ideas	.69					
Q10_7_TP Our team looks at how to improve potential solutions	.68					
Q08_7_TP Our team creates clear action plans outlining who will do what by when	.67					
Q09_5_TP We examine the weaknesses of the best potential solutions	.66					
Q09_7_TP Our team identifies the assumptions we have about a problem	.66					
Q08_4_TP Before solving a problem, our team envisions a desired outcome	.65					

Q09_4_TP Our team uses a variety of techniques to generate ideas	.65	
Q10_5_TP Team members discuss the pros and cons of potential solutions	.65	
Q11_1_TP Our team develops a clear understanding of an issue before generating problem solving ideas	.65	
Q07_2_TP Our team captures ideas either visually or in writing	.64	
Q10_3_TP Once a new solution is implemented, we evaluate its effectiveness	.62	
Q07_6_TP Our team takes the time needed to come up with many ideas	.61	
Q10_1_TP Our team strategizes how to overcome obstacles to potential solutions	.61	
Q07_1_TP The format of our team meetings brings out our best thinking	.60	
Q09_3_TP Our team explores each challenge from several angles	.60	
Q11_6_TP Before selecting the best solution, our team considers several options	.60	
Q11_7_TP Our team considers ways to address resistance to new solutions	.53	
Q04_7_TD I feel emotionally safe with my team		.75
Q04_3_TD It feels safe to share ideas with my team		.74
Q05_3_TD I am comfortable being myself with this team		.69
Q06_7_TD There is a supportive environment within our team		.69
Q04_4_TD Team members respect each other's different working styles		.68

Q04_2_TD Team members are open with each other about their concerns	.67	
Q06_1_TD Team members openly share information with each other	.66	
Q05_5_TD Team members listen to each other	.65	
Q05_1_TD Team members openly share their different perspectives	.64	
Q06_2_TD Our team cooperates to work through our differences	.63	
Q04_1_TD Team members share knowledge with each other	.59	
Q06_9_TD Team members rely on each other's experience or knowledge	.54	
Q06_4_TD When a mistake is made our team focuses on how to move forward	.53	
Q08_6_TP When needed, our team is flexible about changing the way we work	.41	
Q12_1_PP Team members are committed to doing their work effectively		.74
Q13_2_PP Team members are motivated to produce excellent results for the team		.73
Q12_3_PP Our team is dedicated to reaching our goals		.72
Q12_6_PP Our team strives to produce high quality results		.72
Q13_7_PP Team members are willing to work hard to make sure our team succeeds		.72
Q13_1_PP Team members are invested in the team's outcomes		.71
Q13_3_PP Team members follow through with their commitments		.69

Q12_7_PP All team members work toward our shared goals	.66			
Q08_5_TP Our team is known for getting things done	.55			
Q11_8_TP Our team generates wild ideas		.68		
Q04_8_TDr Team members rarely communicate with each other outside of meetings			.82	
Q05_7_TD Team members frequently interact with each other outside of our meetings			.80	
Q06_5_TDr Our team talks too much about the details of each problem				.75
Q04_6_TDr During team meetings, members often focus on other things				.71
Q04_5_TD Team members avoid sharing their opinions during our meetings				.49

Note. Factor loadings <.4 are suppressed. Rotation Method: Varimax with Kaiser Normalization.

Of the six components, or factors, one had only one item and another only two. A factor must have at least three items to be considered a scale (Ullman, 2013); thus, the two components with one or two items were deleted. Another component included three items that were all reverse worded and they did not appear to have a theoretical basis; their loading was most likely due to their jointly shared negative reference or a method effect (Brown, 2015). "Method effect exists when additional covariation among indicators is introduced by the measurement approach" (Brown, 2015, p. 3). Therefore, the component with the negatively worded items was deleted.

The remaining three components, or factors, corresponded to the predicted constructs: team purpose, team dynamics, and team creative process. Based on the literature review I expected that creative synergy in teams would be based on a team having a strong sense of purpose, positive team dynamics (specifically trust, communication, and creative abrasion), and

the use of a creative process such as Creative Problem Solving or something similar. The items for the initial survey were designed with the expectation that they measured one of three proposed concepts related to creativity. The results of the PCA supported the theoretical underpinnings.

Reliability statistics. After the PCA, reliability statistics were run to determine if the components, or subscale would be stronger if any particular items were deleted. For the Team Purpose scale Cronbach alpha was .945 and deletion of any of the items would not have increased reliability. For the Team Dynamics Cronbach alpha was .953 and again deletion of any of the items would not have increased reliability. Similarly, the Team Creative Process scale Cronbach alpha was a high .960 and no items needed to be deleted. The correlation tables for the three subscales are shown in Tables 4.5, 4.6, and 4.7.

Table 4.5

Team Purpose Correlations

		1	2	3	4	5	6
1.	Our team is dedicated to reaching our goals.	1.00					
2.	Our team strives to produce high quality results.	.69	1.00				
3.	All team members work toward our shared goals.	.71	.68	1.00			
4.	Team members are motivated to produce excellent results for the team.	.70	.71	.75	1.00		
5.	Team members follow through with their commitments.	.60	.57	.64	.66	1.00	
6.	Team members are willing to work hard to make sure our team succeeds.	.68	.69	.72	.76	.69	1.00

Table 4.6

Team Dynamics Correlations

		1	2	3	4	5	6	7	8
1.	Team members are open with each other about their concerns.	1.00							
2.	Team members respect each other's different working styles.	.59	1.00						
3.	I am comfortable being myself with this team.	.50	.54	1.00					
4.	Team members listen to each other.	.59	.62	.59	1.00				
5.	Team members openly share information with each other.	.64	.56	.60	.70	1.00			
6.	Our team cooperates to work through our differences.	.63	.63	.56	.69	.70	1.00		
7.	When a mistake is made our team focuses on how to move forward.	.53	.55	.52	.62	.58	.67	1.00	
8.	Team members rely on each other’s experience or knowledge.	.55	.53	.55	.63	.67	.65	.60	1.00

Table 4.7

Team Creative Process Correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	The format of our team meetings brings out our best thinking.	1.00														
2.	Our team captures ideas either visually or in writing.	.51	1.00													
3.	Our team takes the time needed to come up with many ideas.	.56	.48	1.00												
4.	Before solving a problem, our team envisions a desired outcome.	.54	.43	.53	1.00											
5.	Our team narrows the issue or problem into a clearly stated challenge.	.57	.46	.51	.59	1.00										
6.	Our team explores each challenge from several angles.	.53	.45	.65	.54	.56	1.00									
7.	Our team uses a variety of techniques to generate ideas.	.56	.47	.61	.54	.54	.67	1.00								
8.	Our team identifies the assumptions we have about a problem.	.52	.41	.53	.54	.56	.58	.61	1.00							
9.	Our team strategizes how to overcome obstacles to potential solutions.	.49	.45	.58	.54	.56	.64	.55	.57	1.00						
10.	Once a new solution is implemented, we evaluate its effectiveness.	.51	.38	.53	.52	.53	.56	.54	.51	.57	1.00					
11.	Team members discuss the pros and cons of potential solutions.	.50	.45	.59	.52	.55	.66	.55	.53	.65	.61	1.00				
12.	Our team breaks down a new solution into action steps.	.54	.51	.53	.52	.59	.54	.55	.52	.58	.60	.64	1.00			
13.	We identify criteria to help us decide on the best ideas.	.50	.46	.53	.51	.57	.57	.60	.59	.54	.52	.52	.56	1.00		
14.	Before selecting the best solution, our team considers several options.	.51	.47	.59	.49	.53	.65	.60	.55	.63	.56	.64	.58	.59	1.00	
15.	Our team considers ways to address resistance to new solutions.	.47	.39	.53	.46	.49	.55	.52	.56	.58	.52	.53	.54	.53	.62	1.00

Confirmatory Factor Analysis. After the 75 survey items were narrowed to 43 through PCA and reliability statistics, the three components with the remaining items were run through Confirmatory Factor Analysis (CFA). PCA and other forms of exploratory factor analysis are exploratory (Costello & Osborne, 2005). They are used to narrow the results into the appropriate number of factors, whereas CFA is used to confirm that data fit the model, including the subscales and item loadings, that results from exploratory factor analysis (Brown, 2015; Kahn, 2006). Kahn (2006) states, "analysts typically use EFA [exploratory factor analysis] to explore possible factors that may explain covariation among variables, whereas they use CFA to confirm that a hypothesized factor structure provides a good fit to the data" (p. 701). This combination of exploratory factor analysis and CFA was specifically used to address the first three research questions. The research identified factors designed to measure team-level behaviors related to creative synergy in teams, examined the relationship between the ten proposed creative synergy concepts and the factors resulting from the factor analyses, and examined the correlations between the factors.

During the CFA process multiple considerations were made to determine which items should remain part of the final scale and which should be removed in order to increase goodness-of-fit (Brown, 2015).

> After substantive justification of the model is established, the acceptability of the fitted CFA solution should be evaluated on the basis of three major aspects: (1) overall goodness of fit; (2) the presence or absence of localized areas of strain in the solution (i.e., specific points of ill fit); and (3) the interpretability, size, and statistical significance of the model's parameter estimates. A common error in applied CFA research is to evaluate models exclusively on the basis of overall goodness of fit. However, descriptive fit indices are best viewed as providing information on the extent of a model's lack of fit. In other words, although these indices may provide conclusive evidence of a misspecified model, they cannot be used in isolation from other information to support the conclusion of a

> good-fitting model. Goodness-of-fit indices provide a global descriptive summary of the ability of the model to reproduce the input covariance matrix, but the other two aspects of fit evaluation (localized strain, parameter estimates) provide more specific information about the acceptability and utility of the solution. (Brown, 2015, p. 96)

Model fit was tested by using a number of indices that are most common and useful in reporting CFA (Jackson, Gillasphy, & Purc-Stephenson, 2009). Four goodness-of-fit indices were used to measure the CFA results at a global level. Chi-square is the most common and traditionally used index. However, goodness-of-fit is best measured through a variety of indices "falling into three categories: absolute fit, fit adjusting for model parsimony, and comparative or incremental fit" (Brown, 2015, p. 70). The following measures were used in these three categories:

- For absolute fit: chi-square test and chi-square divided by degrees of freedom (CMIN/DF)
- For fit adjusting for model parsimony: root mean square error of approximation (RMSEA)
- For comparative or incremental fit: comparative fit index (CFI)

In addition to goodness-of-fit indices, modification indices are "frequently used to identify focal areas of misfit in a CFA solution" (Brown, 2015, p. 97). When the modification index between two items was high then one of the items needed to be deleted. There is not a set cut-off for modification indices, rather outliers were evaluated. Initially this was any modification index above 30 and in the final round all modification indices were below 27.

CFA is an iterative process. Like PCA, the data is run through SPSS AMOS multiple times with modifications made after each round. Decisions are made about

which items to retain and which to keep based on several criteria. The decision of which items to remove was based on the following, in order of priority:

- If an item covaried with all three factors it was deleted.
- If the modification index between two items was high, one item was removed.
- If an item covaried with many other items it was deleted.
- If it was hard to determine which item to delete then I referenced the item wording and kept the one that was the clearest.

Table 4.8 shows the fit indices for each run of the CFA and how many items were removed or covaried during each round. During each round fit indices were assessed as well as the modification indices and standardized residual co-variances. As mentioned above, it was important to use both global and local measures of fit (Brown, 2015). Therefore, even after the global goodness-of-fit indices were acceptable, additional items were deleted due to higher modification indices between items (Rounds 1–4). In Round 5 the fit indices were good and no additional items needed to be deleted. However, three pairs of variable were covaried due to modification indices over 20 (Gaskin, 2013). Then in Round 6, with the new items co-varied the standardized residual covariances were examined. One item was too high and was removed. By the final round the highest modification index was 17.44. The resulting scale has 29 items. The final model with correlations is shown in Figure 4.1

Table 4.8

Confirmatory Factor Analysis, Item Removal Process

	Chi Square	CMIN/DF	CFI	RMSEA	Number of items deleted or covaried and the reason
Round 1	3310.26	3.37	.92	.05	4: due to high modification index, items covarying with all 3 factors, or with too many other items
Round 2	2467.25	3.03	.94	.05	4: due to high modification index, items covarying with all 3 factors, or with too many other items
Round 3	1919.47	2.97	.94	.05	3: due to high modification index. or covarying with many factors
Round 4	1329.38	2.88	.95	.05	2: due to high modification index.
Round 5	1134.65	2.82	.96	.05	1: due to high standard residual covariance caused of one item, also covaried 3 pairs of items due to high modification index.
Round 6	966.49	2.61	.97	.04	None

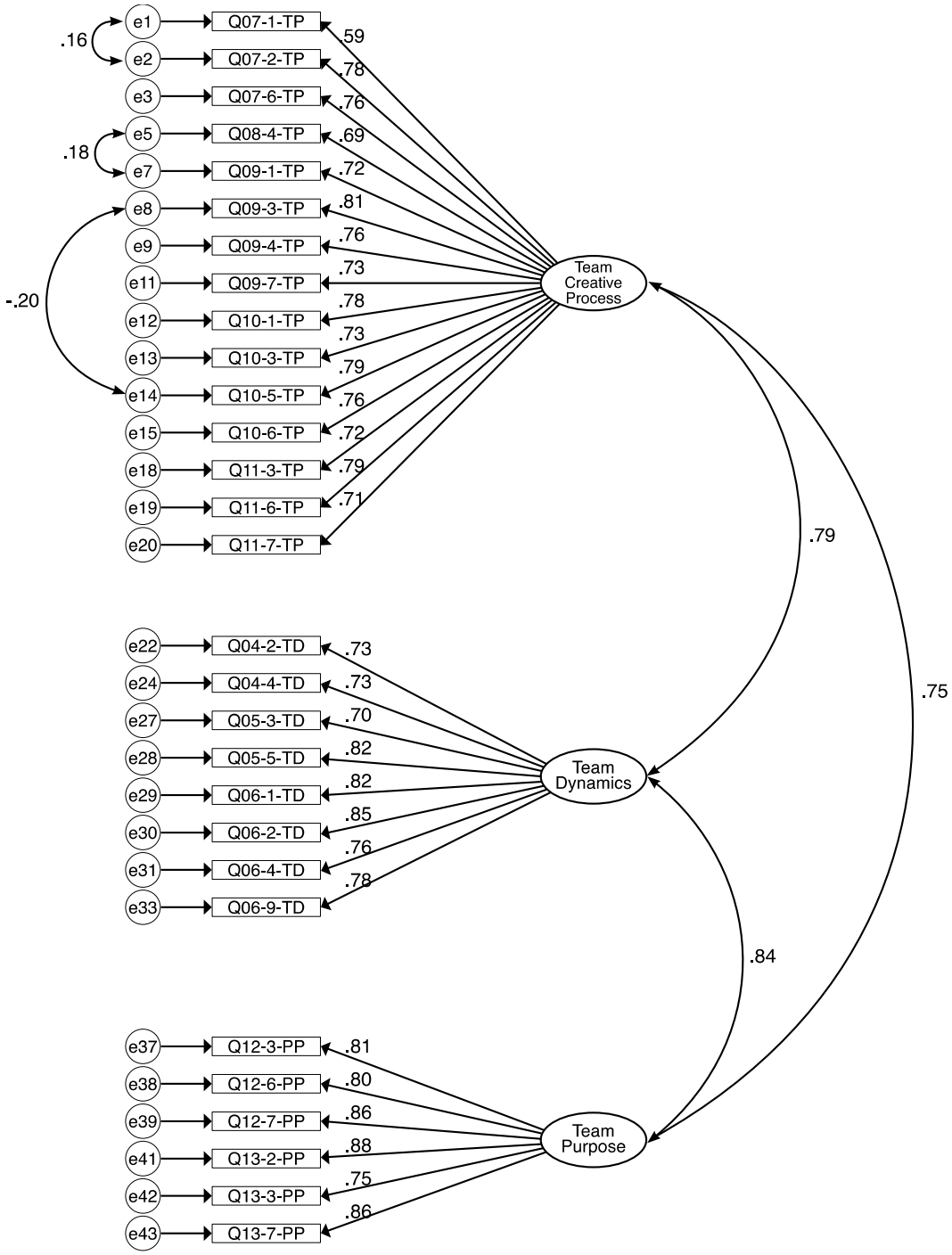


Figure 4.1. Creative synergy scale model resulting from confirmatory factor analysis. Correlations between factors and items are shown. Range is 0–1.

Model fit. By the final round of CFA the CMIN/DF, CFI, and RMSEA were all within acceptable levels. For CFI the range is 0.0-1.0 and > .9 is acceptable (Hu &

Bentler, 1999). In the final round CFI was .97, which was well within the acceptance range. The range for RMSEA is 0.0-1.0 and smaller is better. Hu and Bentler suggest 0.6 or lower. RMSEA in the final round were .04

For CFA the aim is to get a chi-square result that is not statistically significant; closer to 0.0 is better. However, chi-square is impacted by sample size because the equation "is the product of the sample size minus one and the minimum fitting function" (Hu & Bentler, 1999, p. 2). The chi-square was lowered considerably with each round, but will always be significant due to the high sample size (Arbuckle, 2012; Kahn, 2006). Therefore, the CMIN/DF was also included (Kahn, 2006). CMIN/DF addresses the issue because it is a relative chi-square divided by the degrees of freedom, a term that is a function of sample size. The ideal range is a ratio of 3 to 1 or even 2 to 1 (Arbuckle, 2012). The final CMIN/DF was 2.45, therefore acceptable. Based on the CFA, the multi-dimensional scale with three components (Team Purpose, Team Dynamics, and Team Creative Process) and 29 items met goodness of fit standards. This means the model fits the proposed theory that the three factors of team purpose, team dynamics, and team creative process measure creative synergy.

Research Question 2 and Research Question 3

Research question 2 and research question 3 are similar. One asks, what is the relationship between the ten proposed creative synergy concepts and the factors resulting from the factor analyses? The other asks, what correlations exist between the factors that emerge from the factor analyses? Based on the literature review I hypothesized there would be three main factors, each with two to five sub factors resulting in 10 different components, or subscales. Since PCA resulted in only the three main factors, the items in

each factor were run independently through PCA at varying loading thresholds (.2, .3, and .4) to see if multiple subscales existed. For instance, items under Team Dynamics were written about trust, communication, and creative abrasion. However, when the full set of 13 potential scale items were analyzed together using PCA, they all fit under the Team Dynamics component and no subscale distinctions emerged. Thus, these three concepts did not emerge as separate components. Similarly, no additional subscales, or components, were found for the other two constructs (Team Purpose and Team Creative Process). Therefore, there were not 10 different components, only the three overarching constructs emerged as components—Team Purpose, Team Dynamics, and Team Creative Process.

Confirmatory factor analysis revealed a moderately strong correlation between the three factors. The correlations reveal the level of discriminant validity (Brown, 2015). Discriminant validity asks "do variables that should not correlate with the scale score not do so" (Abell et al., 2009, p. 101)? Brown (2005) explains, "a factor correlation that equals or exceeds .85 is often used as the cutoff criterion for problematic discriminant validity" (p. 146). The correlation between Team Purpose and Team Dynamics is .84, between Team Purpose and Team Creative Process is .75, and between Team Dynamics and Team Creative Process is .79. Figure 4.1 shows the correlations. All the correlations were below the .85 cut-off, although the Team Purpose and Team Dynamics correlation was close to the cut-off.

In Phase 1 the Creative Synergy Scale was created using a survey developed from the theoretical basis found in the literature review. The survey was completed by 830 people. Then, exploratory and confirmatory factor analyses were used to reduce the initial

items to those that supported a validated scale. The next phase was to test the new scale with real teams.

Research Question 4 and Phase 2: Scale Testing

Phase 2 was designed to address the fourth research question: do team results of the scale align with the teams' perceptions of themselves? Three teams were invited to participate and provide feedback on the scale. Teams were emailed the Creative Synergy Scale to complete. Once their results were analyzed I met with the full team to share their results and gather their input. Two teams met with me in person, one team met with me online because they were too far away to meet in person. Team members shared their feedback about the scale verbally during the meeting and afterwards via a paper evaluation form. Teams ranged in size from 5–14 people and represented three different professional sectors: higher education, non-profit/financial, and business.

In Phase 2, three types of data were collected. The first type was the responses from team members on the 29 Creative Synergy Scale items and one open-ended question. The second type was the feedback team members verbally shared during the meeting. The results and feedback portion of the meetings were recorded and later transcribed. Transcription was done by a professional transcriptionist. Finally, each team member received a paper evaluation form that included three quantitative questions and four open-ended questions about the scale and the presentation. After each meeting, the teams were also sent an additional feedback form digitally, but only one person responded and their response did not include any new information. The feedback from the teams is incorporated into the sections below.

This section describes each team, explains each team's scale results, and reports their reaction to the scale. Following the details about the team, general reflections are shared. The organizations' names have been changed for the sake of anonymity.

Team scale results. Scores for the Creative Synergy Scale were calculated as follows. As mentioned earlier, each item in the scale had a response of one through six for *strongly disagree* to *strongly agree*. For each team, the average response for each item was calculated. The score for each subscale was the mean of the average scores, also known as the grand mean. The range of responses for each item was also shared with participants.

The scores from all three teams had a similar trajectory. Team Purpose was highest in each team. Team Dynamics was the middle score and Team Creative Process was lowest. Figure 4.2 shows the team results.

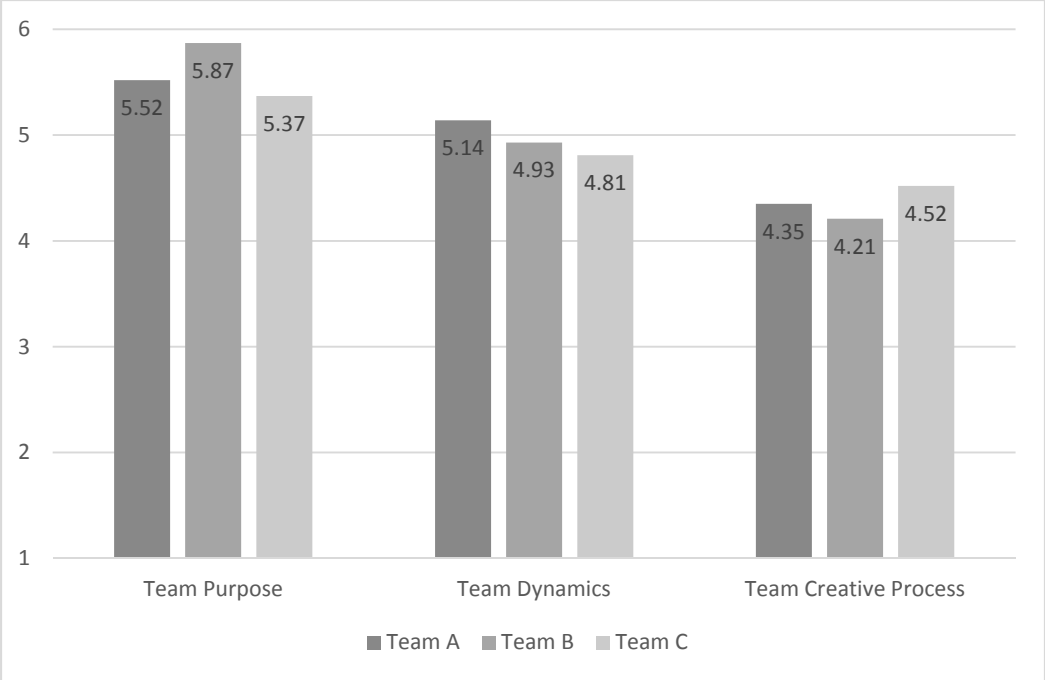


Figure 4.2. Creative synergy scale scores for teams in Phase 2.

With only three teams in this phase it is too small of a sample size to determine if this is typical of all teams or a coincidence. The scale results for each team are explained below, as well as their reactions to the scale. The scale results and evaluation results are included in Appendix H and I.

Team A: University of the Midwest, Student Affairs Team (higher-ed). Team A was a team of student affairs professionals at a large Midwestern university. The team included eight team members, but only seven completed the survey. One male team member was not able to complete the survey, but he was present for the in-person meeting. Of those that completed the survey, four identified as female and three as male. All were white/Caucasian.

The results were shared in-person during a one-hour session at their office. They were eager to understand the results and curious about their meaning. They viewed the

results as beneficial feedback and agreed with the areas needing improvement. Their results were as follows:

Team Purpose: This team scored high in this area with a mean score of 5.52. They strive to reach high quality results and members follow through with their commitments. They should continue to focus on their collective goals and ensure all members are motivated to work towards those shared goals.

Team Dynamics: The team had a mean score of 5.14 in this section. Attention could be given to the two areas where they scored lowest: team members are open with each other about their concerns and team members openly share information with each other. They scored highest on relying on each other's knowledge and experience (M = 5.43). This was tied with I am comfortable being myself with the team, but that item had one response in the *somewhat agree* area. This is an area where the team should pay attention. The range of answers may mean that team members have varying levels of comfort within the team. However, this team scored highest of the three teams in Team Dynamics.

Team Creative Process: The team scored lowest in this area with a mean score of 4.35. Eight items had responses in the *somewhat disagree* category. Areas the team can work on include: clearly stating the challenge or problem to be solved, envisioning a desired outcome, taking time to come up with new ideas, using a variety of techniques to generate ideas, identifying assumptions about problems, discussing pros and cons of potential solutions, identifying criteria for deciding the best ideas, and addressing resistance to new solutions. The area they were strongest in was capturing ideas either visually or in writing.

Overall, Team A scored well in all areas, but was strongest in Team Purpose and Team Dynamics. They scored higher in Team Dynamics than the other two teams. During the meeting it was clear they enjoyed each other's company and respected each other. No one dominated the conversation and everyone contributed more than once throughout the hour-long meeting. When asked what they thought of the results, one participant said, "I think in my mind when reading through this, a lot of this stuff might fit, but I wouldn't have thought about it ever before without doing this. So I think these statements are a good reflection tool moving forward."

There was a sense of openness about the results. Even when examining the items with "somewhat disagree" or "disagree" responses they viewed those as areas to improve and accepted that they had some work to do if they wanted to be more creative together. If anything, they seemed to have a shared drive to improve and were eager to try new techniques and learn more about creativity and Team Creative Process. As one person stated on the evaluation, "there are areas that we can focus as a team and there are tools and resources to help us do that." Their biggest challenge was finding time. One person stated,

> For what it's worth, as I looked at these results, I think we're pretty uniquely positioned because a lot of time I figured you have to first figure out what your purpose is. So being able to feel like we're doing pretty well there frees us up to really focus on what else do we need to do to help ensure that there is good trust amongst the group. Because the Team Dynamic is pretty solid, but maybe we have a couple of things to tweak. And I think with our processes I do think there is the time sensitivity piece to it, the time intensiveness, and how do we create some space and share some ownership in implementing some things that are different.

Perhaps their reflective nature and openness is related to the work they do. They work with college students who are student organization leaders helping them to develop

their leadership skills. They push students to be reflective, engaged learners and can only do this well if they are also role modeling that behavior. Therefore, it was not surprising that Team A was also engaged and reflective when examining the results of the Creative Synergy Scale. The evaluation asked each person to share their response to this statement: "I felt the Creative Synergy Scale results accurately represent our team." On a scale of one to six, this team responded with an average of 5.5. Results from each team are shown in Table 4.9.

Table 4.9

Mean Results From Creative Synergy Scale Evaluation

	Mean (1=strongly disagree, 6= strongly agree)			
Evaluation Item	All Teams (n=24)	Team A (n=8)	Team B (n=5)	Team C (n=11)
I feel the Creative Synergy Scale results accurately represent our team.	5.20*	5.50	5.8	4.65*
The Creative Synergy Scale will be valuable for other teams aiming to achieve creative synergy.	5.33	5.75	6.0	4.7
I would recommend the Creative Synergy Scale to other teams.	5.29	5.5	5.8	4.9

*One person in Team C did not answer the first question, reducing the n by 1 for that mean.

Team B: Financial Services Association, Business Development Team (non-profit). Team B was a business development team of a large, non-profit, national trade association that supports businesses in the financial industry. The five team members were all female and identified as white/Caucasian. Two of the team members work remotely and three work in the same location. They meet in person at least twice each year. The scale results were shared with them during a 90-minute meeting at their office during one of their biannual meetings. Here are their results.

Team Purpose: The team score was very high in this area at 5.87. All responses were in the “agree” and “strongly agree” categories. The results showed a 6.0 for the items about dedication to reaching goals, working towards shared goals, and motivated to produce excellent results.

Team Dynamics: The team dynamics mean score was 4.93. They scored highest in relying on each other’s experience ($M = 6.0$). They scored lowest in being open with each other about their concerns ($M = 4.20$) and respecting each other’s different working styles ($M = 4.20$).

Team Creative Process: Their mean score for team creative process was 4.21, their lowest score, and lowest of the three teams. Nine of out 15 items had responses in the “disagree” or “somewhat disagree” category. Only three items had responses in the “strongly agree” category. This is clearly an area this team can work on. Based on the conversation it became clear they were not familiar with a creative process or tools and techniques they could use to enhance their skills to generate ideas or challenge their own assumptions about a problem. They had a wide range of scores for the individual items, with means ranging from 3.60 to 5.40. They scored highest in capturing ideas visually or in writing ($M = 5.40$). Their lowest scores were in identifying criteria to help decide on the best ideas ($M = 3.60$), considering ways to address resistance ($M = 3.60$), and identifying assumptions about problems ($M = 3.60$).

Team B scored higher than the other two teams in Team Purpose. Based on the type of work they do this was not surprising. They are a driven team with a strong desire to create valuable products and programs for their customers. They also enjoyed each other’s company and seemed to have a light-hearted camaraderie with each other. There

was a lot of laughing and playful joking throughout the meeting. However, of the five women, only four spoke during the meeting. One person was very quiet and did not share any comments. The other four team members participated evenly and were open and curious about the results. When asked what they thought of the results, one participant stated,

> I personally think that they are awesome in the sense that if you want to continue to grow and strengthen the team dynamics, you know exactly what you need to keep focusing on and where you have the opportunities for improvement, and that is not always so clear. This makes it very simple and easy to see where you can pinpoint and focus that energy to make the team gel even better than we all feel it already does.

The areas they were strongest in, particularly Team Purpose, affirmed what they were already doing. Whereas, the areas where they were not as strong provided insight into where they could improve. Many of the team members are trainers with a focus on learning and development with a mindset of continual improvement. This background likely helped them approach the Creative Synergy Scale results with a sense of openness and eagerness for where they could improve.

Team C: Creative Services Agency, Staff Team (for-profit). Team C was the entire staff of a small, private creative services agency that provided web design, graphic design, and strategic marketing to clients. Team members included developers, designers, and the company founders/owners. Fourteen members completed the survey, five men and nine women. All identified as white/Caucasian. The results were shared with them in a webinar-style meeting that lasted 75 minutes. The team was together in their office, but they are based in another state 450 miles away from me so I connected to them via GoToMeeting. This provided an additional challenge when debriefing the scale because I

could not pick up on nuances such as facial expressions and body language. Their results are explained here.

Team Purpose: The team scored a mean of 5.37 for team purpose. This was the lowest score in this subscale for the three teams. This was most likely because while the staff work together they often form sub teams to focus on specific projects. The email I sent specified to answer the scale thinking about the full team. There may have been some confusion with regard to which team they were supposed to be referring to in answering the questions and some may have answered about a sub team. One question asked how many people were on the team and of the 14 people, three answered between 3–6 and one responded with between 10–12. This indicates some people may have been thinking of different configurations of the team and that may have skewed their results. The team scored highest in striving to produce quality results ($M = 5.64$) and willing to work hard to ensure the team succeeds ($M = 5.64$). Their lowest score was in following through with commitments ($M = 5.07$). In response to their team purpose scores, one participant said, "I guess I would agree that I was expecting this result or I expected team purpose to certainly be the highest just because I feel like everyone here is motivated and engaged...and committed."

Team Dynamics: For team dynamics their mean was 4.81. They were strongest on relying on other's experience and knowledge ($M = 5.29$) and members feeling comfortable being themselves with the team ($M = 5.07$). They scored lowest on openness about concerns ($M = 4.57$) and respecting each other's working styles ($M = 4.57$). In response to the Team Dynamics score, one participant said,

> I think I was disheartened to see how many disagree and somewhat disagree in this category, but I'd like to have it pointed out—you can't work on something if

> you don't know that it is there. So I think on the second, the team members respect each other's different working style, and our team corporates to work through differences, was just a little discouraging. But it is what it is.

The question arose of how important it was to consider the outliers. Some of the items had only 1–2 responses in the "disagree" or "somewhat disagree" categories. One participant said,

> So my thought on this is how much do we weigh the results? Because one person doesn't like it, someone else disagrees, but then seven agree. So it's like when there's such a high majority one way, how do you come to terms with the outlier that doesn't? Do you change everything? Do you figure out—I mean, how do you solve this if it's not a majority or even a large minority? You don't want to leave someone behind, but if you make too much change, do you destroy the 95 percent that likes what's going on? So I think that's what I would be interested in figuring out—how do we weigh this?

Another participant followed with an additional comment.

> Well, I guess I'll kind of reiterate what [Participant G] said. The two questions that you pointed out [Participant G], the second one and like the third to last one, those two were the ones that I had questions about. And I guess maybe I'm the one that disrespects people's working styles, though I don't see it, (laughing) but I guess that's something I'd like to understand more about. What does that mean?

The technical definition of an outlier is "a data point that is far outside the norm for a variable or a population" (Osborne & Overbay, 2008). It generally refers to something unusual enough to raise suspicion. This scale was designed for a small group of people, between three to 20. In this case the team was only 14 people. If two out of 14 answer in a certain way then it is 14% of the group, not a true outlier. With such a small number of responses it is important to consider every response. If two to three people have indicated *disagree* or *somewhat disagree* then it would be important to examine why they have responded this way. It may indicate they are having a different experience from others in the team. One participant pinpointed the risk via a comment on their

feedback form. They said, “hopefully we focus on the outliers instead of dismissing them as such, or we risk them becoming toxic.”

Team Creative Process: This team had a mean score of 4.52. In this subscale they scored highest in capturing ideas visually or in writing ($M = 4.93$) and strategizing how to overcome obstacles ($M = 4.93$). Several comments were made about lack of time being a challenge, which was reflected in one of the items they scored lowest in “our team takes the time needed to come up with many ideas” ($M = 4.21$). They also scored low on using a variety of techniques to generate ideas ($M = 4.14$) and evaluating the effectiveness of new solutions ($M = 4.21$).

Of the three teams, Team C scored highest in Team Creative Process. Considering the creative work this company does, this was not surprising and somewhat expected. When I explained the Creative Problem Solving process to them, even though they did not know that specific model, they said it was similar to how they worked. Some of the team members were open and curious about the results, others were quiet and did not share much, and some seemed somewhat concerned about the results.

When asked if they believed the scale was an accurate representation of their team, one person wrote: “I don't think it aligns with what I thought, but if people were honest then I guess it is.” This represents one of the benefits of the Creative Synergy Scale, to reveal truths that may not be transparent to everyone. This concept will be examined more in the next chapter.

Two participants also commented on the accuracy in the following dialogue:

> *Participant A:* I think it’s somewhat because I—and everyone who knows me will probably understand why I’m saying this. One person or two can sway both ways a lot.

> *Participant B:* But that's why I agree with it because you have those outliers, you know what I mean? So I think that is where the conversation is.
>
> *Participant A:* Yeah, I just think it's interesting that way that I think it is somewhat indicative. I think it's one method to help us in discovering really what do we do. I feel like it's a start, then the next step for us is to figure out what really is underlining this. Like [Participant E] said, everybody came from a different perspective, so I think that's why I think it's a great start, but it can't be the end all. . . . So I like that it's a great starting point and then we need to start digging deeper.

The Creative Synergy Scale was designed as a tool to help teams become more creative together. It was designed to help them assess their current state and identify areas they can improve to achieve a higher level of creative synergy. The implications and ways to use the scale will be further explored in Chapter V. The next section expands on the feedback from the teams on the accuracy of the scale.

Feedback on the Creative Synergy Scale. The primary purpose of Phase 2 was to determine if the Creative Synergy Scale results aligned with the teams' perception of themselves. In order words, how accurate did the scale seem. Teams were asked about this toward the end of the meeting and they were invited to complete a paper feedback form to provide quantitative and qualitative impressions (See Appendix D).

The first item in the paper evaluation forms stated, "I felt the Creative Synergy Scale results accurately represent our team." Twenty-four evaluations were received from all three teams and the mean response was 5.20 on a 1 to 6 scale with one being "strongly disagree" and six being "strongly agree" (n = 23, one person did not answer this item). This showed the teams agreed that the scale felt accurate. This affirmatively addressed research question 4. There were many comments during the meetings and in the form supporting the quantitative results. Here are a few of the comments about the accuracy of the scale:

- “Overall just looking at it for what it is, it feels pretty accurate, at least from my standpoint anyway.”
- “I don’t think that any of the responses surprise me. So to me that kind of signals that . . . we all are kind of on the same page. Even with the ones that have a wide spread, none of them really surprise me, I guess.”
- “And if I’m just looking at the scale at a glance and I’m like yes. That’s like totally on target. That’s our strong suit, that’s our weak point.”
- “No, I don't think it aligns with what I thought, but if people were honest then I guess it is.”

In addition to assessing the scale’s accuracy, team members were asked if they felt the results were easy to understand and what, if anything they would change. The overwhelming response was as simple as this comment, “I thought it was really easy to understand.”

A few suggestions were made to improve readability of the results. If the changes suggested were minor and simple then, where possible, they were incorporated into the presentation of the next team’s results. For instance, the first team suggested that the rows of the table alternate colors to make it easier to read. This change was implemented for the latter two teams (see Appendix H).

The evaluation also asked “what did you learn today?” Team members learned more about their team and about creative synergy in general. Here are a few responses:

- Affirmation that our team understands our purpose and seems to be on the same page.

- Our clear purpose is refreshing and knowing our challenges are shared by the team gives a clear direction for improvement.
- There are areas that we can focus on as a team and there are tools and resources to help us do that.
- Understanding creativeness comes in several methods.
- We need to develop more tools to allow those to be more creative.
- I learned the range of where we are at and what things we should work towards.
- I learned that people are not fully comfortable and some feel disrespected, which is disheartening.
- In general, we are aligned, but the outliers mean that the experience is not necessarily shared.

Another question in the evaluation asked, "How will the results from the Creative Synergy Scale help your team?" Team members responded that the results helped them identify their strengths and areas to improve. One team member said it well, "At a minimum it gives us a chance to reflect on our collective strengths and opportunities to improve. We have an opportunity to take more time to be intentional in building trust and introducing new process in team settings." Another stated, "I think that the result will serve as a platform to discuss possible/potential areas for improvement. It gives us a reason to have the difficult, painful conversations." Those difficult, painful conversations can help teams deepen their level of communication, trust, and creative abrasion. In essence, it can help them strengthen their team dynamics. If the Creative Synergy Scale

can be a catalyst for difficult conversations that lead to positive, healthy change then it will be a valuable tool for teams.

As a whole the teams found value in completing the Creative Synergy Scale. They felt it accurately represented their team. In sum, research question 4 was positively answered. Yes, team members felt the Creative Synergy Scale aligned with their perceptions of themselves. This increases the validity of the scale, although these three teams are only the beginning and more research will be needed.

Summary

The development of the Creative Synergy Scale involved a robust process of designing a new scale to help teams assess their current state in relation to creative synergy. The scale went through a process of factor analysis and then was tested with three teams to assess validity. The results showed three factors that impact creative synergy in teams: Team Purpose, Team Dynamics, and Team Creative Process. The feedback from teams provides evidence for face validity.

The next chapter further explores the meaning of the results, discusses limitations, offers recommendations for how to use the scale, and provides recommendations for how to develop creative synergy in a team.

Chapter V: Discussion and Recommendations

We are in an era where creativity matters. Businesses, schools, and non-profits are operating differently than they did decades ago, well at least the successful ones are. As we move into the future, one guarantee is that things will continue to change. In order to adapt to change we need creativity to help us evolve, to solve new (and old) problems, and to make a difference in the lives of others. Because the world is complex, we also need the collaborative power that comes from teams. Teams are complex adaptive systems. They can adapt to become more creative together (Amabile, 1996, 1998; Csikszentmihalyi, 1996; Paulus & Nijstad, 2003; Sawyer, 2007) or they can wither, stagnate, and delve into a process of groupthink where no one dares share original ideas (Paulus & Nijstad, 2003; Wong et al., 2009). When teams thrive they can achieve creative synergy, that state where they are collectively more creative than the sum of their parts. This research revealed three elements of creative synergy: Team Purpose, Team Dynamics, and Team Creative Process. Achieving proficiency in these three areas can be challenging. Therefore, the Creative Synergy Scale was designed to help teams assess their current state in regards to those three elements. Understanding their current state will help teams move to their desired future state of being more creative together.

Summary of Key Findings

Developing the Creative Synergy Scale was a two phase process. In Phase 1, 830 adults responded to a survey about a team they were a member of. Through exploratory and confirmatory factor analysis, a scale was created and three factors critical to creative synergy were identified: Team Purpose, Team Dynamics, and Team Creative Process. In

Phase 2, the new scale, called the Creative Synergy Scale, was tested with three teams to determine face validity.

The factors influencing team creativity can be divided into four quadrants based on two intersecting pairs of variables. On the horizontal axis is Input on the left and Process on the right. Input variables are present before the team forms (e.g., education level of team members, personalities, the organization's reward structure). Process variables occur once the team gets together (Hackman, 1987). Examples include the team's decision making process, level of trust between team members, accountability from external leaders. On the vertical axis are Internal variables on the top and External variables on the bottom. This research study focused solely on internal-process variables, essentially those elements of within-team behaviors that are present only once a team forms. For example, communication, level of trust, and collaborative processes are types of internal-process variables. I did not examine individual skills or strengths of team members, leader influence, or environmental factors that might impact a team's creativity. While those other factors can influence creativity, internal-process is the most impactful quadrant of a team's creativity (Hülsheger et al., 2009).

The Creative Synergy Scale that evolved from this research identified three internal-process variables that impact creative synergy. These emerged from the factor analysis process into three subscales. Examples of items from each subscale are below. For a complete list see Appendix H.

Team Purpose:

- Our team is dedicated to reaching our goals.
- Team members are motivated to produce excellent results for the team.

Team Dynamics

- Team members openly share information with each other.
- Our team cooperates to work through our differences.

Team Creative Process

- Our team uses a variety of techniques to generate ideas.
- Our team explores each challenge from several angles.

The items are based on observable behaviors and the participant's experience with the team. Answering the items requires the participant to be familiar with the team's process, patterns, and typical behavior. Therefore, the scale is useful only for established teams. Although, there is no minimum time they must be together since group development varies from group to group (Garmston & Wellman, 2009; Katzenbach & Smith, 1999; Tuckman & Jensen, 1977).

This chapter will synthesize the new results, present a new model of creative synergy, provide recommendations for practitioners who are working with teams, and explain contributions to the fields of leadership and creativity. Limitations and future research will also be discussed.

The Creative Synergy Model

The results of the research revealed three factors critical to creative synergy: Team Purpose, Team Dynamics, and Team Creative Process. Each factor plays a critical role in a team achieving creative synergy. Together these create the model of Creative Synergy in Teams (see Figure 5.1). In this section, each element of the model is explained with reference to the results.

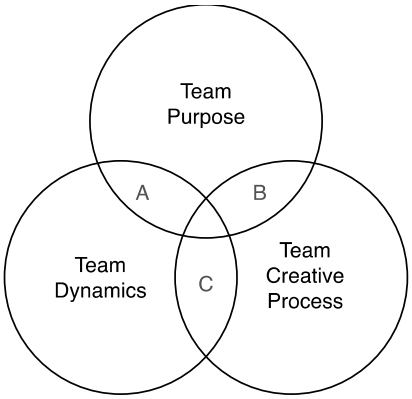


Figure 5.1. Creative synergy in teams.

Team purpose. Team purpose is the team's collective focus, their shared goals, and the team's commitment to reaching the goals. Without a clear sense of direction, the team flounders (Katzenbach & Smith, 1999; Larson & LaFasto, 1989). They might get frustrated by the lack of purpose or they might enjoy the camaraderie (if team dynamics are high), but regardless of how they feel there will not be significant output. In the survey in Phase 1, items related to Team Purpose were created for shared goals and team commitment thinking that these may evolve as two separate sub factors within Team Purpose. For instance, one item about commitment was, "team members follow through with their commitments." An item about shared goals was, "all team members work toward our shared goals." Statistically, these items did not load on separate factors. This implies that shared goals and team commitment are intertwined and connected. For instance, shared goals without team commitment are only a list of goals, not *shared* goals. Commitment is not possible without shared goals because what would the team be committing too? Shared goals leads to team commitment and team commitment leads to shared goals (see Figure 5.2). Together these create Team Purpose. The three teams in Phase 2 all scored highest in team purpose.

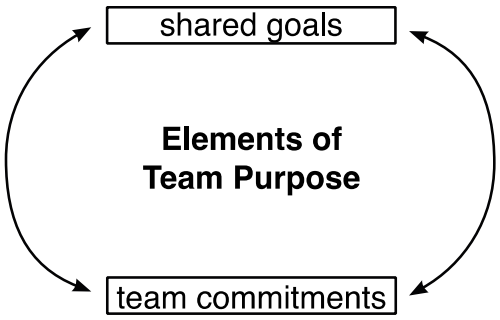


Figure 5.2. The elements of team purpose

Team dynamics. Team Dynamics are the behaviors and interactions within a team and the relationships between the team members. The specific team dynamics that have the greatest impact on creative synergy are trust, communication, and creative abrasion (Hill et al., 2014; Hülsheger et al., 2009). Trust is the belief that I can be myself and bring my best self to the team. I know that my team members will not belittle me for an unworthy idea or unintelligent remark. In addition to trust, a moderate level of communication is ideal for creative teams (Kratzer, Leenders, & van Englen, 2004). This means that teams need to clearly convey information, knowledge, and ideas with each other, yet they also need external influences. If they become too insular it can decrease creativity (Hülsheger et al., 2009). Creative abrasion is the third element. Creative abrasion means the team is comfortable disagreeing around ideas, plans, and concepts. They speak their mind and avoid groupthink. However, they do not engage in conflict because of personal identity or personalities (Hill et al., 2014; Hirschberg, 1999). Similar to Team Purpose, factor analyses did not show these three elements as three separate factors. Again, this may be because they are so intertwined and interconnected. An item asking about trust was, “I am comfortable being myself with this team.” An item asking

about communication was, “Team members listen to each other.” An item about creative abrasion was, “Team members are open with each other about their concerns.” Figure 5.3 shows the three elements of team dynamics. Essentially, clear communication increases trust, increased trust leads to comfort with creative abrasion, and successful creative abrasion improves communication. When teams engage in healthy cognitive conflict and avoid affective conflict it increases trust. This interconnection explains why team dynamics can be difficult to develop. Of the three factors needed for creative synergy, team dynamics may be the most complex.

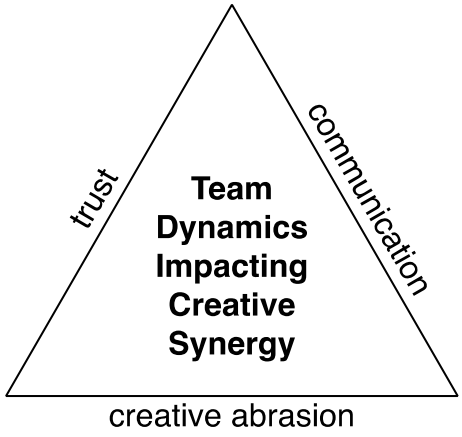


Figure 5.3. Team dynamics impacting creative synergy in teams

Team creative process. Team Creative Process is the collaborative use of tools, techniques, and strategies leading to breakthrough thinking. Items were written to follow the general creative process of problem-finding, problem-solving, and solution implementation (Basadur, 1994) but more specifically the Creative Problem Solving process, as well as to incorporate both divergent and convergent thinking (Basadur, 1994; Puccio et al., 2006, Sawyer, 2012). Factor analysis also did not indicate that there were any subscales in the Team Creative Process factor. Again, this is likely because the

elements of creative process are intertwined and connected with each other. An example of an item asking about clarify was, “Our team identifies the assumptions we have about a problem.” An example of an item about ideate was, “Our team uses a variety of techniques to generate ideas.” An item about develop was, “Before selecting the best solution, our team considers several options.” An item asking about the implement stage was, “Our team considers ways to address resistance to new solutions.”

Creative process is somewhat cyclical and teams can enter the process at any point on the cycle. Sawyer (2013) refers to the process as a zig zag because it can be valuable to bounce around within the cycle. Even though most creative process models may be written as linear (i.e., cyclical is still linear) they are rarely enacted in such a clean, tidy way.

All three teams scored lowest in Team Creative Process. I believe this is, in part, because as a society we have a lower level of collective consciousness around creative process than we do around team purpose or team dynamics. For instance, during the team meetings in Phase 2, I briefly explained the Creative Problem Solving process to each of the three teams. Two of the teams were not aware of a creative process. The creative services agency did not know Creative Problem Solving in particular, but they understood and used the general creative process. However, they did not know many tools and techniques for each stage. They confessed to primarily using brainstorming as an idea-generation technique. After seeing the scale results, one participant commented on this and said,

> I’ve been reading and storing ideas on different ways instead of brainstorming, we kind of do it the same way and I looked up different ways that we could do it. . . . I think that maybe I should try to help implement that in a couple of cases and see if they like it or don’t like it or if they find value or not.

I hope their participation in this research and experiencing the Creative Synergy Scale will be the catalyst needed to experiment with new ideation techniques.

I have found within my consulting practice that teams generally understand why team purpose and team dynamics are important, but they often are not familiar with creative process. The collective consciousness around creativity and innovation is increasing, in part due to a surge of research in the last 10 years on creativity in teams and to more popular books, videos, and courses on creativity. For instance, the most viewed TED talk is called *Do Schools Kill Creativity?* by Sir Ken Robinson (2006). It has been viewed 38 million times.

The Venn Diagram in Figure 5.1 shows a new model of creative synergy in teams. Each circle is based on the three factors of creative synergy. Some teams will have only two of the three factors of creative synergy. These intersecting components are labeled A, B, and C on the model and explained in this section.

A. Intersection of team purpose and team dynamics. Teams without creative process, but with purpose and strong team dynamics will be effective teams, but they will not be creative teams. Not all teams need to be creative. If a team does not need to be creative and develop new programs, processes, or ideas then this may be the ideal spot for that team.

B. Intersection of team purpose and team creative process. Collaboration is a critical element of creative synergy (Sawyer, 2007). Collaboration requires trust (Costa & Anderson, 2011), communication (Hoegl, 2001), and creative abrasion (Hill et al., 2014; Hirschberg, 1998). Without the team dynamics needed to collaborate the team will not be a team and be more like a nominal group, a collection of individuals working towards the

same goal. When teams lack effective team dynamics, but have a clear purpose and know how to use a creative process their dysfunction may lead to self-sabotaging behaviors (Kegan & Lahey, 2009) and competition for recognition (Kohn, 1999).

C. Intersection of team dynamics and team creative process. Team purpose is critical for a team and without it there is no team (Katzenbach & Smith, 1999). If a group of people do not have a clear purpose, but have strong team dynamics and team creative process then they will have no impact, but may enjoy each other's company. This could be a group of friends who are creative together. There is not a clear focus on achieving anything in particular, but they have developed a high sense of trust, they communicate well, and are comfortable with disagreeing on concepts or ideas. If they develop a clear sense of team purpose they would have the capacity to be an effective, highly creative team.

The Creative Synergy Model evolved from this research study. Next I examine how the Creative Synergy scale could be used and how leaders can build creative synergy in teams.

How the Creative Synergy Scale May Be Used

The Creative Synergy Scale was designed for teams with between three to 20 people who are striving to be creative. It provides a snapshot of the team's current state of creative synergy. Therefore, it is only useful for existing teams that have some history together. New teams will most likely not be able to answer the items. There is no recommended minimum time the teams need to be together, because there are too many variables that contribute to a team's growth. A team that has been together for two years may be less developed than a team that has been together for two months. At minimum,

the team members should have had time to get to know each other, have made a few decisions together, and had the opportunity to be creative together.

Given these parameters, the Creative Synergy Scale can be used as a one-time or regular assessment tool to help team members understand their creative synergy. There are numerous ways the Creative Synergy Scale can be used to help teams develop. Here is a short list of ideas:

- Use the scale to teach teams about creative synergy. When learning new skills, people need to connect the new knowledge to their own lives (Dewey, 1938). The Creative Synergy Scale is a great tool to help individuals understand creative synergy and make it relevant to their own experiences.
- The Creative Synergy Scale can be used as a pre/post assessment for teams who are using training, facilitation, and coaching to enhance their creative synergy or any aspect of the subscales: Team Purpose, Team Dynamics, and Team Creative Process.
- FourSight Thinking Profile and the Creative Problem Solving Profile are assessment tools used by individuals and teams to understand their preferences within the Creative Problem Solving process (Basadur et al., 2014; Puccio et al., 2014). When paired with either of these tools, the Creative Synergy Scale can help teams understand how their preferences emerge within the team and help them see where to better apply their strengths.

This is a preliminary list of how the Creative Synergy Scale can be used with teams. As the scale continues to be developed and refined through future research, a

deeper understanding of its impact will emerge. This will likely lead to more ideas for how the scale can help teams reach a high level of creative synergy.

A detailed discussion of how to facilitate the scale with teams is beyond the scope of this dissertation. However, here are few observations based on the experience in Phase 2. When using the scale, thoughtful consideration should be given to why it is being used, how it will be implemented, when the assessment will be done, and if appropriate, redone. Facilitators, team coaches, leaders, managers, and trainers should be mindful to facilitate the debriefing process with integrity, care, and a sense of openness. It can be especially difficult if the facilitator does not have rapport with the team or if there is not a level of trust within the team. This was one challenge I faced with Team C.

Team C was the Creative Service Agency and due to their distance I met with them in an online webinar format. This created an interesting challenge. I felt it was difficult to facilitate because I could not read body language, see eye movement, and sometimes hear tone of voice. I would not recommend this format of facilitation for the scale unless the facilitator already has a rapport with the team members and knows them fairly well. A closer pre-existing relationship may have helped alleviate some of the distant-ness that I felt during the meeting. Additionally, had I been present in person I would have been able to ask more poignant questions and dig deeper with the team about their results and ensure all voices were heard (some team members did not speak during the meeting). This may have helped them further examine the meaning of the results and understand the implications for their team.

The Creative Synergy Scale may be used to provide valuable feedback to teams about their current state of Team Purpose, Team Dynamics, and Team Creative Process.

Facilitators should make recommendations to the team to help them reach more optimal levels for any of these elements and achieve greater creative synergy. More details about these recommendations are provided in the next section.

How Team Leaders Could Build Creative Synergy

Creative synergy can help teams solve adaptive challenges, challenges requiring solutions that we cannot yet imagine (Heifetz, 1994). This is the true value of creative synergy. Using creativity, we can invent new solutions to our many problems, solutions that we have not yet imagined. Leaders play an important role in the development of a team's creative synergy and therefore, in the development and implementation of new solutions.

The model of creative synergy shows a simple Venn diagram with three factors teams need in order to achieve creative synergy (Figure 5.1). While the concepts are simple, developing creativity in a team may not be a tidy, simple process, in part because teams are complex. Teams "are complex entities embedded in a hierarchy of levels and characterized by multiple, bidirectional, and nonlinear causal relations" (McGrath, Arrow, & Berdahl, 2000, p. 98). Fortunately, one of the principles of complex adaptive systems are that small changes can have big impacts (Garmston & Wellman, 2009; Heifetz, Grashow, & Linksy, 2009). This means even implementing one or two of these ideas may increase your team's creative synergy and therefore their creative output. However, adaptation and change take time (Heifetz et al., 2009). One of the greatest gifts you can give to your team is the dedication to helping them develop their creative synergy. The rewards will be immense for you, for them, for the organization, and perhaps even the world.

If leaders, facilitators, and team leaders use the Creative Synergy Scale it can be an effective tool to help teams grow into high-performing creative teams. This section provides recommendations for those interested in building creative synergy in their team.

How to improve team purpose. Teams need a clear sense of purpose. All three teams in Phase 2 of this study scored highest on team purpose, which includes a combination of team commitment and shared goals. Of the three factors of creative synergy, it may be the most straightforward. However, that does not mean it is easy.

As a leader there are a number of ways to develop team purpose. The first is that you must be very clear yourself about the purpose of the team. This may seem obvious, but it does not always happen. Here's an example. Through my consulting practice, I once worked with a new team within a large organization. The new team was created after the unit restructured. The team members were dedicated, motivated, and eager to do well in their new team. Even though the process of change was difficult, they believed the changes were positive and would be valuable in the long run. Due to the transition, some team members were temporarily doing two jobs and everyone was overwhelmed with the volume of work. The team members did not feel they had the authority to always determine priority for their work, so they sought the input of their supervisor, a member of the executive team. The supervisor never gave them a direct answer and always said that everything was equally important. Needless to say, the team members became frustrated. The challenge was the team did not have a clear purpose. They had a general, high level purpose to provide great customer service, but that was the same purpose everyone in the organization had. It was difficult for any of them to truly clarify their team's purpose, increasing their confusion (and their boss's) about priorities.

On one hand, team purpose seems like such a simple concept, but when faced with the complexities of organizational life, it can be a challenge for a team to narrow in on one purpose. When they do, the results can be impressive (Larson & LaFasto, 1989). With a clear sense of purpose, prioritization becomes evident, shared goals are easier to create and follow, and team commitment soars. In addition to the leader being clear themselves about the team purpose, here are three additional recommendations for how to increase team purpose.

1. Talk about the team's purpose frequently. Everything the team does should ultimately connect back to their purpose (Bennis & Biederman, 1997; Katzenbach & Smith, 1999). Mentioning it once a quarter is not enough. It should be reflected in the decisions you make, the emails you write, and the way you talk about projects. Be repetitive. Be redundant. Be congruent. Always connect the work back to the purpose. Ask team members what they think the team's purpose is. Provide clarification and redirection, as needed. Be able to explain the purpose in less than one minute (Sinek, 2009).

2. Clarify team values. When team members align with the team values their commitment increases (Bishop & Dow Scott, 2000). Values drive actions and actions drive results. If the values can be identified and developed collaboratively that is even better and will further increase commitment. Examples of values a team might hold are integrity, inclusion, innovation, sharing knowledge, and building skills. If a team values creativity and innovation they may decide to spend time and resources deliberately working to improve their creative synergy. This may include creativity training, experimenting with various ideation techniques, and examining their results from the

Creative Synergy Scale. If a team does not value creativity they would spend time in other ways.

3. Collaboratively develop team goals. Every team member should be able to explain the team's top three goals. Often, lack of team commitment from team members is not based on an unwillingness or lack of interest, but rather on ambiguity about the goals and what they should be working towards (Larson & LaFasto, 1989). For example, I was leading a training with an executive team of a medium-sized company and I asked the team what their team goals were. They stared at me a moment, then looked around at each other. There was some stammering and muttering and some excuse for why they could not answer the question. Each executive had goals for their specific team (e.g., marketing, human resources), but collectively the executive team did not have shared goals. It soon became clear they had not realized the importance of team goals. Needless to say, their homework was to develop shared team goals.

These are a few recommendations for how to develop a stronger sense of purpose within a team. While it may seem relatively straightforward it is often overlooked by some team leaders and team members. Taking the time to determine team purpose and assure everyone is in alignment is a valuable use of time and will save time later when difficult decisions must be made.

How to Improve Team Dynamics

Three areas of team dynamics are critical to developing creative synergy: trust, communication, and creative abrasion. I will provide some general recommendations for each area, but this is not a detailed guide; that is far beyond the scope of this dissertation.

In some ways developing team dynamics might be the most difficult area of the three to develop. I believe this is because in both team purpose and team creative process you can follow a relatively clear path. However, team dynamics are more complex and are the root of why teams are complex adaptive systems.

Trust. Trust is perhaps the most important and the most difficult to develop (Lencioni, 2002). The first challenge is to help team members understand what trust is and the importance of trust. In the words of Lencioni (2002) "trust is the confidence among team members that their peers' intentions are good, and that there is no reason to be protective or careful around the group. In essence, teammates must get comfortable being vulnerable with one another" (p. 195). The goal is that the team gets to a place where they can focus on the creative work they are doing rather than wasting time and energy jockeying for political power and guarding their interactions within the group. As trust and psychological safety is developed the team's productivity, sense of team identity, and group learning increases (Faraj & Yan, 2009).

In Phase 2 during the meeting with Team A they talked about the need to be open and trust each other. In particular, one person said,

> so that was an insight to me of like oh, not everyone feels about the team dynamics the same as I do. And wow, what can I be doing differently because I guess my goal will be that everyone is in the *agree* or *strongly agree* in those categories of team members are open, they listen to each other, they openly share information, they cooperate too. I guess those are things I'm like yeah, I think we do those things well. And so others that don't, I'm like okay so why don't they and how do we move through that? Because I think if we are *agree* or *strongly agree* would be great.

A moderate level of trust and psychological safety is sufficient for creative synergy (Barczak et al., 2010; Fairchild & Hunter, 2013). In general, it is difficult to trust others we do not know well. Therefore, part of the process in developing trust is getting

to know teammates well. As Margaret Wheatley (2007) states, “you can’t hate someone whose story you know” (p. 57). This does not mean you must know all the intimate details of their life, but to know who they really are helps us understand each other. There are numerous activities and exercises that can help facilitate this process. Some teams can experience resistance to team building type activities, most likely due to negative experiences in the past. Be sure the approach you take is genuine and gives participants flexibility in what they share. It can often be nice to have the leader go first to model for the group. In addition, tools such as the FourSight Thinking Profile or the Myers-Briggs Type Indicator can be useful to enhance self-knowledge and increase understanding of teammates.

At a minimum, leaders should know that building trust among a group is a gradual process, but it does not need to take a long time. When designing the Creative Synergy Scale, one of the reasons I specifically did not want to include a minimum time limit for teams is that time can be an arbitrary factor for building trust. Yes, you need some time to build trust, but time is not the most critical element. For instance, for the last four years I have been working with Outward Bound as an instructor. Outward Bound is an experienced-based, outdoor leadership program designed to teach resilience, compassion, and courage. Courses are usually nine to 21 days long and include approximately 10 people who, generally, do not know each other before they arrive. During a nine-day course I have seen adult participants grow to trust each other more than teams who have worked together for six years. At the end of one course, a participant said to the group, “I trust you all more than I do anyone in my life.” What is more important than time is the willingness for team members to take risks with each

other. This must start with the leader. If the leader demonstrates vulnerability among the team and supports team members in doing the same, it is easier for others to take risks by sharing insights, ideas, and feedback. The resulting relationships and sense of team identity will be worthwhile leading to a higher level of creative performance (Hirst et al., 2009). If team members cannot be vulnerable with each other it means they may hide the truth, omit important information, or nod in agreement even when they disagree. None of those will encourage creative synergy.

Further details of trust-building methods are beyond the scope of this dissertation. There are numerous resources and books available with varying methods and ideas on how to develop a team's trust (e.g., Garmston & Wellman, 2009; Lencioni, 2002; Robinson & Rose, 2007; Rohnke & Butler, 1995).

Communication. Team members who understand the skills of communication are able to be better collaborators. Spending time teaching team members specific skills of communication and collaboration will lead to improved functioning of the team (Sterr, 2011). Sterr (2011) also points out "the practice of *collaboration* and the concept of *communication* are inextricably intertwined" (p.12). Teaching collaboration skills is primarily about teaching communication skills such as how to engage in cognitive conflict and paraphrasing (Garmston & Wellman, 2009; Sterr, 2011). There are specific techniques that team members can practice to help build their communication skills. For instance, the research from Stone, Patton, & Heen (2010) revealed a common, underlying structure in difficult conversations. Understanding that structure and how to navigate it can lead to healthier, collaborative conversations.

Creative abrasion. There are three different types of conflict that teams might engage in: cognitive conflict, affective conflict, and social identity conflict. The characteristics and capabilities of teams thrive amidst cognitive conflict (Amason et al., 1995; Badke-Schaub et al., 2010) and it is important for leaders to increase cognitive conflict while creating an environment that diminishes affective and social identity conflict. This ideal balance is creative abrasion (Hirshberg, 1998).

Once a group has a moderate to high level of relational trust they are able to disagree with each other without worrying about repercussions from teammates (Garmston & Wellman, 2009). These disagreements lead to deeper thinking around creative challenges (Garmston & Wellman, 2009; Hirshberg, 1998). When a group can challenge each other and criticize ideas they generate ideas of higher quality leading to more innovation (Nemeth et al., 2004). Team A talked about their politeness with each other, particularly in relation to the item "Team members are open with each other about their concerns." The following dialogue ensued,

> *Participant G:* I know that as a group many of us are concerned about hurting each other's feelings, or bringing something up, except for [X], [laughing] that might offend someone. So I know that that's a concern. It is, and so yeah, I mean we're, I think in some cases, sensitive to that. And so when it says that, then I can kind of get where that's coming from, not in a negative way, but just in a real way.
>
> *Participant A:* To me that's part of the cultural phenomenon that is the Midwest.
>
> *Participant G:* Yeah.
>
> *Participant A:* And we talk about students, that this is a difficulty for them dealing with controversy and being forthright with concerns, and we certainly fall into that as a staff. I know that I've had to learn that the first answer may not be the full answer so dig a little, ask a little more because sometimes the first answer is just the kneejerk response that we've been taught to do. "Yeah, no, it's fine."
>
> *Participants:* Right.

Leaders can help teams engage in cognitive conflict and create a culture of collaboration by developing shared behavioral norms, encouraging members to monitor their own behavior, and teaching the skills of collaboration. Last year I taught a one-day class on conflict to a small group of professionals. At the end of the day, one participant shared with the group that she was expecting to learn how to change her co-workers and instead learned how to change herself. Like many people she assumed she was handling conflict well and it was the "other" who was the problem. However, during the class she learned of subtle, but significant changes she could make to move into a relationship of collaboration with her co-workers and away from a place of resistance. Learning new skills such as engaging in healthy conflict and improving communication requires humbleness and openness. In addition, two other recommendations to increase creative abrasion are for teams to develop shared behavioral norms and for members to gain awareness of how their own behavior impacts others.

Identify team values and develop behavioral norms. Every team has values and norms that they operate from, whether they have discussed them or not. The key here is intention. The first step is to collectively identify the values that will drive team decisions, followed by the behaviors team members will exhibit that are in alignment with those values (Kusy & Holloway, 2009). This process can be a powerful tool to help teams focus their behavior to be in alignment with the needs of their teammates (Frank, 2004; Garmston & Wellman, 2009; Priest & Gass, 2005; Stanchfield, 2007). Values and behavioral norms need to be collaboratively developed and agreed upon by all team members. Of course, they are only beneficial if they are used, referenced, and built upon throughout the life of the team. Many teams go through this process only to stuff the

results in a drawer and forget about them. In that case it merely becomes a meaningless exercise. Leaders and team members can facilitate the process by ensuring the values and norms are visible, referencing them periodically, and creating a structure for team members to address issues (Garmston & Wellman, 2009; Kusy & Holloway, 2009).

Members monitor their own behavior. In high functioning teams, members are aware of and monitor their own behavior focusing on how to best contribute to both the team relationship and task (Garmston & Wellman, 2009). It can not only be up to the leader to create a positive group culture. Team members must want to be a part of the team and be willing to focus on appropriate types of conflict. This may mean unlearning inappropriate behaviors such as sarcasm or interrupting, being willing to accept and incorporate feedback from colleagues, and paying attention to responses to their behavior. The leader can help by coaching all team members, being a positive role model, and creating space for conversation about group behaviors.

Team dynamics are deceptively difficult, but the work required can have tremendous positive payoffs. “It is very hard to bring about significant changes in any human group without changes in individual behaviors” (Kegan & Lahey, 2009, p.1). Therefore, leaders may need to act as coaches, mentors, and trainers and help team members develop skills in these areas or invite external coaches or trainers to assist.

How to Improve Team Creative Process

People naturally want to be creative; they want to create (Wheatley, 2007). However, in some organizations the expectation to create is so low that people have forgotten how to be creative. Teaching people how to be creative will help build creative confidence, skills, and increase creative output (Csikszentmihalyi, 1996; Epstein et al.,

2008; Kelley & Kelley, 2013; Puccio et al., 2006; Sawyer, 2012; Scott et al., 2004; Sternberg, 2010; Torrance, 1972). As I mentioned in Chapter IV, Team A and Team B had not thought about creative process before responding to the Creative Synergy Scale items. They were not aware of Creative Problem Solving or any other model. Teaching teams the process, tools, and techniques can help them be more creative.

In case you feel doubtful about the impact of teaching creativity, the research about teaching creativity is consistent in one way—there is ample evidence that creativity can be developed and learned and one can become more creative with practice (Basadur, 1994; Epstein et al., 2008; Ma, 2006; Onarheim & Friis-Olivarius, 2013; Puccio et al., 2006; Sawyer, 2012; Scott et al., 2004; Torrance, 1972). In a meta-analysis of 70 studies examining the impact of creativity training, researchers found that creativity training had positive impacts in the following areas: divergent thinking, problem solving, performance, and attitudes and behaviors (Scott et al., 2004). The interventions were impactful for both youth and adults.

In another meta-analysis of articles examining creativity training in a business context, the authors summarized that creativity training positively impacts communication, fluency and originality of ideas, ability to evaluate and implement ideas, attitudes toward divergent thinking, as well as the financial bottom line (Puccio et al., 2006). Three of the studies examined the impact of creativity training (specifically Creative Problem Solving) on challenges in the workplace. All three found significant gains from the training (Firestien, 1996; Thompson, 2001). For instance, one manufacturing plant saw a decrease in expenditures of $40,000 per week based on a change that came about from the Creative Problem Solving training (Firestien, 1996). In

another study, creativity training was delivered to half of the 346 city employees in Orange County, California (Epstein et al., 2008). In only eight months, city officials reported nearly $600,000 in new revenues and $3.5 million in innovative expenditure reductions. They attributed this financial gain to the new ideas developed by employees after their creativity training. By any measure, these are impressive numbers.

Given all this, creativity training can still be a tough sell. Time is precious and organizations are faced with decreasing budgets and increasing expectations and needs from their employees. When companies decide to provide training for their employees they do not take that decision lightly, they want it to be as impactful and beneficial as possible. Not all creativity trainings are created equal. Research has revealed a few factors that lead to higher quality, more impactful trainings. It is the responsibility of the facilitator and instructional designers to ensure that the creativity training delivered is top-notch. Determining the best and most important components to include is an ethical responsibility and research can shed some light on this challenge (Onarheim & Friis-Olivarius, 2013). In their meta-analysis of creativity training, researchers Scott et al. (2004) found creativity training should have four components (p. 23). Training should:

1. Be based on sound, valid research on the cognitive activities underlying creativity.
2. Be lengthy and challenging introducing appropriate heuristics and various cognitive skills.
3. Include real-world examples and illustrations of how principles are applied.

4. Include experiential exercises appropriate to the group's domain, designed to provide them with more practice in applying the related strategies in a more complex, real context.

In essence, creativity training should provide strategies, tools, and techniques that teams can use in a variety of situations. The training should teach some philosophy and theory behind creative process, but primarily focus on direct application. With focused practice nearly any team can learn to use a creative process that will enhance their creative synergy and lead to more innovation for their organization.

The Creative Synergy Scale as a Reflection Tool

The primary way the Creative Synergy Scale can help teams is as a tool to lead reflection on their behaviors, interactions, and processes. Teams that reflect and learn from their past grow into more capable and effective teams. Garmston and Wellman (2009) said, "All groups, however, work at less than full potential. The best groups regard this not as a deficiency but as a healthy dissatisfaction with their current performance. They consistently commit their resources to working together more effectively" (p. 113). Reflecting on areas to improve requires a sense of humbleness and openness. When asked on the written evaluation form how the scale would help their team, one participant in Team A stated, "will help us reflect on our internal process." Another person in Team C stated, "I think that the result will serve as a platform to discuss possible/potential areas for improvement. It gives us a reason to have the difficult, painful conversations." This attitude of reflection and a desire to improve will help the teams use the data to become higher performing.

Limitations of the Research

Despite the large sample size for the scale development phase (n = 830), this research study had several limitations. The first limitation is the demographic representation of the sample. White women were overly represented, which may be the influence of my own identity and use of my personal network to begin the snowball sample process. Although, I think of my network as diverse, it apparently is not diverse enough.

In Phase 2 the scale was tested with only three teams. While this provided preliminary evidence of face validity, it is by no means a comprehensive result. Additional testing with more teams and more diverse teams is needed.

Future Research

This research can be the foundation for many future studies. Future studies should further test and refine the Creative Synergy Scale, building on the results for additional research on teams and creative synergy. Recommendations are shared for both categories of future research.

Further testing and refinement of the Creative Synergy Scale. The Creative Synergy Scale was created during the study therefore it should be considered the first phase of the scale's development. There are several additional studies that could be done to further refine the scale and test its usefulness in various contexts.

Add open-ended questions. One team suggested adding an open-ended question under each section (i.e., Team Purpose, Team Dynamics, and Team Creative Process) asking participants to add details or explain why they answered the way they did. This would provide more depth and context to their responses giving the team a richer

understanding of their current state, a common characteristic of mixed-method studies (Creswell & Plano Clark, 2007). There was one open-ended question included, but it was general and in Phase 2 only four people responded. Questions that are more specific would provide more value.

Experiment with presentation of results. The quantitative results presented to the teams were the grand mean (mean of the means) for each subscale. Team C suggested also including median because they were concerned that so-called outliers might sway the mean. After our meeting I emailed them updated results that included average, median, and mode (see Appendix H). This may be helpful for larger teams, but it could also be harmful because it could overinflate the results. Future research could include how different presentation formats of the results impact the team's understanding, not only with median versus mean, but looking at a number of variables.

Order of items. In this iteration of the Creative Synergy Scale, the items were grouped into one of three hypothesized overarching subscales. The directions instructed participants to think about an aspect of their team when answering. For instance, for Team Dynamics the directions said, "Thinking about how the team members interact with each other, how strongly do you disagree or agree with each of the following statements?" A future study may sort the items randomly without the preface and see if that changes the response for participants.

Test with more teams and with more diverse teams. In this study, the initial survey was completed by 830 people and the scale was tested with three intact work teams. Additional testing with a more diverse population will be valuable. For instance, in Phase 1 a large percentage and in Phase 2 all team members identified as

white/Caucasian. Testing with more diverse teams will be important to ensure the scale is valid with different racial and ethnic identities. More testing will also be valuable to gather a more even distribution across industries, team size, gender, and countries.

Future research using the Creative Synergy Scale. The impact of the Creative Synergy Scale on teams is still unknown. Future research could be done to determine how teams respond to the Creative Synergy Scale results. How do they use the results to make changes within their teams? How does the scale impact their growth? Based on the Creative Synergy Scale results, some teams may benefit from team coaching (Jacox, 2016), an external facilitator to guide them through developing team purpose, or training about team creative process (Scott et al., 2004). What impact do these interventions have on their creative synergy?

In Phase 2 teams had to be striving to be creative in order to qualify. However, I did not test how creative they actually were. Further research could be done to compare a team's level of creativity with their results on the Creative Synergy Scale. This would also provide evidence of construct validity.

These are two examples of how the Creative Synergy Scale could be used in future research studies. Ultimately, the scale could be a valuable tool to help researchers learn more about creativity in teams, further advancing our understanding of this complex skill.

Contributions to the Fields of Creativity, Leadership, and Change

In the last 15 years there has been a surge of research about creativity in teams (Anderson et al., 2014). Different researchers have examined traits and qualities of creative teams such as trust, communication, commitment, and conflict. This research

study brought together the research on creativity in teams to examine the internal-process variables that impact creative synergy. A new model of creative synergy in teams was developed based on the factor analysis results of the scale (see Figure 5.1). This model can be used to support future research and increase the fields' understanding of creative synergy.

The Creative Synergy Scale is a new scale to help teams measure their level of creative synergy and the elements that impact it. It provides valuable feedback based on team members' observations and experiences within the team. The Creative Synergy Scale can be used by both practitioners and researchers. "Notably few studies have examined within-team innovation processes as they unfold over time" (Anderson et al., 2014, p. 1311). The Creative Synergy Scale may be a useful tool to help assess within-team behaviors over time. They also state, "the most pressing issues to be those pertaining to team climate and leadership as facilitators of work group creativity and innovation" (Anderson et al., 2014, p. 1311). This scale could be valuable for leaders to help facilitate higher levels of performance and creativity within their teams.

This study also presented a new model for displaying the variables impacting team creativity. This helped classify the internal-process variables and focus the direction of this research. Hopefully, it will also prove to be a valuable model for other researchers to categorize the types of variables they are referring to. When exploring other team assessments, it was evident that for some scales the variables being measured were a mix from different categories, but perhaps without a sense of intentionality to that blend (i.e., Anderson & West, 1998). This model could help prevent that and help categorize the variables in future models.

Finally, this study presented a new definition of creative synergy. The definition used throughout this study was the interactions among team members where the collective creative results are greater than the sum of their individual efforts. My hope is that this definition and this study spawn new research on creative synergy in teams.

Final Thoughts

As human beings we have an innate ability and drive to create. When we combine our individual creativity into collaborative teams and achieve creative synergy our abilities exponentially increase. Due to this, I truly believe we have the capacity to solve all the problems that exist on our planet. Because most of those problems are complex (Heifetz, 1994), we need to use the power of teams and the collective creativity that comes from collaboration to address these problems. When teams achieve creative synergy and exceed the sum of their individual contributions their potential increases considerably.

Internal-process variables have a significant impact on team's creativity (Hülsheger et al., 2009). They are also the variables team members have the most control and influence over. This research revealed three factors that impact creative synergy: team purpose, team dynamics, and team creative process. The Creative Synergy Scale provides teams with a tool to assess their level of these three critical internal-process variables. The scale will be useful to practitioners as a valuable tool to enhance team performance. It will also be useful for researchers to spur new research on creative synergy in teams. The scale is my contribution to the field of creativity and leadership. I hope it can be used by teams to build their creative synergy and tap into their collective

problem-solving superpowers. The world will certainly be better off with more high-performing creative teams.

Appendix

Appendix A: Phase 1 Team Survey and Informed Consent

Team Survey

Welcome and Thank You!

This is a survey about teams. For the purpose of this survey, teams are defined as small groups of people who work together and hold each other accountable to achieve a common goal. Teams can be project-based, work teams, or focused on service, recreational, health, the arts, or other interests. Some people are members of multiple teams.

This survey will give you an opportunity to reflect on how team members work together in one of your teams. Your responses will help inform research on teams and will be used to develop a tool to help teams improve their performance. The survey will take approximately 10 minutes to complete.

There are minimal, if any, risks to participate. Your identity will be anonymous and confidential. You will not be asked for your name and no known sensitive demographic information will be collected.

This survey is part of my dissertation research at Antioch University in the Leadership & Change Program. Study results will be posted at creativesynergyscale.com following data analysis. At the end of the survey you may choose to opt-in to receive an email once the results are ready. The study results may also be included in future presentations and publications.

Your participation is voluntary and you may elect to discontinue your participation at any time. This project has been approved by the University Committee on Research Involving Human Participants at Antioch University. If you have any questions about your rights as a research participant please contact:

Dr. Philomena Essed
Chair, Institutional Review Board
Ph.D. in Leadership and Change, Antioch University

If you have any questions about the survey or study, please contact me at:

Amy Climer
Ph.D. Student, Principal Investigator
Antioch University

I have read and understood the above information. By clicking “Next” below you are indicating that you are at least 18 years old, have read and understood this consent form and agree to participate in this research study. Please print a copy of this page for your records.

Thank you for your participation!

1. To participate in this survey you need to be 18 years of age or older. Are you age 18 or older?

- ◯ Yes
- ◯ No

Team Survey

Your Team

2. This survey is about how teams work together. Teams are small groups of people who work together and hold each other accountable to achieve a common goal. Examples of teams include, but are not limited to, project or planning teams, committees, volunteer teams, or sport/recreational teams

Thinking about your work and other interests, are you a member of a team with between 3-20 people?

- ◯ Yes
- ◯ No

Team Survey

Your Team

3. The questions in this survey ask you to think about one specific team in which you are a member. To help you remember the team you select to focus on, please give the name of your team in the space below.

If you are a member of multiple teams, select one that you know well enough to answer questions about the team.

[ ]

Team Survey

Team Dynamics

4. Thinking about how the [Q3] team members *interact with each other*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Team members share knowledge with each other.	○	○	○	○	○	○
Team members are open with each other about their concerns.	○	○	○	○	○	○
It feels safe to share ideas with my team.	○	○	○	○	○	○
Team members respect each other's different working styles.	○	○	○	○	○	○
Team members avoid sharing their opinions during our meetings.	○	○	○	○	○	○
During team meetings, members often focus on other things.	○	○	○	○	○	○
I feel emotionally safe with my team.	○	○	○	○	○	○
Team members rarely communicate with each other outside of meetings.	○	○	○	○	○	○

Team Survey

Team Dynamics

5. Thinking about how the [Q3] team members *interact with each other*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Team members openly share their different perspectives.	○	○	○	○	○	○
Team members ask for input from those outside the team.	○	○	○	○	○	○
I am comfortable being myself with this team.	○	○	○	○	○	○
Team members are easily annoyed with each other.	○	○	○	○	○	○
Team members listen to each other.	○	○	○	○	○	○
I believe my team members have positive intentions.	○	○	○	○	○	○
Team members frequently interact with each other outside of our meetings.	○	○	○	○	○	○
The different personalities on our team make it difficult to work together.	○	○	○	○	○	○

Team Survey

Team Dynamics

6. Thinking about how the [Q3] team members *interact with each other*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Team members openly share information with each other.	○	○	○	○	○	○
Our team cooperates to work through our differences.	○	○	○	○	○	○
Our team constructively debates competing solutions.	○	○	○	○	○	○
When a mistake is made our team focuses on how to move forward.	○	○	○	○	○	○
Our team talks too much about the details of each problem.	○	○	○	○	○	○
Our team collaborates on solving problems.	○	○	○	○	○	○
There is a supportive environment within our team.	○	○	○	○	○	○
Our team talks about ways to improve our communication with each other.	○	○	○	○	○	○
Team members rely on each other's experience or knowledge.	○	○	○	○	○	○

Team Survey

Team Process

7. Thinking about the [Q3] team *processes*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
The format of our team meetings brings out our best thinking.	○	○	○	○	○	○
Our team captures ideas either visually or in writing.	○	○	○	○	○	○
We examine the strengths of the best potential solutions.	○	○	○	○	○	○
Our team gathers information to gain clarity about a problem.	○	○	○	○	○	○
Our team takes the time needed to come up with many ideas.	○	○	○	○	○	○
Our team talks about how to improve our group process.	○	○	○	○	○	○
Our team encourages questions to clarify a problem.	○	○	○	○	○	○

Team Survey

Team Process

8. Thinking about the [Q3] team *processes*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Our team talks about ways to expand our thinking.	○	○	○	○	○	○
Team members build on each other's ideas.	○	○	○	○	○	○
Our team clearly defines each problem we are trying to solve.	○	○	○	○	○	○
Before solving a problem, our team envisions a desired outcome.	○	○	○	○	○	○
Our team is known for getting things done.	○	○	○	○	○	○
When needed, our team is flexible about changing the way we work.	○	○	○	○	○	○
Our team creates clear action plans outlining who will do what by when.	○	○	○	○	○	○

Team Survey

Team Process

9. Thinking about the [Q3] team *processes*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Our team narrows the issue or problem into a clearly stated challenge.	○	○	○	○	○	○
Team members raise concerns about potential solutions in an open-minded way.	○	○	○	○	○	○
Our team explores each challenge from several angles.	○	○	○	○	○	○
Our team uses a variety of techniques to generate ideas.	○	○	○	○	○	○
We examine the weaknesses of the best potential solutions.	○	○	○	○	○	○
Our team knows how to be creative.	○	○	○	○	○	○
Our team identifies the assumptions we have about a problem.	○	○	○	○	○	○

Team Survey

Team Process

10. Thinking about the [Q3] team *processes*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Our team strategizes how to overcome obstacles to potential solutions.	○	○	○	○	○	○
Our team suspends evaluation while generating new ideas.	○	○	○	○	○	○
Once a new solution is implemented, we evaluate its effectiveness.	○	○	○	○	○	○
Our team is playful when we generate new ideas.	○	○	○	○	○	○
Team members discuss the pros and cons of potential solutions.	○	○	○	○	○	○
Our team breaks down a new solution into action steps.	○	○	○	○	○	○
Our team looks at how to improve potential solutions.	○	○	○	○	○	○

Team Survey

Team Process

11. Thinking about the [Q3] team *processes*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Our team develops a clear understanding of an issue before generating problem solving ideas.	○	○	○	○	○	○
Team members use open-ended questions to generate more ideas.	○	○	○	○	○	○
We identify criteria to help us decide on the best ideas.	○	○	○	○	○	○
Developing creative ideas is important to our team.	○	○	○	○	○	○
Team members arrive prepared for meetings.	○	○	○	○	○	○
Before selecting the best solution, our team considers several options.	○	○	○	○	○	○
Our team considers ways to address resistance to new solutions.	○	○	○	○	○	○
Our team generates wild ideas.	○	○	○	○	○	○

Team Survey

Team Purpose

12. Thinking about the [Q3] team *goals and purpose*, how strongly do you disagree or agree with each of the following statements.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Team members are committed to doing their work effectively.	○	○	○	○	○	○
Our team has clear goals.	○	○	○	○	○	○
Our team is dedicated to reaching our goals.	○	○	○	○	○	○
Team members care about each other's growth and success.	○	○	○	○	○	○
Identifying our shared goals is important to our team.	○	○	○	○	○	○
Our team strives to produce high quality results.	○	○	○	○	○	○
All team members work toward our shared goals.	○	○	○	○	○	○

Team Survey

Team Purpose

13. Thinking about the [Q3] team *goals and purpose*, how strongly do you disagree or agree with each of the following statements.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Team members are invested in the team's outcomes.	○	○	○	○	○	○
Team members are motivated to produce excellent results for the team.	○	○	○	○	○	○
Team members follow through with their commitments.	○	○	○	○	○	○
There is a shared sense of purpose within our team.	○	○	○	○	○	○
I like being on this team.	○	○	○	○	○	○
Our team talks about our shared goals.	○	○	○	○	○	○
Team members are willing to work hard to make sure our team succeeds.	○	○	○	○	○	○

Team Survey

Team Details

14. Approximately how many people are on the [Q3] team?

- 3-6
- 7-9
- 10-12
- 13-16
- 17-20

15. What industry does your team belong to?

16. What else, if anything, would you like to share about how the [Q3] team works together?

Team Survey

Demographics

17. What is your gender?

- Male
- Female
- Other (please specify)

18. What is your age?

- 18 - 29
- 30 - 44
- 45 - 59
- 60+

19. In what country do you live?

Team Survey

Demographics

20. Which race/ethnicity best describes you? (Please choose only one.)

- American Indian or Alaskan Native
- Asian / Pacific Islander
- Black or African American
- Hispanic
- White / Caucasian
- Multiple ethnicity / Other (please specify)

Appendix B: Phase 1 Sample Email and Social Media Posts

Email Sample. As you might remember, I'm in the midst of my PhD and I'm now in the data collection phase of my dissertation. For my research I'm developing a scale for teams. For the first phase, I need 600-1000 people to complete a 10-minute survey. The survey asks questions about a team you are on - think project team, committee, work team, service team, etc. You may find it a great opportunity to reflect on your team. Would you be willing to take 10 minutes and complete the survey?

After taking the survey, one person sent me an email and said, "This survey really made me think! Super insightful and made me look critically at all teams I'm a member of. Thanks for the opportunity to participate in your study." Wow! I did not expect such a positive response. There have been other similar emails too.

Would you take 10 minutes and complete the survey?

The link is: [link]

At the end of the survey you'll have the opportunity to join an email list to receive the research results. The results will also be posted at creativesynergyscale.com.

Once you've finished the survey, please share it with your colleagues, students, and friends and/or post on Twitter, Facebook, LinkedIn, etc. That will give others the opportunity to participate and increase the robustness and diversity of the results. I've pre-written sample posts and emails for you to use at [link] Any adult who is a member of a team qualifies to take the survey. The more the better!

If you have any problems or questions please let me know. I hope you enjoy the survey.

Thank you so much for your help!

Amy

p.s. Don't forget to take the survey: [link]

Sample Facebook Posts, Personal Page. Friends - this is a moment I have been looking forward to for months. Dissertation data collection! As some of you know, I'm creating a scale related to teams. For the first phase I need 600-1000 people to complete a 10-minute survey. The survey asks questions about a team you are on - think project team, committee, work team, service team, etc. I've been surprised to get a few emails from people saying how much they enjoyed taking it. Will you take 10-minutes and complete the survey? You will help me immensely and who knows, you might enjoy it! ☺ And, can you share with your networks when you are done? Thank you!!! Many hugs to you all! [link]

Only two days in and already >165 people have responded to my survey about creativity in teams. Thank you everyone! You rock! I need a few hundred more. If you haven't yet taken the survey, you can do so at [link]. Several people have emailed me to say they enjoyed the opportunity to reflect on their teams. Can you help? The 10-min survey will help me with my dissertation research and will add to the research on teams. This could be big!

Wow! I am so grateful for all the amazing people in my life. Thank you to the 435 people who have already completed the team survey I'm doing for my dissertation! Amazed and honored that so many of you would give me your time. My goal is 600 people with a stretch goal of 1000 respondents. It's getting close! If you haven't completed the survey are would like to visit [link]. It takes about 10-15 minutes and asks questions about a team you are on. Thank you for taking and sharing! Hugs to you all!

I have the best friends! 684 people have taken the team survey I'm doing for my dissertation! Wow! Thank you for taking and sharing! I'm hoping for 1000 by the end of next week. If you haven't taken it yet, it's a 10-15 minute survey about a team you are on. Many people have enjoyed it. Visit the link at [link].

I open up SurveyMonkey today and tears almost filled my eyes. 961 people have taken my research survey about teams in only one week. What?! You all are amazing. I can't thank you enough. Before I sent out the survey I felt optimistic about getting a lot of responses because I know many awesome and generous people, but this blows me away. Thank you everyone. However, it's not done. I still need more. The challenge is that only 648 actually completed it. Some people don't make it all the way through for assorted reasons. Can you help me get more responses? If you haven't taken the survey yet there are still a couple days left. The survey will ask you questions about a team you are on and takes about 10 minutes. The link is: [link]. If you've already completed it and want to share on FB, Twitter, or LinkedIn, there are sample posts at [link].

For those of you following my dissertation survey progress - 1132 responses! Yippee!! But, my male friends . . . you are underrepresented. The women have outperformed you with 70% response rate. Can you help by taking the 10-minute survey about a team you are on? On the first day I got this awesome email from a male who finished the survey: "This survey really made me think! Super insightful and made me look critically at all teams I'm a member of. Thanks for the opportunity to participate in your study." The deadline is tomorrow (Fri) at noon. Thank guys! You rock! [link]

Sample Twitter Posts. Are you on a team? Can you take a 10-min survey? This #dissertationjourney is getting real! [link]

Are you a member of a #team (committee, project team, service). If so, please take this survey. #dissertationjourney [link]

Interested in supporting #research on #teams? Please take this survey to support my #dissertation. Thank you!! [link]

Researching #creativity in teams and seeking survey takers. Are you on a team? Will you take this 10-min survey? [link]

Thank you everyone who has helped with my research. The response has been awesome! On a team? Take this survey [link]

Attendees of @cpsiconference: Are you on a team? Take this 10 min to help me with my research on #creative teams [link]

Members of @AssnforEE Are you on a team? Can you take a 10 min survey about teams & support my #dissertation? Thx! [link]

Are you a member of a #team? Support my research on creative synergy. The anonymous survey takes 10 min. [link]

Researching #creativity in teams and seeking survey takers. Are you on a team? Will you take this 10-min survey? [link]

eek! I'm 16 shy of 1000 responses to the team survey for my dissertation. Can you help me get there? #feelingloved [link]

Are you a member of a #team? Support my research on creative synergy. The anonymous survey takes 10 min. [link]

Looking for late night entertainment? I recommend this anonymous #team survey. Help me get 1000 responses! :) Thx! [link]

Appendix C: Phase 2 Outline of Team Sessions

Time	Topic
5 min	**Overview:** Welcome, introductions, and overview of the purpose of the session
15 min	**Overview of creative synergy:** Explanation of creative synergy and the three main components (team purpose, team creative process, and team dynamics).
20-30 min	**Team results:** Teams received their results including team totals (averages) and the range of responses for each category. This was followed with conversation and dialogue about what the results revealed about the team and how to make sense of the results.
15-20 min	**Feedback about the survey:** The team was asked if and how they feel the results accurately reflect their team's level of creative synergy. What did they believe was accurate or not accurate?
5 min	**Closing:** At the end, each person had the opportunity to offer written reflections and feedback about the survey. After the session they also received another follow-up email in case they had additional feedback that they did not think of during the session.

Appendix D: Phase 2 Team Feedback Form

Thank you for your feedback. Your responses will help improve the Creative Synergy Scale.

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
1. I feel the Creative Synergy Scale results accurately represent our team.	1	2	3	4	5	6
2. The Creative Synergy Scale will be valuable for other teams aiming to achieve creative synergy.	1	2	3	4	5	6
3. I would recommend the Creative Synergy Scale to other teams.	1	2	3	4	5	6

4. What is one thing you learned today?

5. How will the results from the Creative Synergy Scale help your team?

6. How would you change the *visual results* to make the scale easier to understand or more useful (e.g. graphs, team result handout, slides)?

7. What suggestions do you have for how to improve the *presentation* of the Creative Synergy Scale?

8. Please provide any additional recommendations, ideas, or other comments on the back. Thank you!

Appendix E: Phase 2 Survey and Informed Consent Form

Welcome and Thank You!

This is a survey about creative synergy in your team. Your responses will help inform research on creative synergy in teams and will be used to develop a tool called the Creative Synergy Scale to help teams improve their performance.

This survey will give you an opportunity to reflect on how the [redacted] Team works together. The survey will take approximately 10 minutes to complete.

Following the survey, I will meet with your team to provide you with your team's results. You will also be able to provide verbal and written feedback about your perception of the scale's accuracy. Your feedback will help further shape the scale leading to a more accurate and robust instrument for future teams.

Risks: There are minimal, if any, risks to participation. Your identity will be confidential. You will not be asked for your name and no known sensitive demographic information will be collected. The results of the scale will be combined with results from other team members and shared with the entire team. Individual responses will not be shared in a way that identifies any team member.

Benefits: The possible benefits of the research include contributing to the development of the Creative Synergy Scale, which will be a valuable tool for teams to assess the elements needed to achieve creative synergy. Your team will also be provided an assessment about their level of creative synergy. Your team may choose to use the results to further develop the creative synergy within the team.

This survey is part of my dissertation research at Antioch University in the Leadership & Change Program. Study results will be posted at creativesynergyscale.com following data analysis. At the end of the survey you may choose to opt-in to receive an email once the results are ready. The study results may also be included in future presentations and publications.

Your participation is voluntary and you may elect to discontinue your participation at any time. This project has been approved by the University Committee on Research Involving Human Participants at Antioch University. If you have any questions regarding your rights as a research participant please contact:

Dr. Philomena Essed
Chair, Institutional Review Board
Ph.D. in Leadership and Change, Antioch University
[redacted]

If you have any questions about the study or the scale, please contact me at:

Amy Climer
Ph.D. Student, Principal Investigator
Antioch University
[redacted]

Thank you for your participation!

1. YOUR CONSENT

I have read and understood the above information. By clicking “Yes, I agree” you are indicating you are at least 18 years old, have read and understood this consent form and agree to participate in this research study. Please print a copy of this page for your record.

- ◯ Yes, I Agree
- ◯ No, I Do Not Agree

Team Dynamics

2. Thinking about how the team members *interact with each other*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Team members are open with each other about their concerns.	◯	◯	◯	◯	◯	◯
Team members respect each other's different working styles.	◯	◯	◯	◯	◯	◯
I am comfortable being myself with this team.	◯	◯	◯	◯	◯	◯
Team members listen to each other.	◯	◯	◯	◯	◯	◯
Team members openly share information with each other.	◯	◯	◯	◯	◯	◯
Our team cooperates to work through our differences.	◯	◯	◯	◯	◯	◯
When a mistake is made our team focuses on how to move forward.	◯	◯	◯	◯	◯	◯
Team members rely on each other’s experience or knowledge.	◯	◯	◯	◯	◯	◯

Team Process

3. Thinking about your team *processes*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
The format of our team meetings brings out our best thinking.	○	○	○	○	○	○
Our team captures ideas either visually or in writing.	○	○	○	○	○	○
Our team takes the time needed to come up with many ideas.	○	○	○	○	○	○
Before solving a problem, our team envisions a desired outcome.	○	○	○	○	○	○
Our team narrows the issue or problem into a clearly stated challenge.	○	○	○	○	○	○
Our team explores each challenge from several angles.	○	○	○	○	○	○
Our team uses a variety of techniques to generate ideas.	○	○	○	○	○	○

Team Process

4. Thinking about your team *processes*, how strongly do you disagree or agree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Our team identifies the assumptions we have about a problem.	○	○	○	○	○	○
Our team strategizes how to overcome obstacles to potential solutions.	○	○	○	○	○	○
Once a new solution is implemented, we evaluate its effectiveness.	○	○	○	○	○	○
Team members discuss the pros and cons of potential solutions.	○	○	○	○	○	○
Our team breaks down a new solution into action steps.	○	○	○	○	○	○
We identify criteria to help us decide on the best ideas.	○	○	○	○	○	○
Before selecting the best solution, our team considers several options.	○	○	○	○	○	○
Our team considers ways to address resistance to new solutions.	○	○	○	○	○	○

Team Purpose

5. Thinking about the team *goals and purpose*, how strongly do you disagree or agree with each of the following statements.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Our team is dedicated to reaching our goals.	○	○	○	○	○	○
Our team strives to produce high quality results.	○	○	○	○	○	○
All team members work toward our shared goals.	○	○	○	○	○	○
Team members are motivated to produce excellent results for the team.	○	○	○	○	○	○
Team members follow through with their commitments.	○	○	○	○	○	○
Team members are willing to work hard to make sure our team succeeds.	○	○	○	○	○	○

Team Details

6. Approximately how many people are on your team?

- 3-6
- 7-9
- 10-12
- 13-16
- 17-20

7. What industry does your team belong to?

8. What else, if anything, would you like to share about how your team works together to achieve creative synergy? *(Your comments may be shared with the team, but will be anonymous. Slight edits may be made to your comments in order to preserve anonymity.)*

Demographics

The following demographic questions will not be shared with your team. They are only for research purposes. Thank you!

9. What is your gender?

- Male
- Female
- Other (please specify)

10. What is your age?

- 18 - 29
- 30 - 44
- 45 - 59
- 60+

11. In what country do you live?

Demographics

12. Which race/ethnicity best describes you? (Please choose only one.)

- American Indian or Alaskan Native
- Asian / Pacific Islander
- Black or African American
- Hispanic
- White / Caucasian
- Multiple ethnicity / Other (please specify)

Appendix F: Institutional Review Board Approval

Sat, Dec 5, 2015 at 7:10PM

Dear Amy Climer,

As Chair of the Institutional Review Board (IRB) for 'Antioch University Ph.D., I am letting you know that the committee has reviewed your Ethics Application. Based on the information presented in your Ethics Application, your study has been approved. Your data collection is approved from 12/05/2015 to 12/03/2016. If your data collection should extend beyond this time period, you are required to submit a Request for Extension Application to the IRB. Any changes in the protocol(s) for this study must be formally requested by submitting a request for amendment from the IRB committee. Any adverse event, should one occur during this study, must be reported immediately to the IRB committee. Please review the IRB forms available for these exceptional circumstances.

Sincerely,
Dr. Philomena Essed

Appendix G: Phase 1 Descriptive Statistics of Item Responses

Item	Mean	SD	Skewness	Kurtosis
Team members share knowledge with each other.	5.12	.922	-1.370	2.768
Team members are open with each other about their concerns.	4.65	1.079	-.805	.657
It feels safe to share ideas with my team.	4.86	1.145	-1.160	1.183
Team members respect each other's different working styles.	4.57	1.127	-.807	.463
Team members avoid sharing their opinions during meetings.	4.35	1.222	-.642	-.348
During team meetings, members often focus on other things.	4.18	1.254	-.481	-.578
I feel emotionally safe with my team.	4.64	1.236	-.988	.558
Team members are easily annoyed with each other.	4.78	1.246	-1.002	.305
Team members openly share their different perspectives.	4.79	.924	-.983	1.683
Team members ask for input from those outside the team.	4.38	1.093	-.656	.256
I am comfortable being myself with this team.	4.93	1.096	-1.324	1.921
Team members are easily annoyed with each other.	4.20	1.252	-.564	-.477
Team members listen to each other.	4.82	.942	-.983	1.328
I believe my team members have positive intentions.	5.38	.859	-1.662	3.464
Team members frequently interact with each other outside of our meetings.	4.47	1.254	-.662	-.212
The different personalities on our team make it difficult to work together.	4.43	1.336	-.773	-.207
Team members openly share information with each other.	4.85	.983	-.965	1.102
Our team cooperates to work through our differences.	4.66	.983	-.934	1.090
Our team constructively debates competing solutions.	4.42	1.170	-.768	.145
When a mistake is made our team focuses on how to move forward.	4.81	.987	-1.056	1.468

Our team talks too much about the details of each problem.	3.72	1.293	-.315	-.697
Our team collaborates on solving problems.	4.74	1.008	-.854	.840
There is a supportive environment within our team.	4.87	1.137	-1.138	1.125
Our team talks about ways to improve our communication with each other.	3.90	1.313	-.415	-.636
Team members rely on each other's experience or knowledge.	5.03	1.070	-1.324	1.814
The format of our team meetings brings out our best thinking.	3.83	1.203	-.318	-.503
Our team captures ideas either visually or in writing.	4.27	1.283	-.644	-.345
We examine the strengths of the best potential solutions.	4.43	1.104	-.818	.570
Our team gathers information to gain clarity about a problem.	4.63	1.033	-.980	1.221
Our team talks about how to improve our group process.	3.88	1.359	-.330	-.758
Our team takes the time needed to come up with many ideas.	4.17	1.248	-.578	-.222
Our team encourages questions to clarify a problem.	4.64	1.161	-.986	.815
Our team talks about ways to expand our thinking.	3.87	1.235	-.354	-.577
Team members build on each other's ideas.	4.81	1.016	-1.060	1.541
Our team clearly defines each problem we are trying to solve.	4.19	1.137	-.563	-.046
Before solving a problem, our team envisions a desired outcome.	4.20	1.213	-.474	-.449
Our team is known for getting things done.	4.77	1.194	-1.000	.612
When needed, our team is flexible about changing the way we work.	4.48	1.225	-.730	-.028
Our team creates clear action plans outlining who will do what by when.	4.29	1.258	-.559	-.255
Our team narrows the issue or problem into a clearly stated challenge.	3.93	1.133	-.333	-.384
Team members raise concerns about potential solutions in an open-minded way.	4.51	1.044	-.893	.779

Our team explores each challenge from several angles.	4.29	1.129	-.611	.133
Our team uses a variety of techniques to generate ideas.	3.87	1.277	-.238	-.682
We examine the weaknesses of the best potential solutions.	3.97	1.154	-.440	-.165
Our team knows how to be creative.	4.60	1.196	-.779	.293
Our team identifies the assumptions we have about a problem.	3.79	1.251	-.308	-.455
Our team strategizes how to overcome obstacles to potential solutions.	4.48	1.061	-.815	.567
Our team suspends evaluation while generating new ideas.	3.56	1.198	-.038	-.617
Once a new solution is implemented, we evaluate its effectiveness.	4.27	1.177	-.732	.194
Our team is playful when we generate new ideas.	4.43	1.362	-.769	-.132
Team members discuss the pros and cons of potential solutions.	4.59	1.010	-.792	.796
Our team breaks down a new solution into action steps.	4.19	1.212	-.612	-.083
Our team looks at how to improve potential solutions.	4.42	1.077	-.847	.825
Our team develops a clear understanding of an issue before generating problem solving ideas.	4.11	1.083	-.530	.092
Team members use open-ended questions to generate more ideas.	4.09	1.148	-.460	-.210
We identify criteria to help us decide on the best ideas.	3.81	1.218	-.284	-.615
Developing creative ideas is important to our team.	4.53	1.286	-.775	.013
Team members arrive prepared for meetings.	4.21	1.195	-.670	.100
Before selecting the best solution, our team considers several options.	4.36	1.086	-.777	.630
Our team considers ways to address resistance to new solutions.	3.94	1.240	-.442	-.451
Our team generates wild ideas.	3.48	1.496	.030	-.921
Team members are committed to doing their work effectively.	5.10	.925	-1.179	1.945
Our team has clear goals.	4.64	1.173	-.947	.694

Our team is dedicated to reaching our goals.	5.04	.976	-1.073	1.289
Team members care about each other's growth and success.	4.73	1.231	-.963	.445
Identifying our shared goals is important to our team.	4.50	1.206	-.779	.193
Our team strives to produce high quality results.	5.24	.940	-1.392	2.155
All team members work toward our shared goals.	4.75	1.182	-1.019	.749
Team members are invested in the team's outcomes.	4.95	1.039	-1.119	1.386
Team members are motivated to produce excellent results for the team.	4.96	1.072	-1.058	.932
Team members follow through with their commitments.	4.71	1.035	-.908	.919
There is a shared sense of purpose within our team.	4.85	1.168	-1.002	.440
I like being on this team.	5.03	1.236	-1.508	1.936
Our team talks about our shared goals.	4.48	1.191	-.684	-.015
Team members are willing to work hard to make sure our team succeeds.	4.97	1.076	-1.190	1.404

Appendix H: Phase 2 Scale Results for Each Team

CREATIVE SYNERGY SCALE: TEAM A RESULTS

TEAM PURPOSE

Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average
Our team is dedicated to reaching our goals.	0	0	0	0	4	3	5.43
Our team strives to produce high quality results.	0	0	0	0	3	4	5.57
All team members work toward our shared goals.	0	0	0	1	2	4	5.43
Team members are motivated to produce excellent results for the team.	0	0	0	1	1	5	5.57
Team members follow through with their commitments.	0	0	0	0	3	4	5.57
Team members are willing to work hard to make sure our team succeeds.	0	0	0	1	1	5	5.57

TEAM PURPOSE FINAL SCORE **5.52**

TEAM DYNAMICS

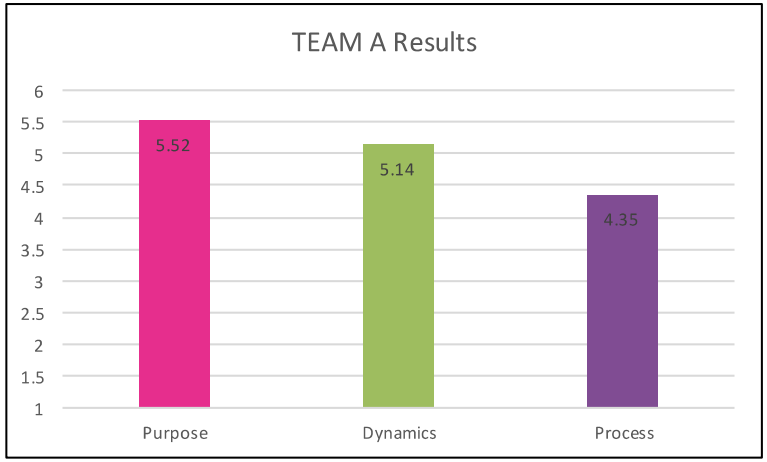
Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average
Team members are open with each other about their concerns.	0	0	0	2	4	1	4.86
Team members respect each other's different working styles.	0	0	0	0	5	2	5.29
I am comfortable being myself with this team.	0	0	0	1	2	4	5.43
Team members listen to each other.	0	0	0	2	2	3	5.14
Team members openly share information with each other.	0	0	0	2	4	1	4.86
Our team cooperates to work through our differences.	0	0	0	1	4	2	5.14
When a mistake is made our team focuses on how to move forward.	0	0	0	1	5	1	5.00
Team members rely on each other's experience or knowledge.	0	0	0	0	4	3	5.43

TEAM DYNAMICS FINAL SCORE **5.14**

TEAM PROCESS

Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average
The format of our team meetings brings out our best thinking.	0	0	0	5	2	0	4.29
Our team captures ideas either visually or in writing.	0	0	0	1	5	1	5.00
Our team takes the time needed to come up with many ideas.	0	0	1	2	3	1	4.57
Before solving a problem, our team envisions a desired outcome.	0	0	1	2	3	1	4.57
Our team narrows the issue or problem into a clearly stated challenge.	0	0	1	5	1	0	4.00
Our team explores each challenge from several angles.	0	0	0	3	4	0	4.57
Our team uses a variety of techniques to generate ideas.	0	0	2	4	1	0	3.86
Our team identifies the assumptions we have about a problem.	0	0	3	3	1	0	3.71
Our team strategizes how to overcome obstacles to potential solutions.	0	0	0	2	5	0	4.71
Once a new solution is implemented, we evaluate its effectiveness.	0	0	0	5	2	0	4.29
Team members discuss the pros and cons of potential solutions.	0	0	1	1	3	2	4.86
Our team breaks down a new solution into action steps.	0	0	0	2	5	0	4.71
We identify criteria to help us decide on the best ideas.	0	0	4	2	1	0	3.57
Before selecting the best solution, our team considers several options.	0	0	0	3	3	1	4.71
Our team considers ways to address resistance to new solutions.	0	0	2	4	1	0	3.86

TEAM CREATIVE PROCESS FINAL SCORE	4.35



CREATIVE SYNERGY SCALE: TEAM B

TEAM PURPOSE

Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average
Our team is dedicated to reaching our goals.	0	0	0	0	0	5	6.00
Our team strives to produce high quality results.	0	0	0	0	0	5	6.00
All team members work toward our shared goals.	0	0	0	0	1	4	5.80
Team members are motivated to produce excellent results for the team.	0	0	0	0	0	5	6.00
Team members follow through with their commitments.	0	0	0	0	2	3	5.60
Team members are willing to work hard to make sure our team succeeds.	0	0	0	0	1	4	5.80

TEAM PURPOSE FINAL SCORE **5.87**

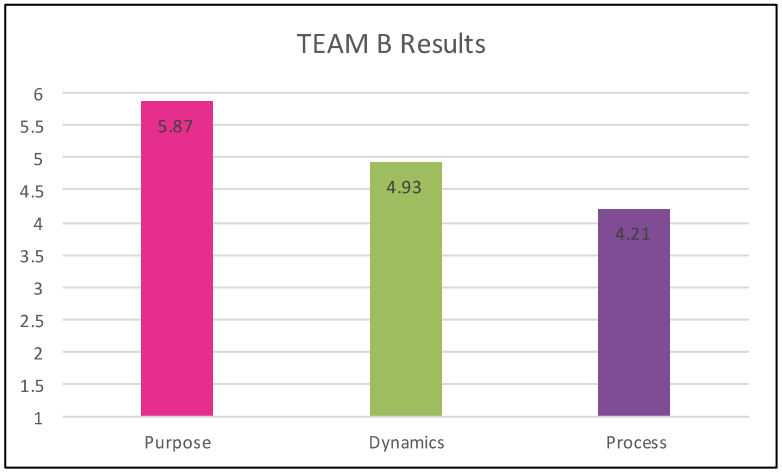
TEAM DYNAMICS

Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average
Team members are open with each other about their concerns.	0	0	0	4	1	0	4.20
Team members respect each other's different working styles.	0	1	0	2	1	1	4.20
I am comfortable being myself with this team.	0	0	0	1	2	2	5.20
Team members listen to each other.	0	0	1	0	4	0	4.60
Team members openly share information with each other.	0	0	0	2	3	0	4.60
Our team cooperates to work through our differences.	0	0	0	2	1	2	5.00
When a mistake is made our team focuses on how to move forward.	0	0	0	0	2	3	5.60
Team members rely on each other's experience or knowledge.	0	0	0	0	0	5	6.00

TEAM DYNAMICS FINAL SCORE **4.93**

TEAM PROCESS

Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average
The format of our team meetings brings out our best thinking.	0	0	1	3	1	0	4.00
Our team captures ideas either visually or in writing.	0	0	0	0	3	2	5.40
Our team takes the time needed to come up with many ideas.	0	0	0	1	3	1	5.00
Before solving a problem, our team envisions a desired outcome.	0	1	0	2	2	0	4.00
Our team narrows the issue or problem into a clearly stated challenge.	0	1	0	3	1	0	3.80
Our team explores each challenge from several angles.	0	0	0	4	1	0	4.20
Our team uses a variety of techniques to generate ideas.	0	1	0	1	3	0	4.20
Our team identifies the assumptions we have about a problem.	0	1	0	4	0	0	3.60
Our team strategizes how to overcome obstacles to potential solutions.	0	0	0	0	5	0	5.00
Once a new solution is implemented, we evaluate its effectiveness.	0	0	1	3	1	0	4.00
Team members discuss the pros and cons of potential solutions.	0	0	0	3	1	1	4.60
Our team breaks down a new solution into action steps.	0	0	0	4	1	0	4.20
We identify criteria to help us decide on the best ideas.	0	1	1	2	1	0	3.60
Before selecting the best solution, our team considers several options.	0	0	1	3	1	0	4.00
Our team considers ways to address resistance to new solutions.	0	1	1	2	1	0	3.60



TEAM CREATIVE PROCESS FINAL SCORE	4.21

CREATIVE SYNERGY SCALE: TEAM C

TEAM PURPOSE: The team's collective focus, their shared goals, and their commitment to reaching the goals.

Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average	Median	Mode
Our team is dedicated to reaching our goals.	0	0	0	1	5	8	5.50	6.00	6
Our team strives to produce high quality results.	0	0	0	1	3	10	5.64	6.00	6
All team members work toward our shared goals.	0	0	0	2	7	5	5.21	5.00	5
Team members are motivated to produce excellent results for the team.	0	0	0	2	8	4	5.14	5.00	5
Team members follow through with their commitments.	0	0	0	1	11	2	5.07	5.00	5
Team members are willing to work hard to make sure our team succeeds.	0	0	0	1	3	10	5.64	6.00	6

TEAM PURPOSE FINAL SCORE **5.37**

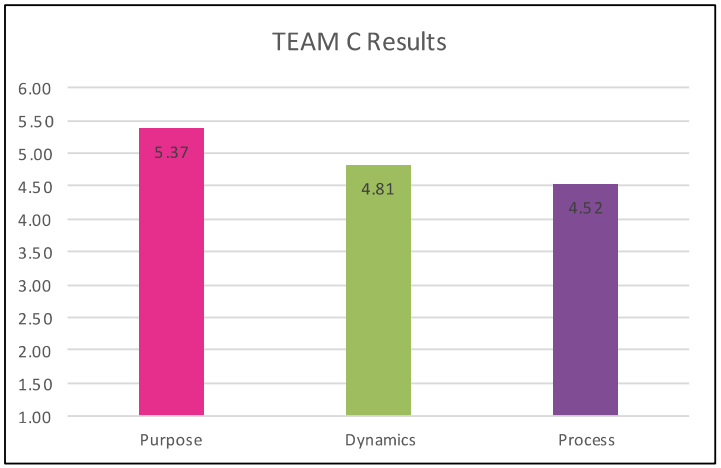
TEAM DYNAMICS: The behavior and interactions within a team and the relationships between the team members.

Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average	Median	Mode
Team members are open with each other about their concerns.	0	0	2	3	8	1	4.57	5.00	5
Team members respect each other's different working styles.	0	0	3	3	5	3	4.57	5.00	5
I am comfortable being myself with this team.	0	0	2	2	3	7	5.07	5.50	6
Team members listen to each other.	0	0	2	2	8	2	4.71	5.00	5
Team members openly share information with each other.	0	0	0	5	5	4	4.93	5.00	4
Our team cooperates to work through our differences.	0	1	2	0	9	2	4.64	5.00	5
When a mistake is made our team focuses on how to move forward.	0	1	1	2	7	3	4.71	5.00	5
Team members rely on each other's experience or knowledge.	0	0	0	2	6	6	5.29	5.00	6

TEAM DYNAMICS FINAL SCORE **4.81**

TEAM CREATIVE PROCESS: The team's use of the tools, techniques, & strategies of a creative process (e.g. Creative Problem Solving).

Items	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)	Average	Median	Mode
The format of our team meetings brings out our best thinking.	0	0	1	7	6	0	4.36	4.00	4
Our team captures ideas either visually or in writing.	0	0	0	4	7	3	4.93	5.00	5
Our team takes the time needed to come up with many ideas.	0	0	4	5	3	2	4.21	4.00	4
Before solving a problem, our team envisions a desired outcome.	0	0	2	3	7	2	4.64	5.00	5
Our team narrows the issue or problem into a clearly stated challenge.	0	0	1	7	6	0	4.36	4.00	4
Our team explores each challenge from several angles.	0	0	2	7	4	1	4.29	4.00	4
Our team uses a variety of techniques to generate ideas.	0	1	1	7	5	0	4.14	4.00	4
Our team identifies the assumptions we have about a problem.	0	1	0	4	7	2	4.64	5.00	5
Our team strategizes how to overcome obstacles to potential solutions.	0	0	0	3	9	2	4.93	5.00	5
Once a new solution is implemented, we evaluate its effectiveness.	0	0	2	8	3	1	4.21	4.00	4
Team members discuss the pros and cons of potential solutions.	0	0	0	4	9	1	4.79	5.00	5
Our team breaks down a new solution into action steps.	0	0	0	4	8	2	4.86	5.00	5
We identify criteria to help us decide on the best ideas.	0	1	2	4	6	1	4.29	4.50	5
Before selecting the best solution, our team considers several options.	0	0	1	4	7	2	4.71	5.00	5
Our team considers ways to address resistance to new solutions.	0	0	1	5	8	0	4.50	5.00	5



TEAM CREATIVE PROCESS FINAL SCORE **4.52**

What else, if anything, would you like to share about how your team works together to achieve creative synergy?

Ego and passive aggressive behavior hinder collaboration and innovative solutions - mostly from senior staff and the design team. This behavior is enabled and subtly woven into our culture.

At times, team members feel uncomfortable with differing opinions and with resolving conflict within the team. Being authentic is something that we are working on but not there yet. Everyone is creative and innovative and extremely focused on doing what's best for the client — it is great to be a part of this environment.

Appendix I: Phase 2 Evaluation Results

Mean (1=strongly disagree, 6= strongly agree)	Team A AVG	Team B AVG	Team C AVG
I felt the Creative Synergy Scale results accurately represent our team.	5.50	5.80	4.65
The Creative Synergy Scale will be valuable for other teams aiming to achieve creative synergy.	5.75	6.00	4.70
I would recommend the Creative Synergy Scale to other teams.	5.50	5.80	4.90

What is one thing you learned today?

TEAM A

- Continue to look at our internal processes. We do have the essential ingredients because of positive environment to be creative in our work.
- Aspects of creative synergy is a helpful concept.
- That we are on the same page for many of the areas.
- Go slow to go fast.
- How to be more mindful of creativity, what creative synergy and CPS are as well.
- To take time to ideate!
- Affirmation that our team understands our purpose and seems to be on the same page.
- There are areas that we can focus as a team and there are tools and resources to help us
  do that.

TEAM B

- Our clear purpose is refreshing and knowing our challenges are shared by the team gives a clear direction for improvement.
- Creativity comes in quantity.
- Understanding creativeness comes in several methods.

TEAM C

- I learned that people are not fully comfortable and some feel disrespected, which is disheartening.
- In general, we are aligned, but the outliers mean that the experience is not necessarily shared.
- I learned that, reinforced that, is vital for team to be open and honest with communication to maximize dynamics and creativity.
- I learned the range of where we're at and what things we should work towards.
- Need to develop more tools to allow those to be more creative.

- The hierarchy of our category results seemed accurate.
- Various tools available to use for creative brainstorming.
- It seems that there is a strong focus on making the client happy, but doesn't always focus on the employees who make the clients happy. Happy, collaborative employees improve work for clients.
- That we have an opportunity to use more techniques for generating ideas.
- The 4-part creative cycle.
- We have pretty good team! We need more ways to ideate and more time to do it.

How will the results from the Creative Synergy Scale help your team?

TEAM A

- It's always good to reflect on how we do things. We are a group that will strive to improve in ways that will help us do our best work.
- At a minimum it gives us a chance to reflect on our collective strengths and opportunities to improve. We have an opportunity to take more time to be intentional in building trust and introducing new process in team settings.
- Makes us more creative - we have tangible tools to guide us in this process and specific areas to focus on.
- Will help us to reflect on our internal process.
- Items on survey can be a spring board for new creative ideas. Put effort into making time to be creative/novel.
- I think we will look for way to be more creative in program planning.
- Gives us opportunity to think differently about our process of problem solving.
- I think it helps us critically think about our process and the team environment.

TEAM B

- We can pinpoint changes to to improve our synergy.
- Allow us to focus on opportunities for improvement.
- Focus on our areas of weakness.

TEAM C

- Help us be more respectful, transparent.
- I don't know. Hopefully we focus on the outliers instead of dismissing them as such, or we risk them becoming toxic.
- I think that the result will serve as a platform to discuss possible/potential areas for improvement. It gives us a reason to have the difficult, painful conversations.
- I think it will provide opportunities to address these topics and talk/identify what to do next.
- Help us start digging deeper on things need fixing.
- It depends how the team/company decides to move forward with them.
- It's a starting point to basic conversations.
- Creates awareness and let other know how people feel or think both about environment and creativity.

- I think it helps identify opportunities for our team to increase our creativity and help us better leverage each other's expertise and ideas.
- Open up dialogue to work through any issues.
- Just being made aware of the scores/answers helps to determine where the team needs work.

How would you change the visual results to make the scale easier to understand or more useful (e.g., graphs, team result handout, slides)?

TEAM A

- 6.0 scale- things that we've already mentioned. Looks great!
- Indicate the corresponding score with the scale (ex-somewhat disagree-3) otherwise the info was easy to access and understand.
- Slides were great. Perfect amount of text, to the point, effective, informative.
- I think gray/white bars for results will make them easier to read.
- Possibly add horizontal lines into the results of graphs, or alternate row colors to make it easier to read/ follow along all the way to the right side of the results.
- Gray every other line, specify the scale is weighed average of results.
- Color changing the table lines - sometimes hard to follow.

TEAM B

- Provide an opportunity to print our individual responses before submitting so we can track our responses versus the team response.
- Add the definitions of the 3 areas.
- It was great. The colors are pleasant and graphs are easy to understand.
- add detail to header for reference provide personal results.

TEAM C

- Felt it was all easy to follow/read.
- Include range lines on the average bars; use median instead of average.
- Present results in order by score.
- I think they were good visually.
- None.
- I like the charts: easy to understand supply a benchmark for the graph in particular. Provide medians other than averages.
- Easy to understand/some comparisons to other groups would be helpful. How many teams score higher/lower than we did?

What suggestions do you have for how to improve the presentation of the Creative Synergy Scale?

TEAM A

- Really well done Amy- Can't think of anything right now.
- It was great- would have liked to spend more time, but I know we had time boundaries.
- More time! :) I think it was great - see above regarding slides, lots of helpful info delivered efficiently and clearly.
- I thought it was great. Handout with slides for participants to follow along/ take notes. Can be emailed ahead of time to individually print as well.
- I thought the presentation was good, Wish we had more time for discussion. Nice job :)
- Would be good to have a baseline for agreement with scale (eg. agree/ most of the time/80-90%).

TEAM B

- We did the "what" and "so what". It would be great to look at our top priorities and facilitate a discussion around "now what."
- None. Love the discussion where you engage us to draw what we saw first.
- Love the presentation. The questions to the group created great dialogue.
- All is good.

TEAM C

- I don't know. Hopefully we focus on the outliers instead of dismissing them as such, or we risk them becoming toxic.
- See above.
- Seemed pretty straight forward.
- Felt just a little being sold to at the end.
- Other than not being in person, you did great
- Sometimes it seems that "neutral" answer options do not provide the clearest results because it's the easy way to answer, but not provide the value hoping to achieve.
- I would love to see more context around the meaning of the results, and would like to see recommended actions be more specific and actionable for each of the three categories instead of explaining the high and low result maybe expand on insight the answers provide.
- Comparison how do we know our scores are good or bad- perhaps average score in our industry would be good to know.

Please provide any additional recommendations, ideas, or other comments on the back. Thank you!

TEAM A

- This was helpful- Thank you.
- Thank you so much for allowing us to participate!
- Great otherwise!
- Loved it! Thank you!

TEAM B

- Thanks Amy!

TEAM C

- Anonymity helped bring some problems to the surface that, if resolved, could make us stronger.
- I would like to see sample examples on the actual survey to help provide concrete and narrow the focus of the questions. I felt like the broadness of the questions introduced plenty of opportunity for respondent bias.
- Would like an overall comparison to other things.
- Something as simple as arranging the answers differently so it isn't so clearly a 1-6 scale
- I'm interested in how this would scale to larger teams. I think it would work a lot better when outlier responses aren't so individualized. I feel that in our meeting when we see 2 people "Disagree" we think it's "just" 2 people. But that's 10% of the team. So it's easy to get lost in large numbers vs small numbers and ensuring teams are not too quick to disregard outlier answers. Clearly, I am torn on how important outliers should be, but that's why I'm a web developer and you're the creativity expert. :)
- Could there be a way to show if one person was consistently low or high in their responses?

Appendix J: Copyright Permissions

Permission for Figure 1.1

Jay Lorsch
May 9, 2016

Amy,
You have my permission.
Jay Lorsch

Jay W. Lorsch
Morgan Hall 337
Harvard Business School
Soldiers Field Road
Boston, MA 02163

Permission for Figure 2.1

Michael Slocum
May 1, 2016

Amy

You have my permission as requested.

I look forward to reading your dissertation.

If you would like me to review it I would be happy to do that.

Regards,

Michael

Ellen Domb
May 1, 2016

Hi, Amy—yes you have my permission, too. And the TRIZ JOURNAL is now publishing again, and always needs new articles, so think of them when you have segments you can extract from the dissertation.

Ellen Domb

Permission for Figure 2.2

May 22, 2016
To: Amy Climer

Yes. Confirmed.

I'm so sorry that slipped between the cracks. I'm glad you wrote back!

Best,
Sarah

Sarah Thurber
Managing Partner
foursightonline.com

Permission for Figure 2.3

Van Morrill (Harvard Business Publishing)
May 9, 2016

Hello Amy,

Thank you for your message and interest in our publications. You have our permission to include the exhibit/image from a Harvard Business Review article in your dissertation, at no charge. We appreciate your checking with us.

Please let me know if you have any questions or need further assistance.

Van Morrill
HARVARD BUSINESS PUBLISHING
Customer Service & Permissions Department
20 Guest Street, Suite 700
Brighton, MA 02135

Appendix K: Transcript of Supplemental Video File

Hi, my name is Amy Climer and welcome to my dissertation *The Development of the Creative Synergy Scale*.

When I started this study, I was really looking at this question of why are some teams more creative than other teams. So, I went to the research literature, and I identified the variables that seem to have the greatest impact on team creativity. These all fell into a category that I call the internal-process variables: the variables that happen within the team once they start working together, their internal process. Of the variables in the literature, I discovered that three of them seem to have the greatest impact on creativity and innovation, specifically, team purpose, team dynamics, and team creative process. When these variables come together, a team has the potential to achieve creative synergy. Creative synergy is the where a team's collective creative results are greater than the sum of the individual efforts.

So then, I figured, what if a team could assess where they are at on those three variables so they can better achieve creative synergy. So I developed a scale to help them see where they are starting at, what are the gaps, and where can they improve. The scale started out as a 75-item survey that I sent to hundreds of people who are on teams. I took the results from the survey and ran them through exploratory factor analysis and confirmatory factor analysis. Those results got narrowed in to 29-item scale called the Creative Synergy Scale. That was the quantitative portion of the study. I then moved into a qualitative phase where I gave the Creative Synergy Scale to three teams from three different industries. I wanted to find out from them—what did they think? Did this scale seem to be an accurate representation of their team? The feedback from them and the results were pretty exciting.

You can read all about it in my dissertation. If you have any questions, feel free to reach out.

Thank you!

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